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MACROECONOMIC DETERMINANTS OF SME PERFORMANCE IN KENYA

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Economics at Strathmore University**

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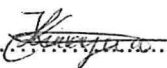
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ABSTRACT

This paper explores the relationship between SME performance, as measured by growth in total annual sales, growth in the number of permanent full-time employees and capacity utilization, and macroeconomic factors – the real effective exchange rate and the terms of trade, using a sample of 45 SMEs in Kenya over a period of 3 years. The random effects estimation technique is used and it is discovered that the real effective exchange rate has an inverse relationship with SME performance and the terms of trade variable has a positive relationship with performance. However, none of the estimates are statistically significant. In addition, the data do not confidently support the conclusions that macroeconomic factors exert a causal impact on SME performance.

Key words: SME Performance, Macroeconomic Environment, Panel, Random Effects

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CHAPTER 1 : INTRODUCTION

1.1. Background to the Study

Majority of a nation's economic wealth is generated by business, through private enterprises. Enterprises in an economy comprise of large, medium, small or micro enterprises. However, one thing is for sure; rising standards of living essentially depend on how well they perform (UNIDO, 2005).

What constitutes an SME varies from country to country (A small enterprise in Germany may be considered a large one in Kenya), and even from industry to industry. The dimensions "small" and "medium" of a firm are also relative to the size of the domestic economy. For this reason, a standard international definition of an SME does not exist. According to the World Bank's Enterprise Survey, each country has their own definition of an SME. In Kenya, under the Micro and Small Enterprise Act of 2012, micro enterprises have a maximum annual turnover of KES 500,000 and employ less than 10 people, while small enterprises have between KES 500,000 and 5 million annual turnover and employ 10-49 people. Medium enterprises are not covered under the Act, but have been reported as comprising of enterprises with a turnover of between KES 5 million and 800 million and employing 50-99 employees (Adeyeye, 2016).

In recent years, acknowledgement of the vital role Small and Medium-sized Enterprises (SMEs) play in economic development has been continually growing, often depicted as being efficient and prolific job creators, seeds of large businesses and fuel of national economic engines (Arbor & Quartey, 2010). Studies have shown that there is a strong, positive relationship between SMEs and GDP per capita growth (Beck, Demirguc-Kunt, & Levine, 2005), thus they are considered essential for the growth of any economy. Moreover, SMEs play an outsized role in transition and developing economies. They make up more than 90% of all firms outside the agricultural sector (OECD, 2004), and account for half of employment and the majority of jobs created (World Bank, 2016). These enterprises thrive because they offer the

majority of low-income populations opportunities to generate income for financial sustainability.

Nevertheless, the advantages of supporting SMEs extend beyond just economic growth and job creation. They also provide innovation, help diversify the economy, provide goods to low-income earners, as well as help empower the youth and women. However, reaping these benefits depends to a great extent on a thriving economy as well as efforts being made by the Government to encourage new businesses and pursue strategies that focus on providing an “enabling environment” for SMEs to trade and compete both nationally and internationally. This is essential to boost economic growth.

Despite their contribution, the majority of SMEs in less developed countries has been less able or unable to exploit the benefits of globalization, and often find it challenging to compete with cheaper imports and foreign competition on the local markets (OECD, 2004). They face greater constraints to growth as compared to larger firms; from government regulations that disproportionately obstruct smaller firms to barriers inherent in markets that affect enterprises because of their size, such as access to credit (Asian Development Bank Institute, 2016). The limited access to bank credit in recent years has increased the pressure on SMEs, forcing them to scale down production and investment plans (Klein, 2014). However, access to credit from banking institutions is not the panacea for all SME problems.

Growth is determined by various factors, in and out of the control of management of small businesses (Debarliev & Janeska-Iliev, 2015). While factors associated with the characteristics of the entrepreneur and the enterprise, such as skilled and innovative managers, a well-trained and devoted staff, and efficient administrative and operational procedures, are important for the development of competitive private firms in a country, their size and efficiency are affected by a host of external factors (UNIDO, 2005). Identified mostly with the external environment of SMEs, external factors are a set of factors that influence the functioning and development of these

enterprises. From the subject-based approach, the environment is a set of institutions and organized interest groups, but from the object-based approach, it is a set of processes and phenomena which the enterprise is subjected to and which it may affect (Lisowska, 2015).

The macro environment involves the following dimensions: political, economic, social, legal, technological, cultural, and international. However, performance is frequently evaluated from macroeconomic stability. Economic fluctuations strongly affect the growth probability of small firms and new firms have higher growth probability than older ones, provided that the firms survive (Kangasharju, 2000). Macroeconomic volatility is greater in less developed nations compared to more developed nations. Key economic factors such as the Consumer Price Index (CPI), interest rate, unemployment rate, Gross National Income (GNI) per capita, and corporate tax rate, can pose a positive or negative threat to the performance of a firm.

Prudent economic management that avoids volatility and uncertainty is crucial to economic growth. Policies that lead to high inflation, high tax rates, distorted factor prices, or lack of foreign exchange discourages private business formation and investment. Furthermore, an efficient financial system is key to mobilizing savings and channeling them into investments (OECD, 2004). This study focuses on investigating how macroeconomic factors such as the real effective exchange rate, affect SME performance.

1.2. Motivation for the Study

Because of a weak operating environment for private business ventures in most developing countries, potential entrepreneurs resort to economic activity outside the legal framework (in the informal sector) for generating income. This both limits the potential benefits for the small business owner (for example, access to finance and supporting services) and hinders the growth of the formal sector by draining resources and reducing the tax base (UNIDO, 2005).

The role of size and age in influencing firm dynamics is crucial in understanding productivity differences across firms in developing countries (Ayyagari, Demirguc-Kunt, & Maksimovic, 2015). They found that initial starting conditions specifically size at birth, plays a significant role in explaining the variation in size and growth since birth, highlighting the importance of founding conditions in studying size and growth over firm lifecycle. Thus, it is important that SMEs start in a good enabling macroeconomic environment. They also found that across developing countries, older firms are larger and grow as they age, but are not much more productive than younger firms.

1.3. Problem Statement

In countries such as Kenya, SMEs play an outsized role, where they account for half of employment and the majority of jobs created (World Bank, 2016). Yet, banks are reluctant to lend credit to SMEs because of the macroeconomic environment of a country (Klein, 2014; Berg & Fuchs, 2013).

Interest in the role of SMEs in economic development continues to be in the forefront of policy debates in most countries. In spite of this, the conversation does not go beyond investigating the barriers to SMEs and factors internal to their operating environment that hinder their growth or performance.

In the long-run, the goal is not only a high GDP per capita but also to create decent higher-quality jobs (Sen, 1990). Thus, an overall favorable operating environment that promote SMEs need to be ensured. This paper attempts to raise awareness of the important role the Government and other parastatal agencies have in managing the economy more wisely and improving economic conditions in less developed nations, so as to avoid volatility and uncertainty in macroeconomic factors that affect SMEs performance.

Management make several decisions which are usually moderated by the macroeconomic environment; these include financial decisions, investing decisions

and operational decisions (Owolabi, 2017). Therefore, their ability to anticipate changes in the macro economy and competition, will affect business growth (Sarwoko & Frisdiantara, 2016). The findings from this study would create awareness on the macroeconomic environment to the entrepreneurs and prepare them to run the business efficiently.

This paper seeks to test the extent to which certain macroeconomic variables affect SME performance in Kenya.

1.4. Research Objectives

1. To investigate how chosen macroeconomic factors affect growth in sales of an SME.
2. To investigate how chosen macroeconomic factors affect growth in the number of employees of an SME.
3. To investigate how chosen macroeconomic factors affect the capacity utilization of an SME.

1.5. Research Questions

1. How do chosen macroeconomic factors affect the growth in sales of an SME?
2. How do chosen macroeconomic factors affect the growth in the number of employees of an SME?
3. How do chosen macroeconomic factors affect the capacity utilization of an SME?

1.6. Significance of the study

A favorable enabling environment that promote SMEs is crucial to their growth. This paper attempts to raise awareness of the important role the Government and other parastatal agencies have in managing the economy more wisely and improving economic conditions in less developed nations, so as to avoid volatility and uncertainty in macroeconomic factors that affect SMEs performance.

