IMPACT OF FOREIGN EXCHANGE RATE MOVEMENTS ON COMPANY PROFITABILITY IN THE TOBACCO SECTOR.

A CASE STUDY OF THE BRITISH AMERICAN TOBACCO KENYA LIMITED.

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other university. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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30/10/2019 Date

This Research Project has been submitted for examination with my approval as the Supervisor.

Joseph Kimemia Kuria

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ABSTRACT

Any firm engaging in international trade is exposed to exchange rate risk, whether translation, transaction or economic risk. Knowing the impact or its extent can help firms evaluate potential positions they can take in the forex market to hedge their exposures. This study examines the impact of movements in exchange rates on profitability of firms in the tobacco industry in Kenya, specifically looking at a case of BAT Kenya. This study explores the impact on profitability by employing a VAR Model from the period of 1995 to 2018. Profitability is looked at in terms of three measures: Return on Equity (ROE), Return on Assets (ROA) and Return on Invested Capital (ROIC) and the main exchange rates incorporated in the study are the USD, Euro and the GBP. The main idea behind using a VAR Model was due to its characteristics of obtaining impulse responses which are highly beneficial for governments when formulating monetary policies that are also dependent on exchange rates. Findings of the study reveal statistical significance of the exchange rates, bit different for different exchange rates. Additionally, shocks in the exchange rates are highly likely to impact corporate profitability and therefore firms operating in international trade are likely to experience exchange rate exposure and therefore these results are highly beneficial for them. A major limitation of the study is the inadequacy of enough data points. Due to the dynamic macro environment that the exchange rates are exposed to, there is yet a great room for research considering the many major exchange rates that affect any firm's cash flows.

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LIST OF ABBREVIATIONS

BAT	British American Tobacco
KES	Kenyan Shillings
USD	United States Dollar
GBP	Great Britain Pound
EUR	Euro
IRP	Interest Rate Parity
FDI	Foreign Direct Investment
RMB	Renminbi
CIRP	Covered Interest Rate Parity
UCIRP	Uncovered Interest Rate Parity
PPP	Purchasing Power Parity
ROA	Return on Assets
ROE	Return on Equity
ROIC	Return on Invested Capital
EBIT	Earnings Before Interest and Tax
EMU	European Monetary Union
VAR	Vector Auto Regressive
GDP	Gross Domestic Product

CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Economics is a contemplation of how human beings behave, referred to as 'logical self-interest' (Flynn, 2008). This can be interpreted as an income and also a profit increase that makes someone be able to meet their requirements. All companies/institutions try to reach a particular profitability margin set target by production and/or delivery of goods and/or services. Most developed and developing economies have experienced elevated fluctuations in real exchange rate, essentially translating into a high percentage of precariousness in attaining crucial macro- monetary policy goals in economic growth (Ajao & Igbekoyi, 2013).

An exchange rate is the cost of a currency with respect to the other; expressing a quotation of an economy's own legal tender with respect to a foreign one. For instance, regarding a dollar and pound, it is considered to be the sum of dollars needed to invest in a pound. Hence, it can also be regarded as a transformation factor or a multiplier, hinged on the side of conversion. Thus the exchange rate can be said to be having two constituents; domestic currency being one and foreign currency being the other, indicated either actively or passively. In a precise/direct approximate, cost of a single foreign currency is indicated connecting the domestic one, whereas passive refers to payment local currency representation exhibited as the foreign one (Chirchir, Muse, & Jagongo, 2017).

The principal challenge with exchange rates is that the stable exchange rate is but a shadow: not perceptible. While exchange rate volatility concerns an economic state in which it the actual rate veers from such an imperceptible equilibrium, undervaluation occurs when the exchange rate deflates in excess of its equilibrium, and overvaluation, when it mounts over the stable value (Aliyu, 2008). An illustration of this is given as: The USD/KES exchange rate being Kshs 103/USD means that an investor needs to pay Kshs 103 in order to purchase 1 USD and should the rate in the next period be Kshs 102/USD, an investor needs a lesser number amount of Kenya shillings to purchase 1 USD. This means that the Kenyan shillings has increased in value/appreciated while if the rate increased above 103, the Kenyan shilling is said to have depreciated in value because more shillings will be required to purchase 1 USD.

Volatility in the rate is the threat analogous with its unpredicted fluctuations. Its stability is a very essential element shaping monetary rate of supply, FDIs, price security and steady economic growth. This can be elaborated from the aspect of predictions: a stable market symbolizes absence of information asymmetry and therefore users have access to all kinds of available information

and hence are able to make decisions likewise. If exchange rate movement was unrestricted, it may be proposed as the quickest moving price in the economy, in conjunction with all global commodities alongside. Exchange rates are a very critical factor affecting economies. Global companies and domestic companies are all concerned with exchange rate variations of their currency, which affects firm value through having an impact on company's asset price, financial structure, profit margins and also cash flows (Kiganda, 2014).

Exchange rate fluctuations can have a strong shock on the profitability of regional/domestic firms in various ways. Discrepancies in exchange rates causing adjustments in prices may either vary the conditions of competitiveness against overseas firms for local exporters and import adversaries, change prices of inputs using universally priced inputs or even firms that ship in for re-sale, or even change asset and/or liability value designated in a different currency (Mohammad, Morteza, & Nadia, 2010).

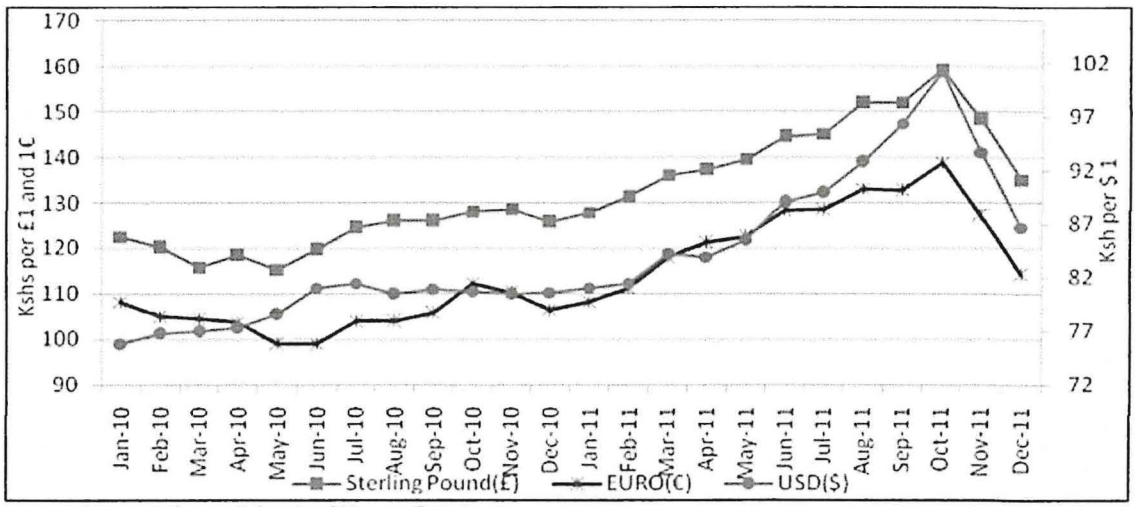
Foreign exchange rate volatility could affect potential firms in a myriad of business' models of operation. For instance, a firm could produce commodities and services locally for domestic sales as well as export sales. It could also produce using local and imported components of production. A firm could also produce identical products or different products at foreign plants (multinationals). As a result, analysis should be comprehensive enough to incorporate at least the above (Chirchir et al., 2017).

The manner in which firms are afflicted can be generally divided into economic and translation risk. Economic exposure can be seen as risks in which transitions in economic conditions negatively influence firm investments and/or operations. Unanticipated exchange rate changes affect firm market value (profitability) since the firm is not able to incorporate such unexpected changes hence the market value of the firm does not contemplate its true worth: an imbalance between implied and true firm value. Transaction exposure, highly faced by firms involved in imports and exports, arises when exchange rate changes upset future cash flows: gain or loss due to currency conversions. Operation exposure is related to a company's risk to exchange rate shifts which value of certain assets, hence affecting overall profitability. Translation risk measures exchange rate change impact on company financial statements. It arises when overseas financial accounts are centralized into the parent entity's statements (Kumar, 2014).

A huge proportion of foreign exchange effects are experienced on the transaction side. During supplier payments, it is this rate of exchange vulnerability that commits a huge change for any business. For instance, a contract of payment by a British dealer to a French one for a goods'

consignment in a time frame of six months, costing €50,000, will be influenced by every percentage alteration in EUR/GBP rate. At inception, a rate of 0.91 makes the total bill € 45,500 on the occasion that payment is made today. Nevertheless, if the rate falls by 2.5%, the rate would rise approximately beyond 0.93, hence an increase in payment to over €46,500: an additional payment of €1,000 (Hardy, 2017).

Moreover, holding capital in an array of currencies can be a huge responsibility. Creation or submission of financial documents, balance sheets can be subject to a high degree of revision if values of capital change due to foreign exchange rate variations. A financial credit undertaken in Chinese RMB will seem to be very distinct on a Euro-designated statement of financial position from one quarter to the next if the current markets are buoyant and fickle.



Source: Central Bank of Kenya Database

Figure 1: Average KES against major world currencies.

The above diagram relates to a period when the Kenyan shilling depreciated against the other major currencies, specifically during the year 2011. Profit before tax for the banking sector from December 2010 to 2011 improved by 20.5 per cent (Kshs. 74.3 billion to Kshs. 89.5 billion). However, the aforementioned was due to higher revenues from loan portfolio growth and product fees on exclusive innovations. In the capital markets, for the year 2011, 5 listed firms had issued profit alarms alluded to low income on investments, a resilient business setting, a weaker local currency (depreciated) and written-off bad debts. The weakening of the Kenyan currency leading to negative sentiments of the bearish market also contributed to the decrease in profits after tax. The market recorded an expansion in accumulated income from commissions, but its net effect was eroded as a result of an escalation in a combined cost to income ratio (CBK, 2011).

Kenya stages a great case for the purpose of investigating the relationship of exchange rate fluctuation. This is because in addition to being an emerging economy, it has a flexible rate system,

from which it aims not to veer away from howbeit its currency (Kenyan shillings) depreciation or appreciation (Rao, 2017).

BAT Kenya proves to be a good choice for this research due to some specific aspects. Having a share of 71.5% in the tobacco industry, it is a peripheral of the London based transnational British American Tobacco Group, being among the global dominant tobacco companies performing in a diversified and competitive market. They operate a vertically integrated business, involved in operations from tobacco leaf growth to finished tobacco products distribution and sale, having performance supported by sustainable practices.

Having only two firms in the tobacco industry in Kenya, BAT Kenya was chosen as the reference firm due its market share contribution. Recent research shows that the firm enjoys around 45 per cent of its earnings attributed to cigarettes and semi-processed (cut rag) tobacco exports. The Kenya National Bureau of Statistics (KNBS) indicates tobacco taking up a 7 per cent of GDP in the Kenyan economy (which is very significant), contributing to approximately Kshs 10.2 billion in tax earnings to the government according to Bath (2018); its relevance explained below under section 1.6.1.

Additionally, the CMA first quarter report for the year 2019 indicated BAT Kenya being one of the top 10 companies in Kenya in the order of market capitalization, equity turnover (at an average of Kshs. 62.28 billion and Kshs. 813.20 billion respectively as at Q1. 2019) and the top in average liquidity at an average of 4.66%, which means that it forms one of the critical firms in the economy (CMA, 2019). In the Euromonitor International newsletter (2018), BAT Kenya is presented as being the leading player in the tobacco sector through its local subsidiary in 2017. This was highly attributed to its concrete and strong portfolio combined with its brand heritage, which has been seen to have developed through its long term presence in Kenyan tobacco sales and therefore a driver to its explicit value.

He, Fayman and Casey (2014) conducted an analysis on impact of foreign currency variations and profitability of banks over a 40-year period and suggested that given its international disposition, large US banks are more vulnerable to such exchange risks. Huge institutions being more sensitive to foreign exchange hazards show a tendency to be more endangered to exchange rate risks compared to smaller firms as a result of a varied scale of activities in relation to foreign currencies.