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This paper will be relevant for policymakers as it seeks to test the extent to which macroeconomic variables affect SME performance in different SMEs in Kenya, and hence determine the most important variable in boosting SME performance.

Interest in the role of SMEs in the development process continues to be in the forefront of policy debates in most countries. Yet, this conversation does not go as far as exploring what external factors could drive SME growth or performance.

This paper attempts to raise awareness of their role in improving economic conditions in developing countries such as Kenya.

1.7. Scope of the study

The research will be looking at SMEs in the formal sector. This is because those in the informal sector are neither taxed nor included in the Gross National Income (GNI) of a country; are exempted from taxes as the employees do not have regular working hours and wages.

This study will focus on SMEs in Kenya, which is a lower middle-income economy. According to the World Bank, for the current 2019 fiscal year, lower middle-income economies are those with a GNI per capita, calculated using the World Bank Atlas method, between \$996 and \$3,895.

1.8. Limitations of this study

This study does not look at SME specific factors within the firm such as the quality of management, degree of informality, ability to leverage new technology, availability of adequate collateral, business skills, among others. Furthermore, the study does not look at all external factors influencing SME performance, but rather it focuses on specific macroeconomic factors. The proposed list of macroeconomic variables representing the determinants of SME performance is not exhaustive. However, cited literature and findings by other authors suggest that such a selection of factors is generally accepted and will help shed light on the research problem. This cross-country analysis should be interpreted with caution because it is most sensitive to differences in the definition of SME across countries.

Furthermore, this study assumes that the growth of an enterprise is synonymous with its performance or development. These terms may be interpreted otherwise in other empirical studies.

1.9. Organization of the study

Chapter 2 examines and critiques existing literature done on similar topics. Chapter 3 provides an explanation and description of the methods and procedures to be used in conducting this study. Chapter 4 presents the findings from the data analysis. Finally, chapter 5 concludes the research paper by summarizing the results as well as giving recommendations to policy makers and suggesting possible areas for future research.

CHAPTER 2 : LITERATURE REVIEW

2.1. Introduction

In order to advance people's collective understanding, a scholar or researcher needs to appreciate what has been done before, the strengths and weaknesses of existing studies, and what they might mean (Boote & Beile, 2005). Thus, the study seeks to test the conceptual linkages between the macroeconomic variables proposed and SMEs performance. This chapter discusses the claims made in existing theoretical and empirical literature, and examines critically the research approaches used by different authors on the subject, to better understand whether the claims are justified.

2.2. Theoretical Literature Review

This review seeks to provide a systematic understanding of the topic. Little theory has been done with regards to macroeconomic factors and firm growth. For this reason, the theories are not really comprehensive. Indeed, there is no unified theoretical model on firm growth. As an early contributor, (Penrose, 2009) considers that the growth of a firm is motivated by external opportunities, such as promising demand prospects for the firm's product and/or internal inducements, such as under-utilization of the existing resources of the firm. On the other hand, external and internal factors also produce obstacles to growth.

Development of demand is the major external factor which determines firm's growth. In addition, the market actions of competitors and the supply of production factors are typically external to the firm. The features of the local business environment are external particularly to a small firm.

Internal growth factors include the features of the firm itself such as the size and age of the firm, the characteristics of the resources such as those of the employees and the manager(s), as well as the strategic choices of the firm. To sum up, the internal factors determine the competitiveness of the firm in the market structured by the external factors.

Kumar, Rajan, & Zingales (1999) find that the average size of firms in industries dependent on external finance is larger in countries with better financial markets, suggesting that financial constraints may also keep firms small.

In their study, they also classify theories broadly as technological, organizational, and institutional, based on whether they focus on the production function, the process of control, or environmental influences.

Under the institutional theories, the channels through which institutions can affect firm size beyond that predicted by the technological and organizational theories are broadly categorized into regulatory and financial.

In regulatory theories, many costly regulations apply only to larger firms, tilting the playing field towards smaller firms. Other regulations such as strong product liability laws, favor creation of separate legal entities that can avail of the protection afforded by limited liability. This effect has been found to be important in explaining the time variation in firm size in the United States.

The effect of taxes on firm size is potentially ambiguous. High corporate taxes could drive many economic activities into the informal sector, and reduce the incentive to create a large firm. However, one could also argue that large firms can afford the staff to indulge in creative tax accounting, thus giving them a comparative advantage in a high tax environment.

Barriers to entry could be important in determining firm size. Hopenhayn (1992) develops a dynamic model of firm size based on entry costs and firm-level productivity shocks. He identifies that output price increases with entry cost leading to higher employment, but the threshold productivity level at which firms exit decreases, which increases the fraction of firms with lower employment. Whether increased barriers to entry increases or decreases average firm size is therefore an empirical question.

Under financial theories, a potential obstacle of firm growth is also the availability of external funds. Financial market development affects both the growth in average size of existing firms and the growth in the number of new establishments in the industries dependent on external finance.

Most of the effects above are country specific.

2.3. Empirical Literature Review

This review pursues research based on observed and measured phenomena and derives knowledge from actual experience rather than from theory or belief. The literature will be structured as follows: literature outside Africa (in Europe and Asia) is followed by literature on African SMEs in the West African region.

Global Empirical Literature

Anggadwita & Mustafid (2013) tested a conceptual model for measuring performance of SMEs, in which the performance depends on the resources available inside an organization. The factors in the study include four independent variables: entrepreneurial aspect (individual characteristics of the owner/managers; motivation, self-management, optimism, self-efficacy), competence of human resource (knowledge and labor skills), innovativeness (technology and product creativity) and sustainability (the feasibility of SMEs in sustaining their business; growth and profitability). They conducted a survey on sampled SMEs in Bandung, Indonesia and analyzed the responses using multiple regression analysis (the estimation technique was not specified). Results from the survey showed that entrepreneurial aspect and competence of human resource influenced SME performance, with the entrepreneurial aspect influencing performance higher than competence of human resource, while innovativeness and sustainability did not affect the performance of SMEs. Unfortunately, the study was limited to examining the internal factors of the SMEs that influence their performance. For further research, the authors

recommended to use different methods to explore the external variables that influence SMEs.

(Lisowska, 2015) did an analysis of external factors that influence the development of SMEs in three components: the macro-environment, meso-environment and micro-environment. She clearly stated that the aim of the study was to analyze and assess the impact of external determinants of the development (qualitative), not growth (quantitative), of SMEs in Poland. Nonetheless, in my study, it is assumed that the growth of an enterprise is synonymous with its development. Macroeconomic factors were recognized barriers to business development – the results from the Kruskal-Wallis test of determinants stemming from the macro-environment indicates their impact on the development of the surveyed enterprises especially in the area of barriers to business development which include, *inter alia*, high cost of raising external capital, and the macroeconomic situation of the country. Interestingly, surveyed entrepreneurs were of the opinion that the patent policy and protection of intellectual property has no significant impact on the development of the analyzed enterprises.

A growing body of research analyzes the factors in the macro economy have direct or indirect influence over the performance of SMEs. Halim, Malim, Derasit, Rani, & Rashid (2017) evaluated the impact of macroeconomic variables (exchange rate, interest rate, and inflation rate) on the profitability of SMEs (represented by SME GDP growth rate) in Malaysia. They built a multiple regression model in four phases; they identified all possible models, carried out tests on the models to remove all insignificant variables, selected the best model using the Eight Selection Criteria (Ramanathan, 2002), and conducted a goodness-of-fit tests. The interest rate and inflation rate were justified as significant and contribute to the SME GDP growth rate, while exchange rate was removed due to insignificance ($p > 0.05$). From the results of their study, Halim, et al. (2017) found a positive correlation between the interest rate and SME GDP growth rate and an inverse relationship between the inflation rate and SME GDP growth rate across time. In the study, they assumed that the SME GDP growth rate was a good representation of SME profitability because it is the level to

which SMEs contribute to GDP growth. This, however, is not a comprehensive measure of the profitability of all SMEs, because it does not take into account the unobserved heterogeneity among individual SMEs in the country.