According to a research conducted last month by Anyango (2019), BAT Kenya currently holds an approximate 71.5 per cent of the market share in Kenya, exporting from the Kenyan focal point to

17 other countries. Mastermind on the other hand controls 15.9 per cent of the market share and the rest being imports. Additionally, the Kenya Revenue Authority ranks BAT Kenya as one of the top 25 corporate taxpayers (Bath, 2018). According to BAT Kenya's annual reports, the firm is susceptible to foreign exchange risk primarily from USD, British Pound and Euro currency exposures. As a result, examining the footprint of these exchange rates on BAT Kenya's profitability will incorporate these three main currencies. Measuring profitability will be done through three ratios: Return on Assets, Return on Equity and Return on Invested Capital.

1.1.1. MEASURES OF PROFITABILITY

Company profitability can be looked at from various aspects of ratios. Return on Invested Capital (ROIC) deals with firm management's ability to promote and sustain shareholder value. It seeks to gauge the yield/return earned on invested capital. This is obtained by dividing net after tax operating profits by invested capital book value (comprising of all interest bearing debt, or rather fixed assets additional to current assets minus current liabilities and cash) (Damilano, Miglietta, Battisti, & Creta, 2018). A higher ROIC is more valuable than a lower one as it means that management is able to employ the obtained capital efficiently and in profitable ventures. According to the Q1 report of Bryant and Hamill (2015) ROIC serves as a valuable screening tool due to an ease of comparability facilitation across companies in the industry due to the standardisation of the invested capital, meaning that it is firm independent and can be adopted to match across different industry corporates.

ROA is another ratio which is a widely reported accounting measure of return and is obtained by getting net income per unit of total assets' book value. Despite this ratio not excluding financial assets, it is an effective measure since it gives a holistic view of how the firm is performing and also because it is less vulnerable to short term gaming which can occur on income statements as many assets such as property and intangibles involve long term decisions that are more difficult to tamper with in the short term (Hagel et al., 2013). A higher ROA is recommended than a lower one since it refers to assets being able to generate more returns/income without adding assets: the assets held by the venture are able to generate a high level of return (Mubin, Iqbal, & Hussain, 2014).

ROE as a test of the company's earnings performance is very key, referring to income produced on equity capital, determined by getting net income per unit shareholder equity book value. This ratio relates to residual earnings for equity investors after the debt service costs have been catered for. This ratio informs shareholders of the efficiency of their investment. The greater the

company's ROE, the more superior the management, regarding employment of shareholders' capital for profit generation. ROE rising signals a growth in profits beyond addition of new equity in the firm, which waters down ownership of current shareholders (Kijewska, 2016).

1.2. MOTIVATION OF THE STUDY

Exchange rate fluctuations has allured public awareness primarily from importers who argue that strengthening the domestic currency is eroding competitiveness. The need for studying the influence of volatility of exchange rate on company achievement is important for the economy as it affects economic growth as well through aggregates of income (national income). For a country which is export and/or import dependent, exchange rate stability is important for credit allocation. Even though exploration has been done on systems of exchange rate and macroeconomic management implications and also those for foreign risk management on economic growth, concrete results have not been achieved on investigation of companies' vulnerability to exchange rate risk regarding the Kenyan tobacco industry (Kiganda, 2014).

The tobacco industry throughout the world is growing larger and larger and more focusing on emerging economies. Developing economies provide a clear scope of expansion for market growth and hence the concentration of tobacco firms to take advantage of such factors (Dash & Yadav, 2014). Companies such as BAT Kenya are also urged to know about currencies and how they operate for the purposes of generating high profits and also for avoiding unexpected losses. This investigation is conducted so as to follow and understand how these exchange rates function and prove that their fluctuations actually have a substantial effect on tobacco firms.

1.3. PROBLEM STATEMENT

Silvente and Walker (2019) conducted international studies in the UK car market which showed a positive link between variations in the exchange rate and value modifications of shipped in cars (due to price competitiveness). Okika, Udeh and Greg (2018) on the other hand found no statistical consequence of exchange rate fluctuations on profitability measures of chosen listed Nigerian conglomerates. They argue that these fluctuations have no notable influence on ROCE and ROA of conglomerates in Nigeria.

An analysis done on the BAT Kenya showed that its finance costs declined by 45%, greatly due to lower foreign exchange related losses and interest expense attributed to a stable rate. Regarding a movement in the reverse direction of the foreign exchange rate, would this translate as an equal and opposite impact on its losses? BAT Kenya gets its long-term funding from BATIF and short-

term through local bank overdrafts. The loan from BATIF is a US denominated floating rate and therefore greatly sensitized to variations in the US/KES exchange rate (Apex, 2017).

Analysis of the BAT financials showed that the USD/KES, GBP/KES and Euro/KES rates reduced by 1.26%, 6.78%, 5.76% respectively during the period 2017/2018. The loss from this nearly offset the achieved gross revenue increase which was 6%. Considering that stable exchange rates are but a shadow, profitability for BAT Kenya is also alongside unpredictable due to its exposure to its main foreign currencies. Additionally, a significant proportion of the company's assets and liabilities are denominated in foreign currencies (See Appendix 3) and therefore any loss accruing from translation to its presentation currency (Kshs) is heightened.

Foreign exchange rate variations in Kenya have faced conditions of swift devaluation of the Kenyan shilling, adversely affecting corporate profitability of Kenyan firms. Emerging markets such as the Kenyan market borrow massively in foreign currency specifically the USD, which has an aftermath of low current account balances and macroeconomic externalities in the economy (Korinek, 2010).

Developing countries, especially the African countries have since the last decade experienced a continuous increase in the use of tobacco, most noticeable within the young generation (African Union, 2014). There is a growing factor of tobacco use in Kenya; relatively more by males compared to females. Generally, around 19% of Kenyan males aged 15-49 years use tobacco products, with women taking up less than 2% (KNBS, 2010). Looking further into the prevalence of use of tobacco products such as cigarettes, there has been an increase from 6.6% in 2001 to 8.9% in 2007 to around 58.1% in 2012. Kenyan students have taken up such products on a high level, cigarettes being the second most used drug among such students. Tobacco leads to around four million deaths annually, and this figure is projected to increase to 1.6 million by 2025 (NCPD, 2017).

A scope for expansion for the tobacco firms is evident in the Kenyan economy and therefore this study is highly significant for this purpose. Having a ready market for its products, BAT Kenya is at most assured of reaping huge profits from increased revenues due to evidence of a persistent increase in usage of such products. However, does this mean that BAT Kenya will enjoy huge profits at the expense of civilians?

1.4. RESEARCH OBJECTIVE

To study the effects of exchange rate fluctuations on profitability of BAT Kenya.

1.5. RESEARCH QUESTION

Does foreign exchange rate admit any significance on the profit margins of companies?

1.6. SIGNIFICANCE OF THE STUDY

This investigation is conducted to assess the tie linking foreign exchange rates and profitability of Kenyan tobacco industry firms. This research is likely to benefit a number of stakeholders that hold an interest in the outcome of this exercise in various aspects.

1.6.1. Government

The government will highly benefit from this research as it deals with economy exposure to a dynamic environment. Foreign currency evolution having a huge impact on firm profitability can be seen to be a very crucial concept as aggregate profitability of various firm in the whole country dictate the growth levels of the whole economy in accumulation. The government will be able to undertake certain policies regarding the foreign exchange market and also come up with potential strategies that are able to curb such exposures during specific times of economic strain.

Additionally, the government is able to formulate particular restrictive policies with regards to tightening the firm and/or industry risk management framework that is probable to affect the whole economy. A research conducted on the effect of banking industry profitability in Nigeria on economic development from 2005 to 2014 concluded that increasing percentage of banks' profitability will remarkably adjust the country's GDP. Using the F statistic, the study showed that there is an unfavourable consequential relationship amidst banks' profitability and Nigeria's GDP (Adekola, 2016).

However, Klein and Weill (2018) provides an extension to the above: past level of profitability exerts an inverse impact on economic growth hence a lack of significance for comprehensive bank profitability. Therefore, the forward-looking effect of profitability on economic development is short-lived. This helps the Central Bank take the necessary measures to ensure a sustainable growth in an economy.

1.6.2. Firms

Tobacco firms will be aware of the height of effect likely posed by the external environment (the rate of USD movement) on their profitability, especially those firms hugely dealing with exports to and inputs from the dynamic extraneous environment. As a result, they can take various decisions related to their operations effectively, bearing in mind the result of this research study. Some of the decisions involved could be whether to increase or decrease the proportion of exports

from the product portfolio or even whether or not to make a change in import volume as inputs for productions to have the optimal mix of portfolio of products' market.

Not only limited to the tobacco firms, any such organisation operating in the forex market is highly exposed to exchange rate fluctuations and therefore highly prone to either translation, transaction and even economic exposure. They can make use of this research and having knowledge on the impact of such exposure will enable firms to take appropriate measure in attempting to hedge their potential exposure in the ever dynamic international business environment.

1.6.3. Financial analysts and investors

These benefit from the knowledge on patterns and movements of foreign exchange rates, which in turn help them make decisions related to various aspects such as forecasts and predictability of future exchange rate behaviour, which successively help them offer useful advice to their clients.

Investors, both local and international, are able to get helpful perceptions enabling them specifying certain trends in exchange rate volatility, which enables them make certain logical deals. They are advantaged in getting beneficial information regarding risk management and profit margins of the firms and also its value, essential in providing an insight in evaluating the most profitable firms to invest their stake in. Foreign investors are able to determine the percentage of stake to invest in global firms such as BAT Kenya based on its exposure to the unstable foreign exchange rates.

CHAPTER 2: LITERATURE REVIEW

2.0. INTRODUCTION

An outline of what financial and economic analysts have described with regards to movements in exchange rate and firm profitability has been provided in this section. Studies on exchange rate volatility impact on corporate profitability, theories on exchange rate shifts and also foreign exchange rate determinants are portrayed. Lastly, conceptual framework explaining how determinants of foreign rate affects firm profitability is also discussed.

2.1. FOREIGN EXCHANGE RATES AND PROFITABILITY

Foreign exchange rates are broadly systemized as fixed and flexible exchange rates in their respective exchange rate systems. However, regarding their degree of resilience, exchange rates can be grouped into three classes. First is the fixed rate system in which the rate(s) are decided upon by the government and involves currency unions or dollarized regimes. The second category is the intermediate systems which is a mix of both flexible and fixed rate systems and include crawling pegs. Third is a flexible one, involving the exchange rates being determined by the forces of market demand and supply and involve managed floats: it is not determined by any regulatory body (Ahmad, Binti, & Fadli, 2011).

The idea that each economy should control its own macro economy, rather than pegging to a worldwide standard, led to the exchange rate being flexible to support implementation of country specific objectives. The Bretton Woods hooked exchange rate system collapse (1970s) was an additional factor to the rise of the floating rate regime, under which it is unpredictable. The Bretton Woods system was a fixed exchange rate system in which each currency was valued in terms of gold and therefore their values with respect to each other was also fixed. However, the U.S. often experienced balance-of-trade deficits, which indicated that the dollar might have been overvalued, since the use of dollars exceeded the demand by foreign countries for goods denominated in dollars. As a result, it collapsed and the Smithsonian Agreement was formulated on December 1971 which called for a devaluation of the U.S. dollar by around 8 percent against the other currencies (Burange & Ranadive, 2011).

Volatility of the rate affects a company's cash flow hence eventually its profit (Mbithi, 2013). Nagahisarchoghaei, Nagahi and Soleimani (2018) realised an obvious inverse relationship of firm performance indexes such as profitability (EBIT) to changes in imports and foreign currency borrowings. Sarchoghaei, Nagahi and Madhumathi (2016) reported the effect of the rates volatility

on profitability via various ways such as cost of imported inputs compared to other factors of production, exports' prices and found the same relationship.

The linkage of foreign exchange exposure with value (profitability), despite being weak based on empirical evidence in developed countries, is well predicted by theory. Conversely, the scenario is different in developing countries (Ruhomaun, Saeedi, & Nagavhi, 2019). For instance, research conducted by Runo (2009) among Kenyan firms revealed that firm performance, proxied by profitability, is positively and significantly afflicted by exchange rate adjustments.

Furthermore, another research conducted by Inyiama and Caroline (2014) extended it to cater for a long run aspect; indicators of firm performance such as earnings per share and also price earnings ratio are adversely and not so greatly associated with exchange rates for the Nigerian beer industry. A significant and negative impact is also concluded in a study made on fluctuations of foreign exchange rates effects on ROA, asset turn ratio, portfolio activity and resilience among the listed companies (Kelilume, 2016).

A report by CPA Australia (2009) states that a falling domestic exchange rate heightens importers' expenditure, potentially narrowing profit margins, whereas it increases net gains for exporters as they turn to enjoy cost advantages which help them boost their market share due to a deepening of the target market. This shows that the link of foreign rates towards profitability is dependent on the identity (character) of the institution being referred to. Despite that, if the firm is both an export and import oriented firm, then more exploration needs to be undertaken to determine the balance between the two.

2.2. THEORETICAL FRAMEWORK

Theoretical literature review helps establish theories already in existence, the relationships between the various theories, the degree that the existing theories have been explored, and formulation of new hypotheses to be tested. There are various theories with regards to foreign exchange rates, majorly focusing on theories of purchasing power parity, interest rate and that of International Fisher Effect.

2.2.1. Theory of Purchasing Power Parity (PPP) and Foreign Exchange Rates

This theory was established by Professor Gustav Cassel in 1916 based on LOP (law of one price), which entails prices in two countries of commodities and services of similar qualities being the same when stated in unit terms of the same currency. Under PPP theory, the exchange rates between any pair of countries should adjust over time with respect to the changes in corresponding

levels of prices. The theory encompasses three divisions under PPP: absolute, relative and ex ante PPP.

The absolute type of equilibrium entails the foreign exchange rate between two countries being obtained majorly by national price levels. A single market consists of both domestic and foreign market. The balance of international payments and money markets are not considered in this form of PPP hence partial equilibrium theory is demonstrated: this theory is not relevant with respect to non-tradable goods. This theory, by Menuka (2016) can be expressed as:

$$\frac{Product\ price\ in\ country\ X}{Product\ price\ in\ country\ Y} = \frac{Currency\ of\ country\ X}{Currency\ of\ country\ Y}$$

The next form being relative PPP acknowledges existence of imperfections in the market and that the prices of similar goods could have different prices, being stated in the same currency. the percentage change in actual spot rates for two pair countries is entirely determined by differences between currencies' actual inflation rates. This can be demonstrated as:

$$P_1 = P_0\,(1 + I)$$

In country X: $P_{X1} = P_{X0}\,(1 + I_X)$

In country Y: $P_{Y1} = P_{Y0}\,(1 + I_Y)$

The ratio of the prices one year later is: $\frac{P_{X0}\,(1+IX)]}{P_{Y0}\,(1+IY)}$ which can be written as

$\frac{S_{X/Y}\,(1+IX)]}{(1+IY)}$ where $S_{X/Y}$ is the current spot rate.

Since the expected exchange rate one year later, $E(S_{X/Y})$ is a ratio of prices one year later,

$$E(S_{X/Y}) = S_{X/Y}\,[(1 + I_X) + (1 + I_Y)]$$

The last form involves percentage change in spot rates being determined by anticipated differences in national rates of inflation. States anticipated to be receptive to relentlessly high rates inflation should expect a currency depreciation over time (Mishkin, 2012).

The exchange rate that equalizes globally traded commodities' prices across countries is what we refer to as the PPP exchange rate. These PPP (foreign) exchange rates are adopted for global GDP and other economic statistics comparison. Using this rate gives a credible comparison due to its

stability as they stay fairly constant rather than the market exchange rates which tends to have short run rises and falls. The second function is that exchange rates regularly get closer and closer with each passing time. Apart from the long run, as these rates calibrate to relative rates of return, the rate will often deviate away from the PPP exchange rate for a time. However, knowing the PPP allows one to track and predict exchange rate relationships (Mankiw, 2017).

Keynes, however, critiqued this model in the sense that the theory does not take into account influences of capital movements. According to Keynes, foreign exchange rates are dictated by capital movements (elasticity of reciprocal demand) and also other forces affecting foreign exchange demand and supply besides price movements. Elasticity of reciprocal demand can be seen as the responsiveness of a country's demand for another's exports with respect to price or income (Mukher, 2016).

2.2.2. Theory of Interest Parity Rate and Foreign Exchange Rates

This theory was founded by John Maynard Keynes in 1930, also covering the law of one price. This law applies to commodities and services under the PPP, but in the securities market, it applies under the interest rate parity (IRP). This theory is constituted by two components: covered interest rate parity (CIRP) and uncovered interest rate parity (UCIRP).

Under CIRP, a riskless arbitrage bond exists if the overseas market financing instrument is absolutely hedged against the risks of exchange rate and the same return should be obtained from the domestic currency money market investment instrument. UCIRP, nonetheless, necessitates expected return on the unhedged foreign currency investment instrument to be equivalent to comparable return to the local currency investment currency. Unhedged interest rate parity conditions hold for uncertain information.

The interest rate parity relationship demonstrates the effective gain on a foreign transaction framework. Effective return of an investment in currencies is comprised of an interest rate return and an exchange rate return. Even if we go outside the forward market which incorporates the exchange rates, the effective return would be composed of two components: the interest rate return and the anticipated change in the rate, bearing in mind the expected spot rate in the future. For example, UK investors investing in UK bonds would lead to an expected return comprised of the return on the UK investment plus the expected change in the value of the UK currency (Melvin & Norrbin, 2017).

Mathematically, the forward exchange rate for two currencies $F_{X/Y}$ is determined by current spot rate $S_{X/Y}$ and nominal interest rates i_X and i_Y :

$$F_{X/Y} = S_{X/Y}\,[(1 + i_X) + (1 + i_Y)]$$

2.2.3. Theory of International Fisher Effect and Foreign Exchange Rates

This theory was developed by Irving Fisher, who was an American economist. This theorem specifies that nominal interest rates incorporates a premium for expectations of real interest rates and inflation. There exists a link between interest rate differentials and consequent changes in the spot exchange rates in the long term. Considerable deviations nevertheless exist in the short term due to a series of various factors causing exchange rate fluctuations; demand and supply forces of exchange rates, balance of payment issues, increasing inflation and interest rates, monetary policies, speculations and also expectations.

There was substantial deviation in the association of differential of inflation rate and exchange rate (Jorion, 1991). However, there was an initiation of the relationship being flawed in the long run. According to Fisher (1930), the link between inflation and interest rate, such that nominal interest rate for a particular period, should complement the bulk of the real interest rate along with expected inflation rate, is what is described as the Fisher Effect. He claimed that a direct relationship in a perfect world, such that real interest rates are irrelevant to anticipated rates of inflation are entirely dependent on the economy's actual dynamics.

A research conducted by Andrea and Rodrigo (2015) dwelt on describing the theory of the International Fisher Effect and testing it empirical validity for anticipating exchange rate changes in Mexico. Its core objective was built on whether nominal interest differentials might be used to forecast currency changes, especially the Mexican-US exchange rate. Its results revealed that the exchange rate is conveyed in approximately 59% of the interest rate. Technically, market should act in a way that forward rates increase or decrease until it reaches at par with the expected spot rates (Menuka, 2016).

2.3. EMPIRICAL LITERATURE REVIEW

Managing exchange rate research is still a scope of interest to economists and finance experts, especially in developing countries, despite a relatively huge body of literature in this area. This is largely due to the rate not only being a key relative pay of one currency in terms of another that connects domestic and world markets for goods and assets, but it also indicates the competitive edge of an economy's exchange power with the rest in a global market (Ajao & Igbekoyi, 2013). Exchange rate portrays a huge character in dictating performance of companies due to its direct impact on various aspects such as domestic selling price level, profitability, resource allocation and also to an extent specifying companies' investment decisions (Okika et al., 2018).

Contemporary pecuniary matters and economics are concerned about the consequences of exchange rate variations on cash flows and returns of corporations. Foreign rates assist in bridging the local earnings-generation gap in an emerging economy, given that most of their governments look incapacitated to produce sufficient revenue for catering for their expenses. Exchange rate volatility usually deters industries or rather consumers from engaging in international trade and compromises progress in trade negotiations (He et al., 2014).

Inceptive empirical studies principally showed almost no impact of currency value on profit margins of companies such as (Jorion, 1990). Nevertheless, later research provided mixed results, for instance, the research by Dominguez and Tesar (2006) tested many publicly listed companies from eight industrialized and emerging markets. Results showed that exchange rate movements are material for a symbolic share of exposures, through which they are affected and the direction of exposure depends on the specific exchange rate, varying over time. This suggested that firms dynamically alter their behaviours in the retaliation to exchange rate risk.

Movements in these rates is a huge concern for shareholders, analysts, managers and even investors since the nullification of the Bretton Woods fixed exchange rate system in 1971. This structure was recouped by a foreign rates system in which the price of currencies is dictated by demand and supply of money. Given the frequent changes of supply and demand influenced by numerous external factors, this new system is responsible for currency fluctuations (Perry & Grier, 2010).

Responding to the Bretton Woods exchange rate system crash, the IMF formulated the 'Committee of Twenty', suggesting varied preferences for the exchange rate arrangement. These were accepted at Jamaica on February 1976 and formally inducted into the text of the Second Amendment to the Articles of Association, coming into action from April 1978. The options were chiefly: floating-independent and managed, currency pegging, crawling peg, target zone arrangement and others.

Two currencies' exchange rates in a flexible exchange rate system is majorly settled upon by the demand and supply market forces. Floating system advocates put forward two main arguments. First, exchange rate varies naturally according to macroeconomic variable changes. Consequently, there is an absence of break between real exchange rate and nominal exchange rate. That economy does not need any adjustment, which is usually necessary in a fixed exchange rate regime so it does not have to undertake the cost of alteration. The other argument is that this system possesses properties of insulation, meaning currency remains isolated from the shocks originating from other

countries due to the aspect of equilibrium being achieved not by a pre-set body, but rather by dynamic market forces hence insulated from external shocks.

Secondly, for the currency peg, a developing currency has its currency pegged to a strong currency or one which constitutes a huge part of its trade. Pegging to a currency basket is considered for a country with diversified trade. Thirdly, for a crawling peg, the peg is allowed to change gradually with time to catch up with variations in market determined rates. It is a hybrid of fixed and flexible rate systems; the currency being fixed systematically in small volumes at a pre announced, fixed rate.

Fourthly, in a target zone arrangement, the intra-zone exchange rates are usually fixed; a relevant illustration of such a hypothesis was found in the European Monetary Union (EMU) before the Euro launch. Some other practices involve currency board arrangements and dollarization where the former involves a monetary regime to exchange the home currency for a defined foreign currency at a fixed rate and the latter involves adoption of USD as the representative currency.

In line with the exchange rate's General Equilibrium Theory, a country's exchange rate is dependent on the demand for and supply of foreign exchange. Considering the demand for the currency is higher than the supply, the cost for the foreign currency will escalate and a lower demand leading to a cutback in the foreign currency's price (Zhao & Zhijun, 2006). The foreign exchange demand and supply arises from the balance of payments' debit and credit components respectively. Rising interest rate fluctuation is seen to manifest economically and statistically significant profitability, growth, and also to some extent, trade decreasing effects (Hameed, Kang, & Viswanathan, 2010).

Simakova (2016) states that foreign exchange exposure is stated as the gradient resulting from an association of changes in the exchange rate and returns. This exposure can either be negative, positive or zero if there is no correlation. Correlation gauges the strength of linear relationship of one variable with another, coefficient measured on a scale from -1 through 0 to +1, with no units. Having a positive sign means the existence of a positive link and a negative being the existence of an adverse relationship. A positive correlation refers to a common movement meaning that a boost in one variable leads to a similar boost in the other, while for the latter, there exists an inverse movement of one variable due to a movement in the other. Having zero correlation means that there is no association between the variables under study such that a change in one variable has no effect on the other variable (Sedgwick, 2012).

Past studies have pursued demonstrating a connection between foreign exchange migration and financial performance and/or firm value. Grouping firms by specific characteristics, notably country, industry and firm size was used, and a regression model of panel data on various Visegrad countries revealed an unfavourable connection between migrations of exchange rate and value of a firm (Simakova, 2016).

In the research conducted by Dash and Yadav (2014), their results indicated a negative impact of foreign exchange exposure on profitability of small- and medium-cap IT (information technology) firms, with a positive impact on large-cap IT firms. Consequently, a downward movement in foreign exchange rate would be advantageous to small- and mid-cap enterprises, but would adversely affect large-cap firms, and contrariwise. This relationship impact is very crucial in the formulation of various firm-specific policies that have a huge deterministic effect on its rate of profitability, such as the proportion of inputs to be obtained from foreign sources or the share of output to be sold internationally.