A similar study was conducted in Lithuania (Bekeris, 2012). Most of the selected macroeconomic indicators such as inflation, average wages, and the number of enterprises in the country were not statistically significant and showed no strong correlation with company profitability. However, they found that unemployment had the biggest impact on profitability – an increase in the level of unemployment resulted in a reduction of the profitability of firms (negative correlation).

African Empirical Literature

Berg & Fuchs (2013) found that the legal and statutory framework, and the macroeconomic environment are among the main factors impacting bank financing for SMEs. In the study, they provided a synopsis of the state of access to bank financing for SMEs in five Sub-Saharan nations (Kenya, Rwanda, Tanzania, Nigeria, and South Africa). Macroeconomic factors were amongst the most significant obstacles identified by banks across countries, stating that banks in most countries perceived inflation and exchange rate volatility to affect the ease of doing business with SMEs. They also found that the key determinants behind banks' involvement with SMEs happen to be, *inter alia*, the structure and size of the economy, and the extent of Government borrowing, which are all out of the control of management. Moreover, high interest rates on Government securities disincentivized lending to SMEs.

In the region of West Africa, Egbunike & Okerekeoti (2018) conducted a study investigating the effect of interest rate, inflation rate, exchange rate and GDP growth rate on the size, leverage and liquidity of quoted (listed) manufacturing firms in Nigeria. The dependent variable, financial performance, is represented as return on assets (ROA). The study employed multiple regression analysis to understand the relationship between the ROA and the independent variables. The method of

estimation used was Panel Estimated Generalized Least Squares (EGLS). They found that both micro and macro factors determine the financial performance of a firm. However, the volatility of macroeconomic factors, such as inflation, exchange rate and interest rate, which are not under the control of management, hinder performance of manufacturing firms over time.

2.4. Summary of Literature Review

Empirical work has mainly concentrated on the investigation of the effects of certain internal factors to growth. They used a variety of research methods, from multiple regression analysis to EGLS. Nonetheless, the researchers seemed to agree on one fundamental thing: external factors impede growth of enterprises, especially the macroeconomic conditions of a country. The macroeconomic determinants analysed in past empirical literature that influence SMEs include the inflation rate, unemployment rate, interest rate, exchange rate, among others.

2.5. Research Gaps

Both qualitative as well as quantitative research have been done on almost every aspect of SMEs. Although closely associated to prior studies, this paper differs in several ways. First, past empirical work has mainly concentrated on the investigation of the effects of certain internal factors to growth. This paper looks at external macroeconomic factors. Second, most research done on the SME sector focuses on the barriers or obstacles small firms face, but they never address how the government could take certain steps to stabilize the economy by altering the levels of the macroeconomic factors in order to enable the performance of small businesses. Third, very few really delve into the ways a government could take certain steps to improve the macroeconomic environment of their country by varying certain factors, such as inflation or the real exchange rate.

This research paper seeks to test the influence of macroeconomic variables on SME performance in Kenya.

CHAPTER 3 : DATA & METHODOLOGY

3.1. Research Design

The theoretical and empirical literature are not really comprehensive, and since the proxies for SME performance are not detailed enough to allow us to devise precise tests, this study should be viewed as exploratory analysis. An exploratory research design is most suitable when discovering new insights on new data. This study investigates the influence that macroeconomic factors have on performance of SMEs to gain further insight as to the relationship between the dependent variables (measures of SME performance) and the independent macroeconomic variables. The software used for analysis is Stata because it is very useful in analysing survey data.

3.2. Population and Sampling

The population of the study comprises of enterprises surveyed in the Kenya Enterprise Survey for the years 2007, 2013 and 2018, to which the results of the study could be generalized to. The objective of the Enterprise Survey is to gain an understanding of what firms experience in the private sector. The qualitative and quantitative data collected through the surveys connect a country's business environment characteristics with firm productivity and performance. The sample for the Kenya Enterprise Survey was selected using stratified random sampling (World Bank Group, 2018). A stratified random sample is one obtained by separating the population elements into non-overlapping groups, called strata, and then selecting a simple random sample from each stratum (Scheaffer, Mendenhall, Ott and Gerow, 2011). Stratified random sampling was preferred over simple random sampling for several reasons:

- To obtain unbiased estimates for different subdivisions of the population with some known level of precision.
- To obtain unbiased estimates for the whole population. The whole population, or universe of the study, is the non-agricultural economy. It comprises: all manufacturing sectors, construction sector, services sector, and transport,

storage, and communications sector. Note that this definition excludes the following sectors: financial intermediation, real estate and renting activities (except the sub-sector IT, which was added to the population under study), and all public or utilities-sectors.

- To make sure that the final total sample includes establishments from all different sectors and that it is not concentrated in one or two of industries/sizes/regions.
- To exploit the benefits of stratified sampling where population estimates, in most cases, will be more precise than using a simple random sampling method (i.e., lower standard errors, other things being equal.)
- Stratification may produce a smaller bound on the error of estimation than would be produced by a simple random sample of the same size. This result is particularly true if measurements within strata are homogeneous.
- The cost per observation in the survey may be reduced by stratification of the population elements into convenient groupings.

Most surveyed SMEs (46.67%) were sampled from Nairobi County (see *Figure 1* below), followed by Nakuru County (34.81%). However, one would be wrong to infer that Nairobi has the most number of SMEs in the country, based on this information. The more likely reason that Nairobi has the most number of SMEs surveyed in this study is because the World Bank has presence in the county.

location	Freq.	Percent	Cum.
Kisumu	19	14.07	14.07
Mombasa	6	4.44	18.52
Nairobi	63	46.67	65.19
Nakuru	47	34.81	100.00
Total	135	100.00	

Figure 1 - Location

Three levels of stratification were used in this country: industry, establishment size, and region.

The terms industry and sector are often used interchangeably to describe a group of companies that operate in the same segment of the economy or share a similar business type. **Industry** refers to a much more specific group of companies or businesses, while the term **sector** describes a large segment of the economy. In terms of sector, the universe is stratified into 3 main categories: Manufacturing, Retail Services and Other Services (see *Figure 2*). In terms of industry, the universe was stratified into 22 sub-sectors (see *Figure 3*).

sector	Freq.	Percent	Cum.
Manufacturing	71	52.59	52.59
Other services	35	25.93	78.52
Retail services	29	21.48	100.00
Total	135	100.00	

Figure 2 - Sector

industry	Freq.	Percent	Cum.
Basic metals	3	2.22	2.22
Chemicals	2	1.48	3.70
Electronics (31-32)	2	1.48	5.19
Fabricated metal products	6	4.44	9.63
Food	10	7.41	17.04
Furniture	10	7.41	24.44
Garments	8	5.93	30.37
Hotel and restaurants: section H	21	15.56	45.93
IT	3	2.22	48.15
Machinery and equipment (29-30)	2	1.48	49.63
Non metallic mineral products	4	2.96	52.59
Paper	3	2.22	54.81
Plastics & rubber	4	2.96	57.78
Publishing, printing, and Recorded medi	3	2.22	60.00
Refined petroleum product	2	1.48	61.48
Retail	29	21.48	82.96
Services of motor vehicles	1	0.74	83.70
Textiles	3	2.22	85.93
Transport Section I: (60-64)	6	4.44	90.37
Transport machines (34-35)	2	1.48	91.85
Wholesale	4	2.96	94.81
Wood	7	5.19	100.00
Total	135	100.00	

Figure 3 - Industry

For the Kenya Enterprise Survey, size stratification was defined as follows: small (5 to 19 employees), medium (20 to 99 employees), and large (100 or more employees).

Necessary measures were taken to ensure the quality of the frame; however, the sample frame was not immune to the typical problems found in establishment surveys: positive rates of non-eligibility, repetition, non-existent units, among others (World Bank Group, 2018).

3.3. Data Collection

The study makes use of secondary data which is quantitative in nature and employs quantitative methods in order to answer the research questions. The World Bank collected data for Kenya Enterprise Survey through unstructured interviews. The number of establishments in this study are 45 SMEs, surveyed over time spanning 12 periods (2007, 2013, and 2018). The source for data aimed at measuring the performance of SMEs (that is, sales growth, growth in the number of employees and the capacity utilization, of each firm) was acquired either directly or indirectly via calculation from the World Bank's Kenya Enterprise Survey. Data from macroeconomic factors were obtained from the World Bank Open Data Portal as well as the International Monetary Fund's International Financial Statistics.

3.4. Technique of Data Analysis

From the survey, some of the firms are surveyed over the same period of time. Thus, the survey consists of panel data. An advantage of using panel data analysis is that it is useful in controlling for individual heterogeneity among cross-sectional units (Baltagi, 2008). In addition, panel data gives more informative data, more variability, less collinearity among variables, and more efficiency of econometric estimates.

3.4.1. Model Specification

The empirical model to be used in testing the research hypotheses in this study will be a panel data model of the following structure:

$$y_{it} = \beta_0 + \beta_1 x_{1t} + \dots + \beta_i x_{it} + a_i + \mu_{it},$$

where y_{it} represents the measure of SME performance of different SMEs across time, β_0 is a constant term, β_1, \dots, β_i are the coefficients to their respective independent variables, x_{1t}, \dots, x_{it} represent the all the independent variables, a_i is the unobserved heterogeneity, and μ_{it} is the error term.

The general model fits my study because the data in this study comprises of panel data observations, and the analysis as well as the estimation of coefficients (or parameters) will employ panel data techniques.

3.4.2. Robustness Test

In order to formally test the significant differences in the coefficients on the time-varying explanatory variables and whether they are parsimonious, the Hausman test will be employed in order to choose between Fixed Effects Estimation or Random Effects Estimation. I also employ the Breusch-Pagan test for heteroskedasticity.

3.5. Conceptual Framework

3.5.1. Measures of SME Performance

Unlike past empirical literature where researchers used only one dependent variable as a measure of SME growth (from SME GDP growth rate to Return on Assets), my study incorporates 3 dependent variables each with its own separate panel regression. Sales growth (Yeboah, 2015), growth in the number of employees (Kumar, et al. (1999), and capacity utilization (Penrose, 2009), are the variables used to represent the performance of SMEs.

Sales Growth

The growth in total sales is the increase in the total annual sales of an establishment at the end of last fiscal year from the total annual sales of the establishment three years ago, as a percentage of the total annual sales three years ago.

Growth in the number of employees

The growth in the number of permanent full-time employees is the increase in the number of permanent, full-time individuals who worked in an establishment at the end of last fiscal year from the number of permanent full-time individuals who worked in the establishment three years ago, as a percentage of those who worked in the establishment three years ago. Permanent, full-time employees are defined as all employees that are employed for a term of one or more fiscal years and/or have guaranteed renewal of their employment and that work a full shift.

Capacity Utilization

The capacity utilization of an enterprise is its output produced as a percentage of the maximum output possible if using all the resources available in last fiscal year.

While these are the most comprehensive data on SMEs in Kenya, they are not without their shortcomings. For instance, it would be useful to have additional information on SME employment beyond the three broad sectors in the study (that is, manufacturing, retail services and other services), but data are unavailable for the share of SMEs in other sectors. Further, the SME performance measures are static in the sense that it does not take into account an increase in profit levels, and graduation of successful SMEs into large enterprises. Another potential problem is that these measures of the SME sector only include formal enterprises and exclude informal enterprises. Some observations are lost due to data restrictions, so that the regression sample comprises up to 45 SMEs.

3.5.2. Macroeconomic factors

According to the International Monetary Fund;

Real GDP per capita growth (annual %)

Annual percentage growth rate of real GDP per capita is measured as the growth in the gross national output, converted to U.S. dollars using the World Bank Atlas method, divided by the mid-year population (UNICEF, 2019), and adjusted for inflation.

Inflation rate, consumer prices (annual %)

Inflation as measured by the consumer price index reflects the annual percentage change in the cost of the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. It measures how fast prices are rising Mankiw (2013).

Real interest rate (%)

Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.

Total unemployment (% of total labor force) (modeled ILO estimate)

Unemployment refers to the share of the labor force that is without work but available for and seeking employment.

Net foreign direct investment (Balance of Payments (BoP), current US\$)

Foreign direct investment (FDI) refers to the direct investment equity flows in the reporting economy. Net FDI refers to the net inflows in FDI less the net outflows in FDI.

General government final consumption expenditure (current US\$)

General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of

employees). It also includes most expenditures on national defense and security but excludes government military expenditures that are part of government capital formation.

Real effective exchange rate (Local Currency Unit, LCU)

The real exchange rate measures domestic costs as a proportion of foreign costs in the same currency. It is most common to measure the real exchange rate based on consumer goods prices.

Terms of trade (%)

Terms of trade are the ratio of export prices to import prices, and they measure how much can be obtained in imports per unit of exports. Terms of trade are generally presented as an index based on a given base year and therefore show the proportional change in the price of exports and imports.

To some extent, there is a tendency for these two variables (real exchange rate and terms of trade) to move together, but there are also forces that pull them in different directions. The difference may be less pronounced, but nonetheless considerable.

Broad money growth (annual % change from previous period)

Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

Claims on private sector (annual % change from previous period)

Claims on private sector include gross credit from the financial system to individuals, enterprises, nonfinancial public entities not included under net domestic credit, and financial institutions not included elsewhere.

3.6. Methodology

To evaluate the relationship between macroeconomic factors and SME performance, we use the following panel regression:

$$Y_{it} = \beta_0 + \beta_i X_{it} + a_i + \varepsilon_{it}, \quad i = 1, 2, \dots, N; t = 1, 2, \dots, T$$

where Y_{it} represents the measure of SME performance specific to each regression, namely the growth in the total annual sales, growth in the number of permanent full-time employees, or capacity utilization of different SMEs across time; β_0 is the constant (or intercept) term, β_i are the estimated coefficients of the independent variables; X_{it} represent the all the independent variables – the macroeconomic factors – across time; a_i is the unobserved heterogeneity, and ε_{it} is the error term.

Following [Egbunike & Okerekeoti \(2018\)](#), variables such as the GDP per capita growth, the interest rate and the exchange rate, are included. However, in this study the variables aforementioned are adjusted for inflation. In addition, several policy variables such as the inflation rate, the general government final consumption expenditure, the terms of trade, and the claims on private sector, are included.

CHAPTER 4 : RESULTS

4.1. Descriptive Statistics

Before engaging in any regression analysis, it is essential to have a feel of your data set, that is, what the sample conveys. In this study, a panel dataset is obtained from the World Bank Kenya Enterprise Survey. To understand more about the panel structure, see *Figure 4* below.

Panel: Firm interviewed in these years	Year of survey			Total
	2007	2013	2018	
2007 only	506	0	0	506
2013 only	0	397	0	397
2018 only	0	0	708	708
2007 and 2013 only	91	91	0	182
2013 and 2018 only	0	233	233	466
2007, 2013 and 2018	60	60	60	180
Total	657	781	1,001	2,439

Figure 4 - Original Panel Structure

From the results above, the original survey consists of 2,439 observations. Out of the total number, there are only 180 panel observations across the periods 2007, 2013 and 2018. Out of those 180 observations, only 135 observations are strictly SMEs (45 are Small and Medium Sized Enterprises). The variable, **panelid**, is the same across the waves for the same firm.

Majority of the SMEs surveyed (52.59% to be precise) are in the manufacturing sector, while 21.48% are in retail services (see *Figure 2*). This is not in line with the study done by [Lisowska \(2015\)](#), in which majority of the SMEs she surveyed were involved in trade and services (approximately 70% of them) and only less than 30% were in the manufacturing sector. In addition, 1-in-7 SMEs surveyed in my study have 100% national sales. This is in line with her study as main area of activity for SMEs surveyed

was done in the regional, national and local market (Only 1-in-10 companies expand their businesses to the international market).

Setting the data to be a panel data set, *Figure 5* shows that the data is strongly balanced. However, the data has some randomly missing observations as well as gaps between the years 2007, 2013, and 2018.

```

xtset panelid year
      panel variable:  panelid (strongly balanced)
      time variable:  year, 2007 to 2018, but with gaps
                    delta: 1 unit
  
```

Figure 5

The time period is also uniformly distributed (see *Figure 6* below), implying that the number of time periods (which is 3) occur with equal probability. The data consists of 45 surveyed SMEs (the cross-sectional units) and 3 time periods (2007, 2013, and 2018). This makes this panel data set a short panel (that is, large N and small t).

```

. xtdescribe

panelid:  426003, 426004, ..., 426652          n =          45
  year:   2007, 2013, ..., 2018                T =           3
Delta(year) = 1 unit
Span(year)  = 12 periods
(panelid*year uniquely identifies each observation)

Distribution of T_i:  min      5%      25%      50%      75%      95%      max
                   3         3         3         3         3         3         3

   Freq.  Percent  Cum.  |  Pattern*
-----|-----
   45    100.00  100.00 |  111
   45    100.00          |  XXX

*Each column represents 5 periods.
  