Despite regimes of and the backlash for management of macroeconomic variables and foreign exchange rate risks, there are still some raised questions that need answers (Abor, 2009). Some similar studies conducted in Kenya entail regressions of exchange rate determinants on profitability of firms rather than having the rate itself as an independent variable affecting the level of firm profitability to look at the effects of movements in the USD on corporate profitability of companies' on the NSE.

An investigation of consequence of select macroeconomic variables on performance of listed commercial banks in Kenya involved adopting a panel regression model of exchange rate and other variables on profitability. Results indicated a powerful influence on the banks' profits, having a positive beta coefficient (Gikombo & Doris, 2018). However, these contradicted with another research that revealed that macroeconomic elements admit a trivial impact on profitability (Kiganda, 2014).

Exchange rate volatility inversely affects profitability through productivity growth, and having access to foreign or domestic equity or debt markets does not reduce such effects. Additionally, foreign or publicly traded companies does not seem to outperform others in an outstanding manner. While export-oriented firms react positively to currency appreciations, they are usually threatened more from volatility. According to the effects of growth rate in exchange rates, uncertainty will depend highly on firm and geographic characteristics (Mankiw, 2017).

Essentially, in the existence of financial pressure, firms which have access to domestic and/or foreign capital markets can actually deal with any unanticipated shocks in the exchange rate better than others. Similarly, export inclination level, leverage, import dependence, profitability and productivity too, also direct the nature of response of a firm to exchange rate shocks. According to economy-specific elements, currency crunches are more feasible to have deflationary effects in emerging markets than in developed countries.

A main finding is that exchange rate changes and fluctuations affect performance through changes and fluctuations imports and also forex liability sector but the impact is more realised for firms having smaller market power muscle. The results hold true for various alternative measures of performance such as profitability, internal growth, and also price to earnings.

Exchange rate appreciation benefits enterprises with higher dependence on imported inputs through a reduced variable cost, having a threat to those with a heightened dependence on exports through a lower price competitive edge (Koutmos & Martin, 2003). On the other hand, Jorion (1990) found that companies with a huge degree of export dealings unveil a more positive exchange rate exposure in the case of USA.

Additionally, Bodnar and Wong (2003) stated that small firms are more exposed to currency value development than large companies. However, exposure increases as firm scale increases due to enlarged international activities, but it is also more likely to be able to hedge itself than smaller firms; hedging often used by companies with reasonable opportunities for advancements (Nance & Smith, 1993). Cutting exchange rate exposures can be obtained by the introduction of derivatives (Nguyen & Faff, 2003).

Many existing studies talk about the relationship between exchange rate and firm profitability in theoretical discussions, such as Baggs, Beaulieu and Fung (2009). Various concepts back up the counter-intuitive fact that exchange rate appreciation increases firm profitability. Currency devaluation does not certainly boost a country's exports such as that of Singapore, whose exchange rate risk obstructs the country's exports (Fang & Miller, 2007). A reason is that Singapore's exports depend massively on imported intermediate goods.

An instance of the Renminbi (RMB) appreciation proves that there are three possible channels. First and foremost is productivity enhancement. Firms with higher productivity levels have a higher scope for high profitability. If the currency appreciation forces enterprises to improve on productivity, firm profitability in general will also increase. However, there is no rich evidence to support this hypothesis. The second medium is costs of imported transitional goods. As RMB

appreciation lowers the cost of imported intermediate goods, this may lead to profitability improvement. Lastly is export structure upgrading. RMB appreciation hinder Chinese exports from implementing low-price strategies, highly likely to push them to upgrade the technology level of their exported goods (Zhang & Ouyang, 2017).

When the RMB increases in value, corporates tend to extensively lower the export percentage of low-technology goods, increasing that of medium and high-technology goods. The notable boost of the architecture of exports within the firm increase profitability of the company. There are controversies that currency appreciation depresses firm exports and challenges the economy, and on the other hand, home currency appreciation enhances firm profitability through pushing them to reform their technology. Hence, it wasn't found that RMB appreciation is calamitous for exporters (Auer & Chaney, 2009). Current findings are less than compelling on the link between exchange rate and export value.

Linking exchange rate and imports, existing literature reveals an almost-consistent discovery that home currency appreciation lowers import costs such as Frenkel and Taylor (2009), but elasticity of import prices with respect to changes in the exchange rate is dictated by the industry framework of a firm's imports and the structure of intercontinental production designs (Marazzi & Sheets, 2007). Aggregation of absolute price elasticities of imports and exports must exceed one for any currency weakening to have a good comeback for any firm. Typically, if exports are price inelastic, then this guarantees a high profit margin as quantity demanded would not have a drastic change compared to if they were price elastic. Similarly, if foreign inputs are price inelastic, domestic firms do not have the incentive to purchase, but have no choice to do so and hence deal with heightened total costs hence a reduced profit margin (Sastre, 2015).

Shifts in the rates affect trade intensity, meaning that the export structure is also likely influenced. Research using industry-level data for Mexico reveals that depreciation of the Mexican peso in mid-1990s leads to quality enhancement of exports (Verhoogen, 2008). Some company-level examinations show that a reduction of value in the home currency cause exporters to embrace higher skill-intensive technologies (Alvarez & Lopez, 2009). Contrastingly, by developing a quality pricing model, other studies claim that prices of low-quality goods are more sensitive to exchange rate shocks than high quality goods' prices, hence exports shift in line of superior-quality commodities during a home currency appreciation (Auer & Chaney, 2009).

Some research finds that the movement in exchange rates is not a very key factor affecting profitability such as that conducted by Dominguez and Tesar (2006), but other studies makes clear

on some U.S. exporters heightening their profit margins as the dollar appreciated (Silvente & Walker, 2019).

Most of the studies are based on a quantitative approach and usually have employed the most popular regression analysis to capture relationships among various variables. However, coefficient estimation has seen a variety of methods. For instance, Inyiama and Caroline (2014) used linear regression as the simplest model. Shukeri, Shin and Shaari (2012), Ismail and Subramaniam (2017) on the other hand, included more than one independent variable; a multiple regression model. Other studies employed regression analysis but further used estimation techniques like ordinary least squares and weighted least squares in order to determine parameter estimates (Kimathi, Galo, & Melissa, 2015).

A different study used the probit model due to its appropriateness in analysis of binary response study (Kwong, 2016). Odalo (2016) chose a panel data model for multiple variable measurements at systematic intervals over a specific time frame.

2.4. CONCEPTUAL FRAMEWORK

Presence of a negative association was assumed between foreign exchange rate volatility and level of profitability for a firm. Gains in foreign exchange translates to a reduction in loss due to volatility of foreign exchange and therefore a cushion for profit levels.

Generally, we take a different approach in the sense that absolute values of the exchange rates are not used but rather the change in the values are used. This is so as to determine the effect of the change between a period and the next rather than the effect of the exchange rates in level form. These fluctuations can also be referred to as the exchange rate return based on the incremental or decremental aspects in the next period. Returns technically are obtained by dividing payoff by its price and seeing that the payoff from any exchange rate is the gain/loss in value from one period to the other. As a result, the return for a particular foreign exchange rate can be obtained by:

$$r_t = \frac{P_{t+1} - P_t}{P_t}$$ Where: r_t refers to the return in period t

P_{t+1} refers to the price in period t+1

P_t refers to the price in period t

Models incorporating returns are frequently preferred to those making use of prices as they pose less severe econometric complications than price models (S. Kothari & Zimmerman, 1995). As a result, it would be sufficient to incorporate returns obtained from the exchange rates rather than

use them at level form. This is supported by a research conducted on economic exposure to exchange rates in Jordan companies which incorporated rates of return rather than prices to model vulnerability of the individual firm performance and also the economy as a whole (Manhal & Muhannad, 2009). However, both price and return models can be useful for research purposes as return models lead to estimation of parameters that are less biased (S. Kothari & Zimmerman, 1995).

The same procedure is conducted for USD, British Pound and the Euro. Thereafter, these are then incorporated into the model to be regressed with the measures of profitability so as to examine the type of connection between the variables.

A firm's presentation currency can be different than its presentation currency. presentation currency refers to the currency in which the financial statements are presented. Functional currency on the other hand is that in which an entity's business transactions are denominated (Deloitte, 2019). BAT Kenya's financials involve a different presentation currency from its functional currency. The company's presentation currency is the Kenya Shillings whereas the functional is represented by the currency of the primary economic environment in which the entity operates.

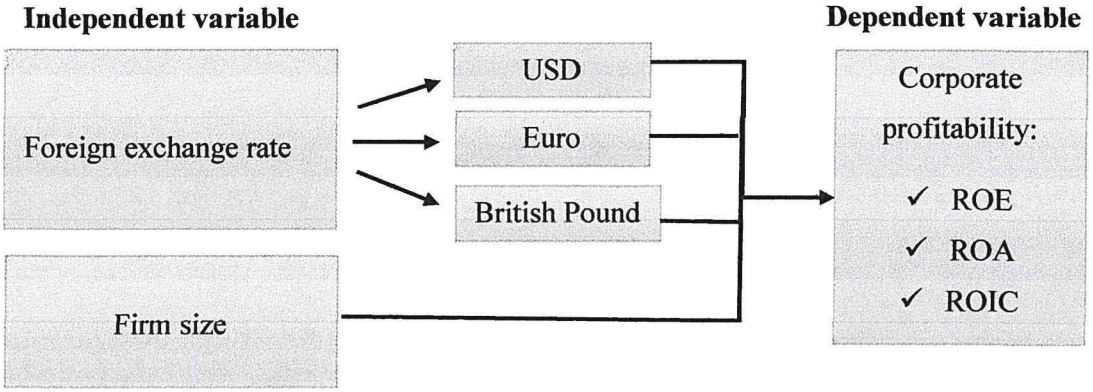


Figure 2: Conceptual Model.

2.5.GAPS IN LITERATURE

There has been a recommendation for additional analysis regarding the effects of foreign exchange vulnerability on local firms (Aggarwal & Harper, 2010). Existing research relating to foreign exchange rate vulnerability of local companies use standard measurements/techniques that cannot fully answer the research in question. Literature states that models used for determining the relationship have either used the exchange rates in price form or even have used just one currency rather than using the currencies that stimulate the foreign exchange rate exposure.

Silvente and Walker (2019) did a study on investigating the impact of exchange rate fluctuations by a candid appraisal of the repercussion on profit margins of exchange rate changes in the UK car market. Their research concluded a positive association between the rates and profits for imported cars, such that when domestic currency appreciates, local firms' mark-ups also increase due to price competitiveness in relation to other competitors. Particular research talk about the negative interrelation between exports and domestic currency such as Bernard (2008) appreciation at firm level (Cheung & Sengupta, 2013). Incorporating industry level data across more than 100 countries, countries experiencing home currency depreciation have higher rates of growth for productivity (Rodrik, 2013).

Okika, Udeh and Greg (2018) found no statistical impact on profit levels and hence the incitement to determine whether this applied to all measures of profitability or just to specific ones. The research was conducted based on selected quoted conglomerates in Nigeria. They argue that fluctuations have no notable effect on two profitability measures: ROCE and ROA of conglomerates in Nigeria.

Does incorporation of exchange rates directly have a different impact than incorporating changes in exchange rates? Using the rates directly means using the rates in absolute terms, but incorporating the change related to getting the incremental or decremental effect in that specific period. For example, if the exchange rate is Kshs 103 per dollar in a particular time period and Kshs 102 in the next period, using rates directly related to using Kshs 103 and 102 but the change involves using Kshs 1/103 (return) for the period t+1. If there is a difference between the two techniques, then does that mean that the inferences made also vary significantly? Also, using exchange rates as prices brings about raised questions relating to the model compared to using returns which have better statistical properties (S. Kothari & Zimmerman, 1995).

Therefore, there was a need to determine what exactly the relationship is and whether the link is significant or not due to the absence of a consensus of what exactly the association is. Absence of concrete evidence from local studies in Kenya in the tobacco industry, the BAT Kenya formed the core of interest.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0. INTRODUCTION.

This section sets out discrete steps followed in order to perform the study and achieve the set objective. Research methodology is a process in which the investigator uses tools and procedures to collect, analyze and evaluate data sets. Covered here, is the research design, population, procedures and processes for data collection including analysis methods; both conceptual and analytical models.

The research design employed by the study is given also together with the underlying idea behind its enactment. The population size is also provided alongside the data type in addition to the conceptual model and analytical model of the study with their measurements for each study variable.

3.1. RESEARCH DESIGN

This states the general scheme chosen to combine the different investigation elements comprehensively and consistently, establishing an effective addressing of the research dilemma. It comprises the approach for data collection, measurement and analysis. Research problem is what dictates the type of design to use. According to Kothari (2005) research offers a structure for gathering and examination of data. This research is an ex post facto one in that the research starts after the facts have occurred independent of the researcher, analysing how the endogenous variable can be affected by the exogenous one(s). This approach can be justified in the sense that the financial statements that will be used are past occurrences and are completely independent of the researcher.

This study made use of descriptive statistics, covering the period from 2000 to 2018. This is convenient in facilitating the researcher to gather information, summarize, present and provide interpretations. In this research, this design was used to investigate the effect of foreign exchange rate fluctuations on profitability of firms (tobacco) in Kenya. The study incorporated time series analysis of data comprised of BAT Kenya's financial data over time.

The ideas behind the approval of this design type were: First, it helps in characterizing the features of the variables of the study and also integrates multiple variables for analysis purposes. Moreover, it is convenient for demonstrations of proofs about the position and nature of the condition as it occurs at the time of study. Finally, it capitalizes on the dependability of collected and examined data.

3.2. POPULATION

This can be defined as a collection of components which have identical characteristics and/or properties defined by the sampling criteria that is adopted by the researcher; involves objective and accessible populace. A target population comprises of a whole association of constituents of interest (whether people or objects) to which the investigator tries to generalize the research findings, while accessible population is one that the analyst has feasible access: it might be a subspace of the target population.

Looking at the tobacco industry in Kenya, BAT Kenya formed the accessible population for the purpose of obtaining data on corporate profitability. BAT Kenya holds a total of 71.5% market share in the tobacco industry and inference can be made out of the results to achieve the set out research objectives (Bath, 2018). The target population for the study being small enabled the use of a census approach.

3.3. DATA COLLECTION

Data collection is assembling experimental evidence to gain contemporary insights about a situation and comment on questions that prompt the undertaking of the research. Data should be collected in an organized way that helps the investigator answer stated research objectives, test hypotheses and also analyse outcomes. The collection procedure conducted should be accurate enough to maintain research integrity (Paradis, O'Brien, Nimmon, Bandiera, & Martimianakis, 2016).

For the purposes of this study, secondary data was obtained from different sources. Secondary data refers to already existing data or data obtained from existing research. BAT Kenya annual reports were extracted from the Capital Markets Authority's Resource Centre Portal from the period 2000 to 2018. These helped to extract the financial statements, specifically the statement of financial position and profit or loss statements for calculating specific profitability measures used in the study process. Data on foreign exchange rates were obtained via the Thomson Reuters terminals on the Eikon platform (USD, British Pound and the Euro).

3.4. SAMPLE SIZE

Sampling from the entire population requires specific criteria to be met. The research involved selected the proxy sample based on:

i. Kenyan company
ii. Within the tobacco sector
iii. Listed on the Nairobi Securities Exchange

iv. Years 2000-2018

Focus was largely on BAT Kenya due to its leading role (out of two firms) in the tobacco industry and hence determine the performance of the industry as a whole.

3.4. VARIABLES

This study identified key variables that influence profitability of BAT Kenya. These include the dependent and independent variable(s):

3.4.1. Dependent Variable

- **Profitability (P):** Three profitability measures were used to stand for the level of profitability of BAT Kenya. The three measures include ROE, ROIC and ROA.

3.4.2. Independent Variables

- **Foreign exchange rates:** Three exchange rates were used for the purposes of this study due to their exposure on BAT Kenya: the USD, British Pound and the Euro. Movements in this dictate how the level of profitability will be affected. Any devaluation of the Kenyan shilling causes exports to be much cheaper as the shilling tends to be of less value and therefore profits for exporting firms are expected to increase (Pettinger, 2017).
- **Firm specific factor:** Size of the firm was used as a variable to assess whether it affects the profit levels that BAT Kenya enjoys. If the size of the firm increases, profitability also increases. Measurement of size was calculated by taking the natural log of sales as this technique smoothens the variations experienced over time. Therefore, a large size of the firm tends to be more profitable than small sized hence we expect a positive relationship between size and profitability (Bhutta & Hasan, 2013).

3.5. ANALYTICAL MODEL

Modelling fluctuation impacts of exchange rates on profitability was achieved through the use of a vector autoregressive (VAR) model which involves achieving various purposes such as economic and firm forecasting, risk and volatility modelling (Fomby, Kilian, & Murphy, 2013). Evaluation of the short-run parameter estimates, as in any other linear model, are based on ceteris paribus effects and inference based on standard errors and test statistics.

A sample of the VAR model used was:

$$P_t = \beta_1 + \beta_2 P_{t-l} + \propto_1 USD_{t-l} + \theta_1 GBP_{t-l} + \varphi_1 Euro_{t-l} + \mu_1 S_{t-l} + \varepsilon_{1t} \ldots . i$$

$$USD_t = \propto_2 + \propto_3 USD_{t-l} + \beta_3 P_{t-l} + \theta_2 GBP_{t-l} + \varphi_2 Euro_{t-l} + \mu_2 S_{t-l} + \varepsilon_{2t} \ldots . ii$$

$$GBP_t = \theta_3 + \theta_4 GBP_{t-l} + \alpha_4 USD_{t-l} + \beta_4 P_{t-l} + \varphi_3 Euro_{t-l} + \mu_3 S_{t-l} + \varepsilon_{3t} \ldots . iii$$

$$Euro_t = \varphi_4 + \varphi_5 Euro_{t-l} + \propto_5 USD_{t-l} + \beta_5 P_{t-l} + \theta_5 GBP_{t-l} + \mu_4 S_{t-l} + \varepsilon_{4t} \ldots . iv$$

$$S_t = \varphi_5 + \mu_6 S_{t-l} + \propto_6 USD_{t-l} + \beta_6 P_{t-l} + \theta_6 GBP_{t-l} + \varphi_6 Euro_{t-l} + \varepsilon_{5t} \ldots . v$$

Where: P is Profitability measure

USD is the United States Dollar

GBP is the British Pound

S is the size of the firm

β, α, θ and φ are parameter coefficients, t being the time period and *l* being the lag

ε_t is the error term

This model was based on the optimal lag length estimated during analysis of the data. Formulation of the model entailed determining whether the variables were stationary by testing for a unit root. Once proved that they were stationary, an estimation of the optimal lag length was determined after which the VAR was estimated and thereafter, the Granger causality. Granger causality methods were evolved in order to evaluate time series information flow (Stokes & Purdon, 2017).

According to Eldawlatly and Oweiss (2010), Granger causality is a prominent technique for examining causal relationships between various variables; through conducting an F test which tests for joint significance of all the types of selected rates on the level of profitability. This shows whether a specific type of exchange rate has a causal relationship with the level of firm profitability. Additionally, the significance of parameter coefficients was tested for to determine whether the existing relationship was significant or not.

Most important of all, a VAR model such as the one above helped determine the impulse responses of all the other variables with regards to a shock in a single variable. This provided an in-depth analysis of a variable impact on the other variables. Such impulse responses also help in policy making for governments as they are able to assess shock impacts and hence they are able to formulate policies accordingly. For example, if a shock USD has a very high impulse response on profitability than the other two exchange rates, then the government can formulate specific policies that minimize exposure to that currency compared to the other two.

Last but not the least, such a VAR model enabled determination of variance decompositions of a specific variable: in case of variations in a variable, how much of it can be attributed to shocks to

each of the other variable(s)? Variance decomposition enables the researcher to allocate a certain percentage to the different variable shocks and therefore one is able to assess the variability of the shocks that lead to variations in a variable.

3.6. DATA ANALYSIS PROCEDURE

Data analysis can be referred to as the use of reasoning to understand the data collected. Inferential statistics is a form of analysis with several means of reliability testing through inferencing from data to general conditions through interpretations such as regression and correlation analysis (C. Kothari, 2005).

Obtained data was sorted in a tabular structure over the years and then imported into EViews software. This data was then processed using this software in such a way so as to assist determine the exact model to be used for this study. The imported data was then tested for stationarity to determine its usage in level form or if obtaining differences would be necessary for it to possess stationarity. This was obtained through conducting unit root tests (involving the Augmented Dickey Fuller Test) of all the variables which also gave us the lag of the variable at which the data will be stationary.

Thereafter the lag length test was conducted to determine the optimal lag length to be used and hence the model specification and potential information obtained from it such as graphs for impulse responses for variables and also their variance decomposition in tabular formats.

CHAPTER FOUR: DATA ANALYSIS

4.0. INTRODUCTION

This chapter followed the design breakdown initially laid out in the previous chapter. The three different exchange rates alongside the profitability measure were covered in depth in this section.

Diagnostic tests included unit rot tests for stationarity, multicollinearity tests, normality and also causality tests. Descriptive tests involved an incorporation of Pearson correlation to perform a correlation analysis.

4.1. RESULTS AND INTERPRETATION

Starting off, data was sorted into a table and the inputs for ratio calculation obtained, which were then used to calculate the respective profitability ratio (See Appendix 4). Unit root tests were then conducted on all variables to check for stationarity. Using the Augmented Dickey Fuller test, all variables were proved to be stationary, hence suitable to be used for analysis. Data being stationary meant that there was no risk for having spurious regressions/results. Having a lag length of 0 upon testing for unit root means that the variable is stationary at level form and no differencing is necessary (See Appendix 5). Using the Schwarz Criterion (SC), the optimal lag length for the variables was found to be 1 for all profitability measures. SC was preferred to the rest as it poses greater penalty for additional coefficients and the lowest lag chosen as having too many lags eats up the model's degrees of freedom (Profillidis & Botzoris, 2018) (See Appendix 6).

Thereafter VAR estimates were obtained for each profitability measure and the results are exhibited in Appendix 7. Since the optimal lag length obtained was 1, coefficients used will be up to the first lag length. The first variable in the tables represent the dependent variable whereas the rest are independent variables. The coefficients show the change in the dependent variable (each profitability measure) for a unit change in each of independent variables. From the results, the model obtained is as follows

- **ROE:**

$$ROE_t = -1.68 + 0.51ROE_{t-1} - 0.59USD_{t-1} + 0.12GBP_{t-1} - 0.35Euro_{t-1} + 0.03S_{t-1} \ldots . i$$

$$USD_t = -0.53 + 0.16USD_{t-1} + 0.07ROE_{t-1} - 0.05GBP_{t-1} - 0.09Euro_{t-1} - 0.06S_{t-1} \ldots . ii$$

$$GBP_t = 0.04 + 0.18GBP_{t-1} - 0.43USD_{t-1} + 0.25ROE_{t-1} + 0.01Euro_{t-1} - 0.09S_{t-1} \ldots . iii$$

$$Euro_t = 0.23 - 0.04Euro_{t-1} - 0.65USD_{t-1} - 0.09ROE_{t-1} - 0.20GBP_{t-1} - 0.14S_{t-1} \ldots . iv$$

$$S_t = 0.79 + 1.03S_{t-1} + 0.10USD_{t-1} + 0.26ROE_{t-1} + 0.03GBP_{t-1} - 0.28Euro_{t-1} \ldots . v$$

- **ROA:**

$$ROA_t = -0.48 + 0.61ROA_{t-1} - 0.30USD_{t-1} + 0.31GBP_{t-1} - 0.34Euro_{t-1} - 0.05S_{t-1} \ldots . i$$

$$USD_t = -0.21 + 0.21USD_{t-1} + 0.40P_{t-1} + 0.02GBP_{t-1} - 0.14Euro_{t-1} - 0.09S_{t-1} \ldots . ii$$

$$GBP_t = 0.56 + 0.31GBP_{t-1} - 0.35USD_{t-1} + 0.75ROA_{t-1} - 0.06Euro_{t-1} - 0.18S_{t-1} \ldots . iii$$

$$Euro_t = 0.66 - 0.17Euro_{t-1} - 0.54USD_{t-1} + 0.23ROA_{t-1} - 0.10GBP_{t-1} - 0.21S_{t-1} \ldots . iv$$

$$S_t = 0.32 + 1.00S_{t-1} - 0.01USD_{t-1} - 0.28ROA_{t-1} - 0.08GBP_{t-1} - 0.13Euro_{t-1} \ldots . v$$

- **ROIC:**

$$ROIC_t = -1.57 + 0.32ROIC_{t-1} - 1.55USD_{t-1} + 2.39GBP_{t-1} - 1.44Euro_{t-1} + 0.40S_{t-1} \ldots . i$$

$$USD_t = -0.34 + 0.03USD_{t-1} + 0.06ROIC_{t-1} - 0.18GBP_{t-1} + 0.07Euro_{t-1} + 0.01S_{t-1} \ldots . ii$$

$$GBP_t = 0.33 + 0.26GBP_{t-1} - 0.60USD_{t-1} + 0.08P_{t-1} + 0.26Euro_{t-1} - 0.19S_{t-1} \ldots . iii$$

$$Euro_t = 0.66 - 0.07Euro_{t-1} - 0.59USD_{t-1} + 0.05ROIC_{t-1} - 0.09GBP_{t-1} - 0.35S_{t-1} \ldots . iv$$

$$S_t = 0.21 + 1.40S_{t-1} - 0.12USD_{t-1} - 0.15ROIC_{t-1} - 0.03GBP_{t-1} - 0.17Euro_{t-1} \ldots . v$$

From the above equations we see that each profitability measure is directly related to the pound but inversely related to the dollar and euro: a unit change in USD will lead to a 0.59 unit change in ROE in the opposite direction (and similarly for the other estimates). This means that an increase in value/appreciation of the dollar and euro will tend to reduce profitability levels and the converse for a reduction in value and for the pound, an increase in value will lead to an increase in level of profits. However, we find that each of the currency has the greatest economic significance in the profitability measure: for ROE, USD is seen to have the greatest impact (in absolute terms), in ROA, the Euro stands out and for ROIC, the GBP can be seen to be having the most significance.