```

Figure 6

Variable	Obs	Mean	Std. Dev.	Min	Max
panelid	135	426365.1	209.0295	426003	426652
p	135	23	13.03554	1	45
year	135	2012.667	4.513661	2007	2018
y	135	2	.8195375	1	3
annualsale~U	120	1.57e+08	3.96e+08	170000	2.50e+09
sales3year~U	110	2.40e+08	8.24e+08	100000	7.00e+09
salesgrowth	110	1.448651	12.68681	-.8214286	132.3333
numberofpe~m	133	54.47368	156.3055	2	1500
employees3~o	127	53.15748	156.3432	2	1300
growthinnu~s	132	.1881936	.4445925	-.6909091	2.6
capacityut~n	66	.7007576	.1860464	.25	1
changeinre~a	135	.0338212	.0042129	.0307841	.0397565
Inflationc~u	135	.0672206	.021961	.0468982	.0975888
changeinin~n	135	-.3764417	.0379223	-.4141916	-.3248194
Unemployment	135	.0938933	.0030198	.09065	.0979
changeinun~t	135	-.0081401	.0230061	-.0399281	.0132478
NetFDI	90	-8.07e+08	1.14e+08	-9.20e+08	-6.93e+08
changeinfd~t	90	12.37244	12.63691	-.1940686	24.93894
Generalgov~p	135	7.94e+09	2.74e+09	4.68e+09	1.14e+10
changeinge~n	135	.1703243	.0654127	.1151249	.2618415
Realeffect~e	135	114.5258	13.8509	99.14002	132.6157
changeinre~g	135	.0313739	.0027823	.0289331	.0352509
Realintere~e	135	.0876853	.0287959	.0481909	.1154784
changeinth~e	135	.3970613	1.714654	-1.601644	2.57169
Termsoftrade	135	-3.58e+10	4.79e+10	-9.58e+10	2.10e+10
changeinte~e	135	-1.75113	3.556974	-6.754852	.9948323
changeinbr~y	135	.151665	.0370167	.1022711	.1908641
changeincl~t	135	.1554458	.0830209	.0393845	.226104
sector	0				
industry	0				
location	0				
nationalsa~a	135	.9333333	.1420899	.2	1
indirectex~a	135	.0344444	.1108358	0	.8
directexpo~a	135	.0322222	.0888456	0	.6
lackofdema~s	0				
insu~linputs	0				
obsoletema~t	0				
uncertaint~r	0				
politicali~y	0				
howmuchofa~s	0				
howmuchofa~r	0				
howmuchofa~t	0				
biggestobs~s	0				
sec	135	1.688889	.805454	1	3
ind	135	11.47407	5.842241	1	22
locat	135	3.022222	.9809124	1	4
lackofdemand	22	1.545455	.5096472	1	2
insu~tinputs	22	1.409091	.5032363	1	2
obsoleteeq~p	22	1.318182	.4767313	1	2
uncertainty	22	1.454545	.5096472	1	2
politicians~b	22	1.818182	.394771	1	2
finaccess	135	3.896296	1.30598	1	6
taxrate	135	4.562963	1.433123	1	7
obstaclepo~b	135	3.8	1.364803	1	6
biggestobs~e	126	7.960317	4.830571	1	15

Figure 7 - Summary Statistics

Figure 7 lists the summary statistics. The variables with no summary statistics are string variables. The last 12 variables represent the string variables with numeric labels, hence they have summary statistics.

There is a wide variation in sales growth shown by the range of values from the minimum value, -0.8214286, to the maximum value, 132.333, and the standard deviation being approximately 12.7. The same goes for the number of employees, with the standard deviation being approximately 156, which is quite a substantial value.

The average sales growth is approximately 1.45% across the different firms, while the average growth in the number of employees is 0.19%, and the average capacity utilization is 0.70%.

Assessing the number of observations across variables, one notices that some observations regarding the total annual sales, the number of permanent full-time employees and the capacity utilization, are missing. The reason behind this is because either the establishment was not in business three years prior or they did not know the sales figures and/or remember how many permanent full-time employees they hired at the time.

According to the survey, approximately 70% of the SMEs in the data set make most of their total sales at the national level (that is, they do not export). Therefore, it is useful to study what macroeconomic factors affect the growth in sales.

Furthermore, 81% of respondents when asked the reason why they do not produce more cite *political instability* as a major reason, while 45% mention *uncertainty about future market prospects*.

In addition to the aforementioned results, 11.9% of respondents believe that the biggest obstacle facing their establishment is political instability, and 10.32% believe that access to finance is a major obstacle (see Figure 8). The level of political stability

has an impact on the macroeconomic environment, affecting factors such as the inflation rate, the real exchange rate, as well as the business environment. This in turn affects the financial system of a country and consequently influencing access to finance for businesses.

biggest obstacle affecting this establishment	Freq.	Percent	Cum.
Access to finance	13	10.32	10.32
Access to land	13	10.32	20.63
Business licensing and permits	8	6.35	26.98
Corruption	7	5.56	32.54
Courts	9	7.14	39.68
Crime, theft and disorder	6	4.76	44.44
Customs and trade regulations	5	3.97	48.41
Does not apply	2	1.59	50.00
Don't know (spontaneous)	6	4.76	54.76
Electricity	6	4.76	59.52
Inadequately educated workforce	2	1.59	61.11
Political instability	15	11.90	73.02
Practices of competitors in the informa	17	13.49	86.51
Tax rates	12	9.52	96.03
Transport	5	3.97	100.00
Total	126	100.00	

Figure 8 - Biggest Obstacle

Appendix B shows the correlations between the different measures of SME performance, the dependent variables, and the chosen macroeconomic factors, the independent variables, for this study. Simple correlations indicate that most macroeconomic variables are all strongly correlated among other, especially the real GDP per capita, the inflation rate, and the general government final consumption expenditure, both at level and differenced. Some macroeconomic variables are also strongly correlated with aspects of the dependent variables. For example, the unemployment rate has a strong positive correlation with SMEs' annual sales in the last fiscal year (0.1813) and the annual sales 3 years ago (0.2418).

Because of the presence of high levels of correlation between variables, most variables would be omitted because of collinearity when regressed. For this reason, certain macroeconomic variables had to be dropped from the analysis. Another motive for

dropping the variables would be because a model with too many independent variables would not be parsimonious. In addition, due to the relatively few number of observations in my study (135 observations), it is best to reduce the number of independent variables in the model from 10 to a range of between 3 to 5 variables, in order to observe the desired effect (based on previous theoretical and empirical frameworks) that the macroeconomic variables have on the different measures of SME performance. Therefore, judging by how significant the correlation coefficient is, the independent variables would be eliminated one by one.

One limitation encountered in this study was finding proxy variables for some macroeconomic variables with highly significant correlation coefficients with each other, because of problems such as data availability. Also, most were being omitted because of collinearity each time they were introduced into the model.

In the end, unfortunately, only 2 independent variables remained without issues of high collinearity – the real effective exchange rate and terms of trade. Subsequently, I went ahead with the analysis, regressing sales growth, growth in the number of employees and capacity utilization, against the real effective exchange rate and the terms of trade.

Note that in the following regressions, the independent variables are level, not differenced or lagged.

Besides, no tests for panel unit root were executed because the time period for this study consists of only 3 years, with gaps between each year (2007, 2013 and 2018). Therefore, there was no need to carry out a panel unit root test.

4.2. Sales growth regressions

The simplest way to estimate panel data is through a single pooled regression on all observations. A pooled regression is one that assumes constant coefficients across firms and across time, and that the error term captures the differences over firms and over time. However, the pooled OLS technique on a panel data set is suboptimal because it assumes that the same relationship holds for all data (that is, no heterogeneity). Therefore, in order to determine whether pooling the data would be ideal or not, I execute a pooled OLS regression.