On the other hand, with regards to statistical significance, at a 5% level of significance, all the estimates are statistically significant except for the pound with regards to ROIC measure. This is obtained by using the t distribution (statistic) and comparing it to the critical value of the t distribution at a 95% confidence interval of [-1.96, 1.96]. if the t statistic falls within the interval then the variable is statistically significant and the converse is true. This means that changes in the three currencies do affect the level of profitability of BAT Kenya.

Additionally, the test for causality involves assessing whether the p value is less than or greater than or equal to 0.05: if it is less than or equal to 0.05, this is a strong evidence against the null

hypothesis and therefore we reject it and if it is greater than, then it signifies a strong evidence for the null hence we fail to reject it.

Hypothesis:

H_0: Variable X does not Granger cause the profitability measure

H_1: Variable X Granger causes the profitability measure

Where X is the independent variable: USD, EUR, GBP, log sales

Only the USD and log sales Granger cause ROE, the Euro and British Pound having no causality impact. However, we also see that each of the independent variable does not Granger causes ROE, their p values being greater than 0.05 and therefore we see a unidirectional causal link between the ROE and USD and log sales. All the dependent variables do not granger cause ROA because all their p values are greater than 0.05 hence we fail to reject the null. Also, each of the independent variable in turn do not Granger cause ROA as seen by their p values exceeding 0.05 hence no causality effect. Regarding ROIC, all the dependent variables do not granger cause it because all their p values are greater than 0.05 hence we fail to reject the null. Also, each of the independent variable in turn do not Granger cause ROIC as seen by their p values exceeding 0.05 hence no causality effect, apart from log sales, for which we see an evidence of some causality (See Appendix 8).

Impulse responses were obtained for each of the profitability measure and were as follows:

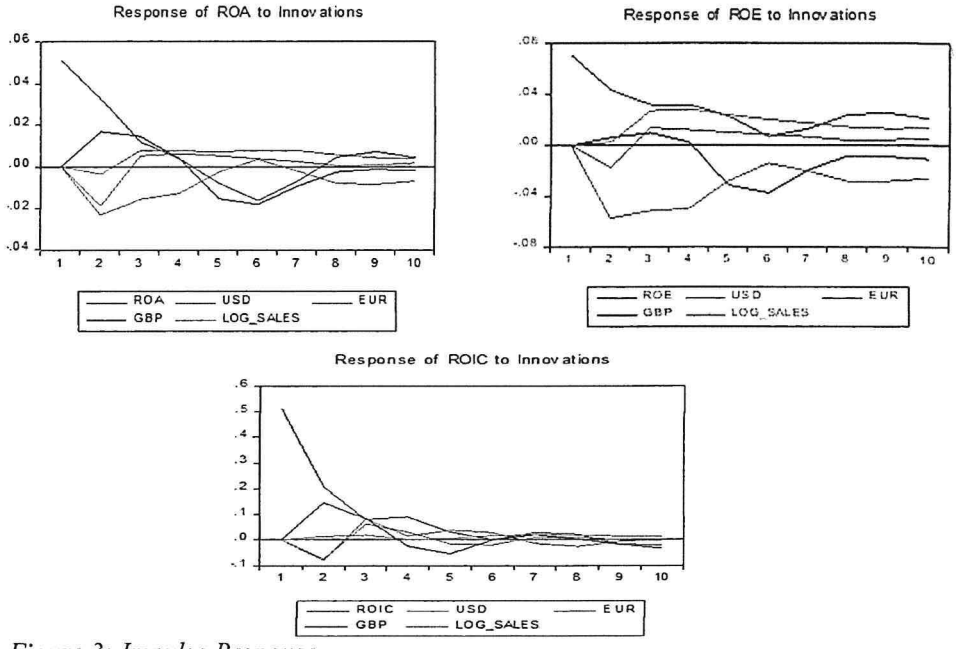


Figure 3: Impulse Response

From the graphs above, a shock in the USD tends to affect ROA and ROE on a higher level compared to ROIC. The response of the former two is negative with regards to the USD shock. This can be explained from the perspective that considering USD is a major widely used currency, any shock in it will lead to a negative response in for profitability, but smoothening out over time as the shocks tend to be assimilated into the firm functionalities. However, comparing the three currencies, the shock in USD tends to affect the most in all profitability measures as it does not revert back to normal even in the tenth period. The Euro is also seen to highly affect the three profitability measure.

Therefore, when undertaking decisions in the forex market, the Central Bank of Kenya is highly likely to make use of this information to assess their decision making with regards to either their indicative rates or even intervening for the purposes of either devaluing or revaluing the currency against such strong currencies. Any decision taken against the USD and Euro will highly affect the profitability levels of firms such as BAT Kenya (multinationals).

Variance Decomposition:

Appendix 8 shows that the decomposition of the variance in each of the profitability measure can highly be attributed to shocks of the measure itself. This means that any variance experienced in profitability is due to the profitability measure itself rather than shocks in the currencies. This means that shocks in the foreign currencies and sales do not account for any variance which might be observed in the profitability measure.

CHAPTER FIVE: CONCLUSION

5.0. INTRODUCTION

This section looks at the research summary, conclusions and also a recommendation in line with the findings obtained throughout the study, together with their limitations. Recommendations for policy provide essential insights to policy makers such as the government and its central bank on the potential effects of fluctuations in exchange rates on profitability of firms.

The limitations faced during this study gives weaknesses that probably compromise on reliability of study findings and recommendations for further study gives suggestions on areas in exchange rate movements requiring further research.

5.1. SUMMARY AND CONCLUSION

The objective of the study was to determine the impact of volatility of foreign exchange rates (specifically the USD, British Pound and the Euro) on corporate profitability in the tobacco sector. The study found statistical significance of the three currencies affecting the level of profit margins for BAT Kenya: the USD and the Euro having an inverse relationship whereas the British Pound having a positive relationship with each of the profitability measure ROE, ROA and ROIC.

Considering the causal relationship, the USD and sales can be seen to have a causal impact on ROE and no causal impact on the other measures whatsoever. Having an impact does not imply a causal relationship and therefore the currencies can be seen to impact the level of profits but not have a causal relationship with profitability.

Shocks in the USD, Euro and the British Pound can be seen to have a huge effect on the response of each of the profitability measure and therefore the government, when making decisions in the forex market and also in relation to monetary policies will have to account for such relationships, such that any devaluation or revaluation of the currency should be within particular boundaries so as to protect the domestic firms.

Additionally, variances in each of the profitability measure can be attributed to shocks in the measures themselves and not to shocks of the currencies. The currencies do tend to impact on how the profitability will respond, but they do not account for any variances experienced in profitability.

5.2. RECOMMENDATIONS FOR FURTHER RESEARCH

The study found the existence of an inverse relationship between the currencies' (specifically the USD and Euro) movement and corporate profitability in the tobacco sector. Practically, it is expected that an increase in the rates should significantly affect profitability and this is evident from this study. For any exchange rate, an appreciation in the foreign currency would highlight a decrease in value of the base (domestic) currency and therefore a depreciation of the Kenyan shilling will make exports cheaper and therefore boosting sales and in turn profitability, which is the converse of the what was realised during this research.

As a result, there is yet some scope for further research around the forex market and their impact on profitability measures. Additionally, currencies affect different industries differently and therefore the thirst for continued research is never ending, also due to the fact that exchange rates work in a completely dynamic environment and therefore the level of impacts vary according to the environment of exposure. Moreover, different currencies affect profitability differently and therefore the exchange rate in question also matters and hence the need for studying various exchange rate impacts on profitability of different sectors of the economy.

5.3. LIMITATIONS OF THE STUDY

The main limitation faced was the use of historic data. Data obtained was historic from annual reports, which on its own is a limiting source of data as it represents past information rather than present hence compromising on the ability to reflect currency situations put into question by various scholars.

Another constraint was inadequacy of enough data points. Inability to obtain quarterly financial statements proved to be the reason for using annual ones and hence a reduction in the number of data points used for the study.

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APPENDICES

Appendix 1: Consolidated Statement of Financial Position

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

	Notes	Year ended 31 December 2018 KSh'000	2017 KSh'000
Capital and reserves attributable to the company's equity holders			
Share capital	16	1,000,000	1,000,000
Share premium	16	23	23
Hedging reserve	16	6,330	7,428
Revaluation surplus	17	1,820,734	1,861,435
Retained earnings		3,332,167	2,721,337
Proposed dividend	15	3,150,000	2,250,000
Total equity		9,309,254	7,840,223
Non-current liabilities			
Borrowings	26	1,222,200	1,239,000
Deferred income tax	18	2,014,780	2,151,722
Total non-current liabilities		3,236,980	3,390,722
Total equity and non-current liabilities		12,546,234	11,230,945
Non-current assets			
Property, plant and equipment	19	9,097,413	9,133,893
Deferred income tax	18	25,271	6,443
		9,122,684	9,140,336
Current assets			
Inventories	21	6,183,918	5,674,768
Receivables and prepayments	22	2,824,409	2,803,043
Derivative financial instruments	23	16,989	17,900
Current income tax	27	-	140,668
Cash and cash equivalents	24	190,257	28,873
		9,215,573	8,665,252
Current liabilities			
Payables and accrued expenses	25	5,440,923	4,757,921
Borrowings	26	99	1,680,724
Derivative financial instruments	23	7,947	7,289
Current income tax	27	297,400	41,332
Provisions for liabilities and charges	28	45,654	87,377
		5,792,023	6,574,643
Net current assets		3,423,550	2,090,609
Total assets		12,546,234	11,230,945

Appendix 2: Consolidated Statement of Profit/Loss and Other Comprehensive Income

CONSOLIDATED STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME

	Notes	Year ended 31 December 2018 KSh'000	2017 KSh'000
Gross revenue		36,495,757	34,467,704
Excise duty and Value Added Tax (VAT)		(15,745,622)	(15,794,407)
Net revenue	6	20,750,135	18,673,297
Raw materials and manufacturing costs	7	(11,316,681)	(10,731,063)
Marketing and distribution costs	8	(1,928,162)	(1,349,409)
Administration and other expenses	9	(1,647,330)	(1,708,638)
Other income		361,095	476,823
Operating profit		6,219,057	5,361,010
Finance costs	10	(338,311)	(494,067)
Profit before tax	11	5,880,746	4,866,943
Income tax expense	13	(1,796,223)	(1,530,937)
Profit for the year		4,084,523	3,336,006
Other comprehensive income			
Items that may be reclassified to profit or loss – net fair value (loss)/gain		(1,098)	7,428
Total comprehensive income for the year		4,083,425	3,343,434
Earnings per share:			
Basic and diluted (KSh per share)	14	40.85	33.36