The output appears as follows:

. reg salesgrowth Realeffectiveexchangerate Termsoftrade						
Source	SS	df	MS	Number of obs	=	110
Model	329.850789	2	164.925395	F(2, 107)	=	1.03
Residual	17214.2599	107	160.880934	Prob > F	=	0.3622
				R-squared	=	0.0188
				Adj R-squared	=	0.0005
Total	17544.1107	109	160.955144	Root MSE	=	12.684
<hr/>						
salesgrowth	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	-.702678	.4929571	-1.43	0.157	-1.679908	.274552
Termsoftrade	1.96e-10	1.42e-10	1.38	0.170	-8.54e-11	4.77e-10
_cons	89.12079	61.61173	1.45	0.151	-33.01728	211.2589

Figure 9

The Stata result includes some summary statistics and the estimates of the regression coefficients. The F-statistics tests the joint null hypothesis that all the coefficients in the model excluding the constant are zero. The probability value (p-value) associated with this F-statistic (Prob>F) is the chance of observing an F-statistic that is greater than 0.05, given a 95% confidence interval. The p-value, $p = .36222$, hence we fail to reject the null hypothesis and conclude that the model as a whole is statistically insignificant.

The R-squared (R^2) for the regression model represents the measure of goodness of fit or the coefficient of determination, indicating that the model with the 2 explanatory variables, real exchange rate and terms of trade, accounts for (or explains) about 2%

of the variation in sales growth, leaving 98% unexplained. The p-value of each of the estimated coefficients are all greater than 0.05 (given a 95% confidence interval), therefore, the coefficients are statistically insignificant.

These findings are in line with the findings of Halim, et al. (2017) where they dropped the exchange rate variable from their multiple regression model because of insignificance. Also, according to the regression, the real effective exchange rate has a negative relationship with sales growth, while terms of trade has a positive relationship. Also, I chose to use the real effective exchange rate as opposed to the official exchange rate (used by Halim, et al. (2017) and Egbunike & Okerekeoti (2018)) because it was a good indicator of the level of purchasing power parity in Kenya.

Testing for heteroscedasticity, Breusch and Pagan (1980) derived the Lagrange Multiplier (LM) test. The output is presented below (Figure 10):

```
. hetttest Realeffectiveexchangerate Termsoftrade  
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity  
Ho: Constant variance  
Variables: Realeffectiveexchangerate Termsoftrade  
  
chi2(2)      =    134.99  
Prob > chi2  =    0.0000
```

Figure 10

The resulting test statistic is a chi-squared statistic with two degrees of freedom. The null hypothesis under the test is that of presence of homoscedasticity. The resulting p-value, $p = .000$ is statistically significant and, thus, I reject the null hypothesis of homoscedasticity. Therefore, one limitation of this model is that heteroscedasticity is present.

Suppressing the constant term reveals the following output:

. reg salesgrowth Realeffectiveexchangerate Termsoftrade, noconstant						
Source	SS	df	MS	Number of obs	=	110
Model	224.07878	2	112.03939	F(2, 108)	=	0.69
Residual	17550.8767	108	162.508118	Prob > F	=	0.5041
				R-squared	=	0.0126
				Adj R-squared	=	-0.0057
Total	17774.9555	110	161.590505	Root MSE	=	12.748

salesgrowth	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	.0101632	.0122121	0.83	0.407	-.0140432	.0343696
Termsoftrade	-6.72e-12	2.26e-11	-0.30	0.767	-5.15e-11	3.81e-11

Figure 11

Despite controlling for the constant term, the p-values of each of the estimated coefficients are all greater than 0.05 (given a 95% confidence interval), therefore, the coefficients are still statistically insignificant. Curiously, however, in the regression model, the real effective exchange rate has a positive relationship with sales growth, while terms of trade have an inverse relationship with sales growth, unlike before I suppressed the constant term. This may be because of the fact the relationship the constant may have with the dependent variable is not significant to the researcher. Therefore, by suppressing the constant term, one gets a true depiction of the effect that the estimated slope coefficients of the independent variables have on the dependent variable in the model.

A limitation of the pooled OLS technique on a panel data set is that it assumes that the same relationship holds for all data (that is, no heterogeneity). For this reason, I go ahead to test for poolability of the data.

Tests for Poolability

The question of whether to pool the data or not innately arises with panel data. The simplest poolability test has as its null hypothesis the OLS (restricted) model;

$$H_0: y_{it} = \alpha + \beta X_{it} + v_{it}$$

and as its alternative the one-way Fixed Effects (unrestricted) model;

$$H_1: y_{it} = \alpha + \beta X_{it} + \mu_i + v_{it}.$$

One can test for poolability of slopes only, allowing for varying intercepts over firms (Baltagi, 2008). In other words, it is a test for the presence of individual effects.

Tests for Individual and Time Effects

Testing for the presence of individual effects, I obtain the following results:

$F(44, 63) = 1.46$
$\text{Prob} > F = 0.0828$

Figure 12

The F-statistic is 1.46 and is distributed as $F(44,63)$ under the null hypothesis of poolability of the slopes across firms. The p-value, $p = .0828$ is statistically insignificant at the 95% confidence level. Therefore, I fail to reject the null hypothesis of poolability of the slopes across firms, implying that the individual effects are statistically insignificant.

Testing poolability across time, I find that the restricted variables are omitted due to collinearity. This implies that across time, the explanatory variables are the same across firms, that is, they are time-invariant. Therefore, there are no time effects. As a result, executing a two-way error correction model gives the same result as testing for individual effects (see *Figure 12*), implying that joint effects are also statistically insignificant.

Hausman's Specification test

The Hausman Test tests whether one should use random effects estimation or fixed effects estimation. The null hypothesis of the test assumes that the covariance of the unobserved heterogeneity with the independent variables is equal to zero. This implies that the random effects estimation is consistent and is the more efficient estimator. On the other hand, the alternative hypothesis implies that the fixed effects estimator is solely consistent.

Running a random effects model, the following output is obtained:

```
. xtreg salesgrowth Realeffectiveexchangerate Termsoftrade, re
```

Random-effects GLS regression	Number of obs	=	110
Group variable: panelid	Number of groups	=	45
R-sq:	Obs per group:		
within = 0.0274	min =		1
between = 0.0143	avg =		2.4
overall = 0.0183	max =		3
	Wald chi2(1)	=	.
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	.

salesgrowth	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Realeffectiveexchangerate	-.6625727	.4590167	-1.44	0.149	-1.562229	.2370836
Termsoftrade	1.79e-10	1.32e-10	1.36	0.175	-7.96e-11	4.38e-10
_cons	84.0573	57.39559	1.46	0.143	-28.436	196.5506
sigma_u	5.795416					
sigma_e	11.628869					
rho	.19895366	(fraction of variance due to u_i)				

Figure 13

The results of the fixed effects model appears as follows:

```

. xtreg salesgrowth Realeffectiveexchangerate Termssoftrade, fe
Fixed-effects (within) regression           Number of obs   =       110
Group variable: panelid                   Number of groups =        45

R-sq:                                     Obs per group:
  within = 0.0320                          min =           1
  between = 0.0000                         avg =           2.4
  overall = 0.0137                          max =           3

corr(u_i, Xb) = -0.0238                    F(2, 63)        =        1.04
                                           Prob > F        =        0.3590

```

salesgrowth	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	-.5524268	.4826983	-1.14	0.257	-1.517022	.4121688
Termssoftrade	1.36e-10	1.39e-10	0.98	0.331	-1.42e-10	4.14e-10
_cons	69.70292	60.3355	1.16	0.252	-50.86795	190.2738
sigma_u	9.9522248					
sigma_e	11.628869					
rho	.42277571	(fraction of variance due to u_i)				

```

F test that all u_i=0: F(44, 63) = 1.46                Prob > F = 0.0828

```

Figure 14

After running the Hausman test, the probability value obtained ($p = .4608$) is greater than the 0.05 significance level given a 95% confidence interval (see Figure 15 below). Therefore, I fail to reject the null hypothesis and conclude that although random effects and fixed effects are both consistent, I ought to use random effects because of the fact that its variance is lower than that of fixed effects, implying that the random effects estimation is more efficient in this circumstance.

```

Test: Ho: difference in coefficients not systematic

      chi2(1) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
              =          0.54
Prob>chi2 =          0.4608
(V_b-V_B is not positive definite)

```

Figure 15

The random effects model allows for serial correlation and uses the Generalized Least Squares (GLS) estimation technique to correct for serial correlation. Assessing the random effects model, none of the estimated coefficients are statistically significant, that is, none of them have a p-value of less than 0.05.