Appendix 3: Proportion of foreign currency-denominated assets and liabilities

	USD	GBP	Euro	Total
Assets	5%	0%	3%	8%
Liabilities	95%	2%	3%	100%

Appendix 4: Sample Workfile

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	000s												
Net Operating Profit	3,728,454	4,621,586	5,310,506	10,842,600	1,861,106	707,867	975,626	1,299,008	1,676,470	1,737,853	2,058,866	1,808,962	1,748,758
Tax Expense	329,348	374,164	303,946	594,876	637,068	100,260	247,234	487,303	537,574	540,408	626,933	545,104	663,949
NOPAT	3,399,106	4,247,422	5,006,560	10,247,724	1,224,038	607,607	728,392	811,705	1,138,896	1,197,445	1,431,933	1,263,858	1,084,809
Profit after Tax	494,977	631,181	634,049	1,156,914	1,237,398	582,710	604,109	823,120	1,140,021	1,210,194	1,382,038	1,201,422	1,385,697
Shareholder Equity	3,434,888	3,616,069	3,791,423	4,385,837	4,965,893	4,323,603	4,182,712	4,110,810	4,200,831	3,761,025	3,893,063	4,194,485	4,693,250
Total equity	3,434,888	3,616,069	3,791,423	4,385,837	4,965,893	4,323,603	4,182,712	4,110,810	4,200,831	3,761,025	3,893,063	4,194,485	4,693,250
Borrowings	766,742	1,210,162	627,758	242,888	1,109,332	1,646,016	1,232,347	835,458	611,173	607,488	751,654	760,959	1,032,190
Shareholder Equity + All Interest Bearing Debt (£ m)	4,201,630	4,826,231	4,419,181	4,628,725	6,075,225	5,969,619	5,415,059	4,946,268	4,812,004	4,368,513	4,644,717	4,955,444	5,725,440
Total Assets	3,434,888	3,616,069	3,791,423	4,385,837	7,138,690	7,156,581	6,742,607	6,313,796	6,356,069	6,121,887	6,246,441	7,776,041	9,269,886
Sales	8808568	10364064	10842600	11726705	5335050	5475685	5461068	5414456	5317916	5466326	6566984	7624473	9418906
Log Sales	6.944905311	7.015530086	7.035133436	7.069176	6.7271385	6.7384385	6.7372776	6.7335548	6.7257415	6.7376955	6.817366	6.8822098	6.9740005
ROE	0.144102806	0.174548937	0.167232461	0.263784085	0.2491794	0.1347742	0.14443	0.200233	0.2713799	0.3217724	0.3550002	0.286429	0.2952532
ROIC	0.808996985	0.880070183	1.132915805	2.213940988	0.2014803	0.1017832	0.1345123	0.1641045	0.2366781	0.2741081	0.3082928	0.2550444	0.1894717
ROA	0.144102806	0.174548937	0.167232461	0.263784085	0.1733368	0.081423	0.0895958	0.1303685	0.1793594	0.1976832	0.2212521	0.154503	0.1494837

Appendix 5: Unit Root Tests

Null Hypothesis: EUR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.657110	0.0001
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: USD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.750775	0.0100
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: ROA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.566294	0.1141
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: ROIC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.962040	0.0537
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GBP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.424291	0.0022
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOG_SALES has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.537750	0.8663
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: ROE has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.757959	0.3906
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Appendix 6: Lag Length Criteria

VAR Lag Order Selection Criteria
Endogenous variables: ROE USD EUR GBP LOG_SALES
Exogenous variables: C
Date: 10/01/19 Time: 11:09
Sample: 1995 2018
Included observations: 22

Lag	LogL	LR	FPE	AIC	SC	HQ
0	113.1911	NA	3.68e-11	-9.835553	-9.587589	-9.777140
1	156.1030	62.41740*	7.76e-12*	-11.46391	-9.976128*	-11.11344*
2	183.8449	27.74181	9.22e-12	-11.71317*	-8.985562	-11.07063

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Lag Order Selection Criteria
Endogenous variables: ROIC USD EUR GBP LOG_SALES
Exogenous variables: C
Date: 10/02/19 Time: 07:38
Sample: 1995 2018
Included observations: 22

Lag	LogL	LR	FPE	AIC	SC	HQ
0	77.11769	NA	9.78e-10	-6.556154	-6.308190	-6.497741
1	129.4200	76.07613*	8.77e-11*	-9.038185	-7.550400*	-8.687708*
2	154.9606	25.54056	1.27e-10	-9.087327*	-6.359721	-8.444785

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Lag Order Selection Criteria
Endogenous variables: ROA USD EUR GBP LOG_SALES
Exogenous variables: C
Date: 10/02/19 Time: 07:37
Sample: 1995 2018
Included observations: 22

Lag	LogL	LR	FPE	AIC	SC	HQ
0	122.8207	NA	1.53e-11	-10.71097	-10.46301	-10.65256
1	165.4474	62.00252*	3.32e-12*	-12.31340*	-10.82562*	-11.96292*
2	188.2078	22.76036	6.20e-12	-12.10980	-9.382190	-11.46725

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 7: Estimation of Parameters

- **ROE:**

Vector Autoregression Estimates
Date: 10/02/19 Time: 07:48
Sample (adjusted): 1997 2018
Included observations: 22 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	ROE	USD	EUR	GBP	LOG_SALES
ROE(-1)	0.506804	0.068875	-0.088280	0.247499	0.257004
	(0.29034)	(0.31828)	(0.32351)	(0.28975)	(0.35430)
	[1.74554]	[0.21640]	[-0.27288]	[0.85419]	[0.72539]
ROE(-2)	-0.133717	-0.169668	-0.088471	-0.440025	-0.131602
	(0.25263)	(0.27694)	(0.28149)	(0.25212)	(0.30828)
	[-0.52930]	[-0.61264]	[-0.31429]	[-1.74533]	[-0.42689]
USD(-1)	-0.585335	0.161348	-0.648033	-0.426345	0.102544
	(0.36906)	(0.40458)	(0.41122)	(0.36830)	(0.45035)
	[-1.58603]	[0.39881]	[-1.57588]	[-1.15759]	[0.22770]
USD(-2)	-0.554602	-0.046236	0.248894	0.674273	0.196154
	(0.37190)	(0.40769)	(0.41439)	(0.37114)	(0.45382)
	[-1.49126]	[-0.11341]	[0.60063]	[1.81675]	[0.43223]
EUR(-1)	-0.351937	-0.091807	-0.037892	0.013793	-0.284638
	(0.32055)	(0.35139)	(0.35717)	(0.31989)	(0.39115)
	[-1.09793]	[-0.26127]	[-0.10609]	[0.04312]	[-0.72769]
EUR(-2)	0.282191	-0.015368	-0.167008	0.046802	0.884740
	(0.27313)	(0.29941)	(0.30433)	(0.27257)	(0.33329)
	[1.03318]	[-0.05133]	[-0.54877]	[0.17171]	[2.65455]
GBP(-1)	0.119695	-0.054226	-0.202841	0.184758	0.025960
	(0.30948)	(0.33926)	(0.34483)	(0.30885)	(0.37765)
	[0.38676]	[-0.15983]	[-0.58823]	[0.59822]	[0.06874]
GBP(-2)	0.068886	0.003847	-0.300820	-0.535249	-1.061864
	(0.33118)	(0.36306)	(0.36902)	(0.33051)	(0.40413)
	[0.20800]	[0.01060]	[-0.81519]	[-1.61949]	[-2.62751]
LOG_SALES(-1)	0.032897	-0.061874	-0.143476	-0.092064	1.028585
	(0.18107)	(0.19849)	(0.20175)	(0.18070)	(0.22095)
	[0.18169]	[-0.31172]	[-0.71115]	[-0.50949]	[4.65529]
LOG_SALES(-2)	0.240082	0.145128	0.127176	0.097241	-0.145279
	(0.20805)	(0.22808)	(0.23182)	(0.20763)	(0.25388)
	[1.15395]	[0.63631]	[0.54859]	[0.46834]	[-0.57223]
C	-1.675763	-0.525467	0.228127	0.037559	0.794405
	(0.70966)	(0.77796)	(0.79073)	(0.70821)	(0.86598)
	[-2.36136]	[-0.67544]	[0.28850]	[0.05303]	[0.91735]
R-squared	0.821847	0.154626	0.479224	0.477078	0.931467
Adj. R-squared	0.659889	-0.613896	0.005791	0.001694	0.869165
Sum sq. resids	0.056122	0.067445	0.069678	0.055894	0.083570
S.E. equation	0.071429	0.078303	0.079589	0.071283	0.087163

F-statistic	5.074456	0.201199	1.012232	1.003563	14.95076
Log likelihood	34.46723	32.44572	32.08735	34.51219	30.08754
Akaike AIC	-2.133384	-1.949611	-1.917032	-2.137472	-1.735231
Schwarz SC	-1.587863	-1.404089	-1.371511	-1.591951	-1.189710
Mean dependent	0.315367	0.028012	0.026402	0.020836	7.036710
S.D. dependent	0.122479	0.061637	0.079820	0.071343	0.240973

Determinant resid covariance (dof adj.)	1.21E-12
Determinant resid covariance	3.79E-14
Log likelihood	183.8449
Akaike information criterion	-11.71317
Schwarz criterion	-8.985562
Number of coefficients	55

- **ROA:**

Vector Autoregression Estimates
Date: 10/02/19 Time: 07:51
Sample (adjusted): 1997 2018
Included observations: 22 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	ROA	USD	EUR	GBP	LOG_SALES
ROA(-1)	0.609942	0.403484	0.230554	0.751790	-0.278993
	(0.29853)	(0.44885)	(0.45273)	(0.40020)	(0.51086)
	[2.04318]	[0.89894]	[0.50925]	[1.87852]	[-0.54613]
ROA(-2)	-0.314609	-0.288673	-0.451952	-0.719023	0.045083
	(0.28391)	(0.42687)	(0.43056)	(0.38061)	(0.48584)
	[-1.10813]	[-0.67626]	[-1.04968]	[-1.88914]	[0.09279]
USD(-1)	-0.295453	0.206446	-0.536661	-0.354713	-0.011260
	(0.26866)	(0.40394)	(0.40744)	(0.36017)	(0.45975)
	[-1.09973]	[0.51108]	[-1.31716]	[-0.98486]	[-0.02449]
USD(-2)	-0.193369	0.052772	0.324602	0.782407	-0.021311
	(0.25428)	(0.38232)	(0.38563)	(0.34089)	(0.43514)
	[-0.76045]	[0.13803]	[0.84174]	[2.29520]	[-0.04897]
EUR(-1)	-0.341847	-0.142808	-0.172538	-0.057324	-0.133805
	(0.22765)	(0.34228)	(0.34525)	(0.30519)	(0.38957)
	[-1.50162]	[-0.41722]	[-0.49975]	[-0.18783]	[-0.34346]
EUR(-2)	0.185044	0.011187	-0.108614	0.059873	0.763312
	(0.19271)	(0.28975)	(0.29226)	(0.25835)	(0.32978)
	[0.96021]	[0.03861]	[-0.37164]	[0.23175]	[2.31461]
GBP(-1)	0.310714	0.016844	-0.095360	0.306328	-0.081582
	(0.20976)	(0.31538)	(0.31811)	(0.28120)	(0.35895)
	[1.48131]	[0.05341]	[-0.29977]	[1.08936]	[-0.22728]
GBP(-2)	-0.038853	-0.072678	-0.396728	-0.621878	-0.864083
	(0.24544)	(0.36903)	(0.37222)	(0.32904)	(0.42001)
	[-0.15830]	[-0.19694]	[-1.06584]	[-1.89000]	[-2.05728]
LOG_SALES(-1)	-0.047088	-0.086977	-0.211267	-0.184011	0.995111
	(0.13658)	(0.20535)	(0.20712)	(0.18309)	(0.23372)
	[-0.34477]	[-0.42356]	[-1.02000]	[-1.00501]	[4.25774]