Furthermore, the real effective exchange rate variable has an inverse relationship with sales growth while the terms of trade variable has a positive relationship with the dependent variable. This implies that an increase in the level of the real exchange rate by one Kenya Shilling results in a 0.6657227 decline in the sales growth; an increase in the terms of trade by one unit results in a $1.79e^{-10}$ rise in sales growth.

4.3. Employees growth regressions

Effecting a pooled OLS regression, the following output appears:

. reg growthinnumberofemployees Realeffectiveexchangerate Termsoftrade						
Source	SS	df	MS	Number of obs	=	132
Model	.584726706	2	.292363353	F(2, 129)	=	1.49
Residual	25.3090595	129	.19619426	Prob > F	=	0.2292
				R-squared	=	0.0226
				Adj R-squared	=	0.0074
Total	25.8937862	131	.19766249	Root MSE	=	.44294

growthinnumberofemployees	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	-.0040563	.015076	-0.27	0.788	-.0338846	.0257719
Termsoftrade	-2.18e-13	4.35e-12	-0.05	0.960	-8.83e-12	8.40e-12
_cons	.6444426	1.880925	0.34	0.732	-3.077013	4.365898

Figure 16

The probability value (p-value) associated with this F-statistic (Prob>F) is the chance of observing an F-statistic that is greater than 0.05, given a 95% confidence interval. The p-value, $p = .2292$, is statistically insignificant. Hence, I fail to reject the null hypothesis and conclude that the model as a whole is statistically insignificant.

The R-squared for the regression model indicates that the model with the 2 explanatory variables, real exchange rate and terms of trade, explains roughly 2% of the variation in the growth in the number of employees, leaving 98% unexplained.

The p-value of each of the estimated coefficients are all greater than 0.05 (given a 95% confidence interval), therefore, the coefficients are statistically insignificant.

Testing for heteroscedasticity, the output below is obtained:

```
. hetttest Realeffectiveexchangerate Termsoftrade

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: Realeffectiveexchangerate Termsoftrade

chi2(2)      =    14.40
Prob > chi2  =    0.0007
```

Figure 17

The resulting p-value, $p = .0007$, is statistically significant and, thus, I reject the null hypothesis of homoscedasticity. Therefore, one limitation of this model is that heteroscedasticity is present.

Suppressing the constant term reveals the following output:

. reg growthinnumberofemployees Realeffectiveexchangerate Termsoftrade, noconstant						
Source	SS	df	MS	Number of obs	=	132
Model	5.23671599	2	2.61835799	F(2, 130)	=	13.44
Residual	25.3320905	130	.194862235	Prob > F	=	0.0000
				R-squared	=	0.1713
				Adj R-squared	=	0.1586
Total	30.5688065	132	.231581867	Root MSE	=	.44143

growthinnumberofemployees	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	.0011073	.000386	2.87	0.005	.0003437	.0018709
Termsoftrade	-1.69e-12	7.40e-13	-2.28	0.024	-3.15e-12	-2.25e-13

Figure 18

Curiously, when the constant term is controlled for, both the real effective exchange rate and the terms of trade are statistically significant. The estimated coefficient of the real effective exchange rate variable has a p-value, $p = .005$, while that of the terms of trade variable is, $p = .024$. This implies that the pooled OLS model is statistically significant.

Terms of trade has a negative relationship that is statistically significant ($p = .024$). An increase in the terms of trade by one unit causes a $1.69e^{-12}$ decline in the number of permanent full-time employees of a firm. On the other hand, the real exchange rate has a positive relationship and is strongly statistically significant ($p = .005$). An increase in the real exchange rate by one unit results in a 0.0011073 increase in the firm's number of permanent full-time employees. This is not in line with the findings of Halim et al. (2017) where they remove the exchange rate from their model due to insignificance ($p > .05$).

Also, the p-value of the F-statistic given a 95% confidence interval, $p = .000$, provides strong evidence for me to reject the null hypothesis and conclude that the model as a whole is strongly significant statistically.

However, the R-squared for the regression model, which represents the measure of goodness of fit, indicates that the model with the 2 explanatory variables, real exchange rate and terms of trade, accounts for (or explains) approximately 17% of the variation in growth in the number of employees, leaving 83% unexplained.

Tests for Individual and Time Effects

Testing for the presence of individual effects (or testing for poolability), I obtain the following results:

$F(44, 85) = 2.08$ $Prob > F = 0.0020$

Figure 19

The F-statistic is 2.08 and is distributed as $F(44,85)$ under the null hypothesis of poolability of the slopes across firms. The probability value, $p = .002$. This is statistically significant at the 95% confidence interval. Therefore, I reject the null hypothesis of poolability of the slopes across firms, implying that the individual effects are strongly significant and that I ought to conduct better regression techniques to take these effects into account.

While testing poolability across time, it is found that the restricted variables are omitted due to collinearity. This implies that across time, the explanatory variables are the same across firms, that is, they are time-invariant. Therefore, there are no time effects. As a result, executing a two-way error correction model gives the same result as testing for individual effects (see *Figure 19* above), implying that joint effects are also statistically significant.

Hausman's Specification test

The Hausman Test tests whether one should use random effects estimation or fixed effects estimation. The null hypothesis of the test assumes that the covariance of the unobserved heterogeneity with the independent variables is equal to zero. This implies that random effects estimation is consistent and is the more efficient estimator. On the other hand, the alternative hypothesis implies that the fixed effects estimator is solely consistent.

Running a random effects model, I obtain the following output:

```
. xtreg growthinnumberofemployees Realeffectiveexchangerate Termssoftrade, re

Random-effects GLS regression              Number of obs   =       132
Group variable: panelid                   Number of groups =        45

R-sq:                                     Obs per group:
      within = 0.0504                      min =           2
      between = 0.0241                     avg =          2.9
      overall = 0.0226                     max =           3

corr(u_i, X) = 0 (assumed)                Wald chi2(1)    =         .
                                           Prob > chi2     =         .
```

growthinnumberofemployees	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Realeffectiveexchangerate	-.004161	.0129171	-0.32	0.747	-.0294781	.0211561
Termssoftrade	-2.22e-13	3.73e-12	-0.06	0.953	-7.53e-12	7.09e-12
_cons	.6545088	1.612021	0.41	0.685	-2.504995	3.814012
sigma_u	.23298509					
sigma_e	.3788728					
rho	.27439202	(fraction of variance due to u_i)				

Figure 20

Furthermore, evaluating the size effect of each explanatory variable, both the real effective exchange rate and the terms of trade have an inverse relationship with growth in the number of employees. This implies that an increase in the level of the real exchange rate by one Kenya Shilling results in a 0.004161 decline in growth of an SME's number of employees; an increase in the terms of trade by one unit results in a $2.20e^{-13}$ decline in the growth in the number of employees.

4.4. Capacity Utilization regressions

Executing a pooled OLS regression, the following output appears:

. reg capacityutilization Realeffectiveexchangerate Termsoftrade						
Source	SS	df	MS	Number of obs	=	66
Model	.038512424	2	.019256212	F(2, 63)	=	0.55
Residual	2.2113497	63	.035100789	Prob > F	=	0.5805
Total	2.24986212	65	.034613263	R-squared	=	0.0171
				Adj R-squared	=	-0.0141
				Root MSE	=	.18735

capacityutilization	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	-.0028232	.0092056	-0.31	0.760	-.021219	.0155727
Termsoftrade	3.26e-13	2.65e-12	0.12	0.902	-4.97e-12	5.62e-12
_cons	1.035292	1.149361	0.90	0.371	-1.261523	3.332107

Figure 23

The p-value of the F-statistic, $p = .581$ given a 95% confidence interval, hence, I fail to reject the null hypothesis and conclude that the model as a whole is statistically insignificant.