LOG_SALES(-2)	0.134254	0.118158	0.130317	0.105631	-0.031550
	(0.14790)	(0.22238)	(0.22430)	(0.19828)	(0.25310)
	[0.90772]	[0.53134]	[0.58099]	[0.53275]	[-0.12465]
C	-0.476004	-0.212330	0.661543	0.559579	0.319280
	(0.41654)	(0.62628)	(0.63170)	(0.55841)	(0.71280)
	[-1.14277]	[-0.33903]	[1.04724]	[1.00210]	[0.44792]
R-squared	0.615536	0.181023	0.503166	0.514023	0.930590
Adj. R-squared	0.266023	-0.563502	0.051499	0.072225	0.867490
Sum sq. resids	0.028903	0.065339	0.066475	0.051945	0.084640
S.E. equation	0.051260	0.077071	0.077738	0.068719	0.087719
F-statistic	1.761126	0.243138	1.114019	1.163480	14.74785
Log likelihood	41.76669	32.79466	32.60506	35.31817	29.94760
Akaike AIC	-2.796972	-1.981333	-1.964096	-2.210742	-1.722509
Schwarz SC	-2.251451	-1.435812	-1.418575	-1.665221	-1.176988
Mean dependent	0.169139	0.028012	0.026402	0.020836	7.036710
S.D. dependent	0.059832	0.061637	0.079820	0.071343	0.240973

Determinant resid covariance (dof adj.)	8.17E-13
Determinant resid covariance	2.55E-14
Log likelihood	188.2078
Akaike information criterion	-12.10980
Schwarz criterion	-9.382190
Number of coefficients	55

- **ROIC:**

Vector Autoregression Estimates
Date: 10/02/19 Time: 07:53
Sample (adjusted): 1997 2018
Included observations: 22 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	ROIC	USD	EUR	GBP	LOG_SALES
ROIC(-1)	0.320987	0.055505	0.052641	0.082643	-0.152720
	(0.37253)	(0.04971)	(0.05719)	(0.04936)	(0.04275)
	[0.86164]	[1.11654]	[0.92051]	[1.67442]	[-3.57206]
ROIC(-2)	0.074484	0.036708	-0.053807	-0.005664	0.092937
	(0.55734)	(0.07437)	(0.08556)	(0.07384)	(0.06396)
	[0.13364]	[0.49356]	[-0.62891]	[-0.07671]	[1.45297]
USD(-1)	-1.546777	0.032470	-0.585578	-0.604207	-0.124206
	(2.67528)	(0.35700)	(0.41068)	(0.35445)	(0.30703)
	[-0.57817]	[0.09095]	[-1.42588]	[-1.70465]	[-0.40454]
USD(-2)	1.308070	0.040755	0.360502	0.750929	0.029181
	(2.41439)	(0.32219)	(0.37063)	(0.31988)	(0.27709)
	[0.54178]	[0.12649]	[0.97267]	[2.34752]	[0.10531]
EUR(-1)	-1.440031	0.066905	-0.068975	0.259780	-0.174838
	(2.16068)	(0.28833)	(0.33168)	(0.28627)	(0.24797)
	[-0.66647]	[0.23204]	[-0.20795]	[0.90747]	[-0.70506]
EUR(-2)	0.720487	0.091952	-0.144656	0.026866	0.502354

	(1.86154)	(0.24841)	(0.28576)	(0.24664)	(0.21364)
	[0.38704]	[0.37016]	[-0.50621]	[0.10893]	[2.35137]
GBP(-1)	2.392752	-0.183716	-0.085097	0.119651	-0.025426
	(2.26959)	(0.30286)	(0.34840)	(0.30070)	(0.26047)
	[1.05426]	[-0.60660]	[-0.24425]	[0.39791]	[-0.09761]
GBP(-2)	-0.235560	-0.105941	-0.356616	-0.511782	-0.605911
	(2.24849)	(0.30005)	(0.34516)	(0.29790)	(0.25805)
	[-0.10476]	[-0.35308]	[-1.03318]	[-1.71795]	[-2.34802]
LOG_SALES(-1)	0.400718	0.012454	-0.347523	-0.186821	1.397626
	(2.31362)	(0.30874)	(0.35516)	(0.30653)	(0.26553)
	[0.17320]	[0.04034]	[-0.97849]	[-0.60947]	[5.26360]
LOG_SALES(-2)	-0.151013	0.035338	0.261932	0.138324	-0.421633
	(2.30474)	(0.30755)	(0.35380)	(0.30535)	(0.26451)
	[-0.06552]	[0.11490]	[0.74034]	[0.45299]	[-1.59403]
C	-1.566794	-0.344667	0.658524	0.328799	0.210777
	(3.98870)	(0.53227)	(0.61230)	(0.52846)	(0.45777)
	[-0.39281]	[-0.64754]	[1.07549]	[0.62218]	[0.46044]
R-squared	0.357953	0.355287	0.491266	0.525641	0.968801
Adj. R-squared	-0.225726	-0.230817	0.028781	0.094405	0.940438
Sum sq. resids	2.888469	0.051436	0.068067	0.050703	0.038045
S.E. equation	0.512434	0.068381	0.078663	0.067892	0.058810
F-statistic	0.613270	0.606184	1.062231	1.218917	34.15734
Log likelihood	-8.883174	35.42642	32.34470	35.58433	38.74363
Akaike AIC	1.807561	-2.220584	-1.940427	-2.234939	-2.522148
Schwarz SC	2.353083	-1.675063	-1.394906	-1.689418	-1.976627
Mean dependent	0.381527	0.028012	0.026402	0.020836	7.036710
S.D. dependent	0.462851	0.061637	0.079820	0.071343	0.240973
Determinant resid covariance (dof adj.)		1.68E-11			
Determinant resid covariance		5.24E-13			
Log likelihood		154.9606			
Akaike information criterion		-9.087327			
Schwarz criterion		-6.359721			
Number of coefficients		55			

Appendix 8: Granger Causality Tests

- **ROE:**

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 10/03/19 Time: 07:35
Sample: 1995 2018
Included observations: 22

Dependent variable: ROE

Excluded	Chi-sq	df	Prob.
USD	6.794925	2	0.0335
EUR	1.938419	2	0.3794
GBP	0.234039	2	0.8896
LOG_SALES	6.454338	2	0.0397
All	16.42206	8	0.0367

Dependent variable: USD

Excluded	Chi-sq	df	Prob.
ROE	0.463274	2	0.7932
EUR	0.077865	2	0.9618
GBP	0.026013	2	0.9871
LOG_SALES	0.608273	2	0.7378
All	1.660788	8	0.9897

Dependent variable: EUR

Excluded	Chi-sq	df	Prob.
ROE	0.573696	2	0.7506
USD	2.500172	2	0.2865
GBP	1.250351	2	0.5352
LOG_SALES	0.519334	2	0.7713
All	7.696023	8	0.4637

Dependent variable: GBP

Excluded	Chi-sq	df	Prob.
ROE	3.308650	2	0.1912
USD	3.706819	2	0.1567
EUR	0.034950	2	0.9827
LOG_SALES	0.263456	2	0.8766
All	9.629891	8	0.2920

Dependent variable: LOG_SALES

Excluded	Chi-sq	df	Prob.
ROE	0.538822	2	0.7638
USD	*0.328387*	2	*0.8486*
EUR	7.120887	2	0.0284
GBP	7.117559	2	0.0285
All	12.21169	8	0.1420

- **ROA:**

VAR Granger Causality/Block Exogeneity Wald Tests Date: 10/03/19 Time: 07:34 Sample: 1995 2018 Included observations: 22			
Dependent variable: ROA			
Excluded	Chi-sq	df	Prob.
USD	2.668263	2	0.2634
EUR	2.745869	2	0.2534
GBP	2.242199	2	0.3259
LOG_SALES	2.209616	2	0.3313
All	9.547941	8	0.2982
Dependent variable: USD			
Excluded	Chi-sq	df	Prob.
ROA	0.832747	2	0.6594
EUR	0.175464	2	0.9160
GBP	0.038806	2	0.9808
LOG_SALES	0.304419	2	0.8588
All	2.068859	8	0.9788
Dependent variable: EUR			
Excluded	Chi-sq	df	Prob.
ROA	1.131428	2	0.5680
USD	1.909337	2	0.3849
GBP	1.477959	2	0.4776
LOG_SALES	1.764600	2	0.4138
All	8.596977	8	0.3774
Dependent variable: GBP			
Excluded	Chi-sq	df	Prob.
ROA	4.396417	2	0.1110

USD	5.314226	2	0.0702
EUR	0.075744	2	0.9628
LOG_SALES	1.884743	2	0.3897
All	11.19821	8	0.1907

Dependent variable: LOG_SALES

Excluded	Chi-sq	df	Prob.
ROA	0.392955	2	0.8216
USD	0.004318	2	0.9978
EUR	5.363094	2	0.0685
GBP	4.818935	2	0.0899
All	11.91826	8	0.1549

- **ROIC**

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 10/03/19 Time: 07:18
Sample: 1995 2018
Included observations: 22

Dependent variable: ROIC

Excluded	Chi-sq	df	Prob.
USD	0.447310	2	0.7996
EUR	0.626048	2	0.7312
GBP	1.112593	2	0.5733
LOG_SALES	0.207783	2	0.9013
All	3.234358	8	0.9188

Dependent variable: USD

Excluded	Chi-sq	df	Prob.
ROIC	4.031101	2	0.1332
EUR	0.181498	2	0.9132
GBP	0.558218	2	0.7565
LOG_SALES	0.403235	2	0.8174
All	5.601330	8	0.6918

Dependent variable: EUR

Excluded	Chi-sq	df	Prob.
ROIC	0.847659	2	0.6545
USD	2.219300	2	0.3297
GBP	1.213916	2	0.5450
LOG_SALES	1.695466	2	0.4284

All	8.138581	8	0.4201

Dependent variable: GBP

Excluded	Chi-sq	df	Prob.
ROIC	4.773505	2	0.0919
USD	6.188770	2	0.0453
EUR	0.826678	2	0.6614
LOG_SALES	0.694737	2	0.7065
All	11.74188	8	0.1631

Dependent variable: LOG_SALES

Excluded	Chi-sq	df	Prob.
ROIC	14.34635	2	0.0008
USD	0.167780	2	0.9195
EUR	6.239642	2	0.0442
GBP	5.679901	2	0.0584
All	39.98715	8	0.0000

Appendix 9: Variance Decomposition

Variance Decomposition of ROA:

Period	S.E.	ROA	USD	EUR	GBP	LOG_SALES
1	0.051260	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.069927	75.45550	11.22258	7.239395	5.809924	0.272605
3	0.074666	68.73599	14.27238	6.810125	8.876555	1.304949
4	0.076573	65.60263	16.36519	7.134211	8.691731	2.206243
5	0.079028	62.61043	15.46301	7.129419	11.93722	2.859929
6	0.083218	60.27961	14.11773	6.637884	15.48615	3.478631
7	0.084430	59.22958	13.78384	6.530097	16.25923	4.197254
8	0.085168	58.48896	14.45102	6.421252	16.06939	4.569374
9	0.086008	58.04389	15.15090	6.302002	15.78014	4.723065
10	0.086529	57.59109	15.62904	6.263642	15.64437	4.871862

Variance Decomposition of ROE:

Period	S.E.	ROE	USD	EUR	GBP	LOG_SALES
1	0.071429	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.103329	65.56869	31.20555	2.819921	0.350621	0.055217
3	0.124182	52.10927	39.08989	3.178174	0.845173	4.777496
4	0.140950	45.61701	42.81269	3.200295	0.681701	7.688309
5	0.151056	41.96389	40.70029	3.242683	4.929359	9.163771
6	0.157922	38.58608	38.04225	3.246393	10.09266	10.03262
7	0.162034	37.29320	37.67297	3.257542	11.05412	10.72217
8	0.167103	37.13261	38.28815	3.118289	10.62510	10.83584
9	0.172161	37.16875	38.76521	2.999119	10.27517	10.79175
10	0.176298	36.84410	39.14500	2.966810	10.16842	10.87568

Variance Decomposition of ROIC:

Period	S.E.	ROIC	USD	EUR	GBP	LOG_SALES
1	0.512434	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.582384	90.12634	1.888100	1.643308	6.293801	0.048449
3	0.602281	85.98788	3.565598	2.578866	7.730101	0.137549
4	0.610139	85.88406	3.530902	2.741387	7.709262	0.134392
5	0.614671	84.86351	3.846529	2.769980	8.381380	0.138600
6	0.615818	84.54772	4.032828	2.863254	8.350265	0.205935
7	0.617291	84.34856	4.066911	2.871595	8.405833	0.307100
8	0.618505	84.12978	4.239250	2.883983	8.373654	0.373336
9	0.619221	84.02566	4.241972	2.877350	8.432641	0.422376
10	0.620643	83.93331	4.222694	2.865778	8.507886	0.470331