The R-squared (R^2) for the regression model represents the measure of goodness of fit or the coefficient of determination, indicating that the model with the 2 explanatory variables, real exchange rate and terms of trade, accounts for (or explains) approximately 2% of the variation in capacity utilization, leaving 98% unexplained.

The p-value of each of the estimated coefficients are all greater than 0.05 (given a 95% confidence interval), therefore, the coefficients are statistically insignificant.

Testing for heteroscedasticity, the output below is obtained:

```
. hettest Realeffectiveexchangerate Termsoftrade

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: Realeffectiveexchangerate Termsoftrade

chi2(2)      =      1.25
Prob > chi2  =      0.5341
```

Figure 24

The resulting p-value, $p = .5341$, is statistically insignificant and, thus, I fail to reject the null hypothesis of homoscedasticity. Therefore, the pooled OLS model regressed above lacks the problem of heteroscedasticity.

Suppressing the constant term reveals the following output:

. reg capacityutilization Realeffectiveexchangerate Termsoftrade, noconstant						
Source	SS	df	MS	Number of obs	=	66
Model	32.420071	2	16.2100355	F(2, 64)	=	463.18
Residual	2.23982903	64	.034997329	Prob > F	=	0.0000
				R-squared	=	0.9354
				Adj R-squared	=	0.9334
Total	34.6599	66	.52515	Root MSE	=	.18708

capacityutilization	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Realeffectiveexchangerate	.0054661	.000233	23.46	0.000	.0050006	.0059317
Termsoftrade	-2.03e-12	4.35e-13	-4.67	0.000	-2.90e-12	-1.16e-12

Figure 25

Remarkably, when the constant term is controlled, both the real effective exchange rate and the terms of trade are strongly significant, implying that the pooled OLS model is statistically significant. Terms of trade has a negative relationship that is statistically significance ($p = .000$). An increase in the terms of trade by one unit causes a $2.03e^{-12}$ decline in the capacity utilization of a firm. On the other hand, the real exchange rate has a positive relationship and has strong statistically significant ($p = .000$). An increase in the real exchange rate by one unit results in a 0.0054661 increase

in the firm's capacity utilization. This is in not in line with the findings of Halim et al. (2017) where they remove the exchange rate from their model due to insignificance ($p > .05$).

Moreover, the p-value of the F-statistic, $p = .000$ given a 95% confidence interval, hence providing strong evidence for me to reject the null hypothesis and conclude that the model as a whole is strongly significant statistically.

The R-squared for the regression model represents the measure of goodness of fit or the coefficient of determination, indicating that the model with the 2 explanatory variables, real exchange rate and terms of trade, accounts for (or explains) approximately 94% of the variation in capacity utilization, leaving only 6% unexplained.

Tests for Individual and Time Effects

Testing for the presence of individual effects, I obtain the following results:

$F(26, 37) = 1.92$
Prob > F = 0.0333

Figure 26

The F-statistic is 1.92 and is distributed as $F(26,37)$ under the null hypothesis of poolability of the slopes across firms. The p-value, $p = .033$ implying significance at the 95% confidence interval. Therefore, I reject the null hypothesis of poolability of the slopes across firms, implying that the individual effects are strongly significant and that I ought to conduct better regression techniques to take these effects into account.

Testing poolability across time, I find that the restricted variables are omitted due to collinearity. This implies that across time, the explanatory variables are the same across firms, that is, they are time-invariant. Therefore, there are no time effects. As a result, executing a two-way error correction model gives the same result as testing for individual effects (see *Figure 26* above), implying that joint effects are also statistically significant.

Hausman's Specification test

The Hausman Test tests whether one should use random effects estimation or fixed effects estimation. The null hypothesis of the test assumes that the covariance of the unobserved heterogeneity with the independent variables is equal to zero. This implies that random effects estimation is consistent and is the more efficient estimator. On the other hand, the alternative hypothesis implies that the fixed effects estimator is solely consistent.

Running a random effects model, I obtain the following output:

```

. xtreg capacityutilization Realeffectiveexchangerate Termssoftrade, re
Random-effects GLS regression           Number of obs   =       66
Group variable: panelid                 Number of groups =       27

R-sq:                                   Obs per group:
  within = 0.0620                        min =           1
  between = 0.0485                       avg =          2.4
  overall = 0.0171                       max =           3

corr(u_i, X) = 0 (assumed)                Wald chi2(1)    =       .
                                           Prob > chi2     =       .

```

capacityutilization	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Realeffectiveexchangerate	-.0034339	.0081377	-0.42	0.673	-.0193835	.0125158
Termssoftrade	4.70e-13	2.34e-12	0.20	0.841	-4.12e-12	5.06e-12
_cons	1.108108	1.016279	1.09	0.276	-.8837622	3.099978
sigma_u	.08776591					
sigma_e	.15939124					
rho	.23265544 (fraction of variance due to u_i)					

Figure 27

random effects model, none of the estimated coefficients are statistically significant, that is, none of them have a p-value of less than 0.05.

Furthermore, evaluating the variables' size effect, the real effective exchange rate variable has an inverse relationship with capacity utilization while the terms of trade variable has a direct relationship with the dependent variable. That is, an increase in the level of the real exchange rate by one Kenya Shilling results in a 0.0034339 decline in an SME's capacity utilization; an increase in the terms of trade by one unit results in a $4.70e^{-13}$ rise in the capacity utilization.

CHAPTER 5 : CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The development of small and medium-sized enterprises is influenced by a number of external factors arising from the environment around which an enterprise is established. The determinants can contribute to but also restrict the performance or development of SMEs.

This paper explores the relationship between SME performance and certain macroeconomic factors. I conduct a panel data analysis using data for 45 Kenyan SMEs obtained from the World Bank Enterprise Survey. In this study, 3 dependent variables that represent performance of SMEs; growth in total annual sales, the growth in the number of permanent full-time employees, and the capacity utilization, are each regressed against two independent variables; real effective exchange rate and terms of trade.

After conducting a pooled OLS regression, the estimated coefficients of the independent variables do not have a statistically significant effect on the dependent variables. However, once the constant term is suppressed, the estimated coefficients are strongly significant statistically; real effective exchange rate and the terms of trade have a positive influence and a negative effect on the growth in the number of employees and the capacity utilization, respectively. Generally, the real effective exchange rate had a positive relationship with SME performance, while the terms of trade had a negative effect on performance.

When random effects estimation is executed, the real effective exchange rate has an inverse relationship with overall SME performance while the terms of trade has a positive relationship with sales growth and capacity utilization, but a negative relationship with growth in the number of employees. However, the regressions' estimated coefficients are not statistically significant. Moreover, this does not imply

that there is a causal relationship between the real effective exchange rate and the terms of trade and overall SME performance in Kenya.

5.2. Recommendations for Policy Action

Interest in the role of SMEs in economic development continues to be in the forefront of policy debates in most countries. This paper will be relevant for policymakers because inclusive economic growth and development requires a serious consideration of the opportunities and challenges that SMEs face. SMEs have the potential to boost national productivity and transform the economy. However, the challenges faced by SMEs – of which access to finance is critical – if not addressed will impact growth and hinder Kenya’s goal of using entrepreneurs to support future growth.

A discouraging macroeconomic environment and an unfavorable regulatory environment are other challenges. This paper attempts to raise awareness of the important role the Government and other parastatal agencies have in managing the economy more wisely and improving economic conditions in Kenya, so as to avoid volatility and uncertainty in macroeconomic factors that affect SMEs performance. For instance, the Central Bank of Kenya could regulate the currency exchange rate, and the Government could enable imports and exports by managing import tariffs, tax exemptions, the corporate tax rates, as well as participating in trade agreements or treaties that empower SMEs, and as a result improve trade with other countries.

Overall, there is the need for changes to law, fiscal policies, financial institution strategy and management of SMEs.

5.3. Possible Areas for Future Research

One could improve on the measures of performance of SMEs by incorporating other variables such as profitability, cash flow, and study the impact of additional macroeconomic factors such as unemployment, and/or level of government debt. Future research studies could also explore the relationship of microeconomic factors that affect SME performance.

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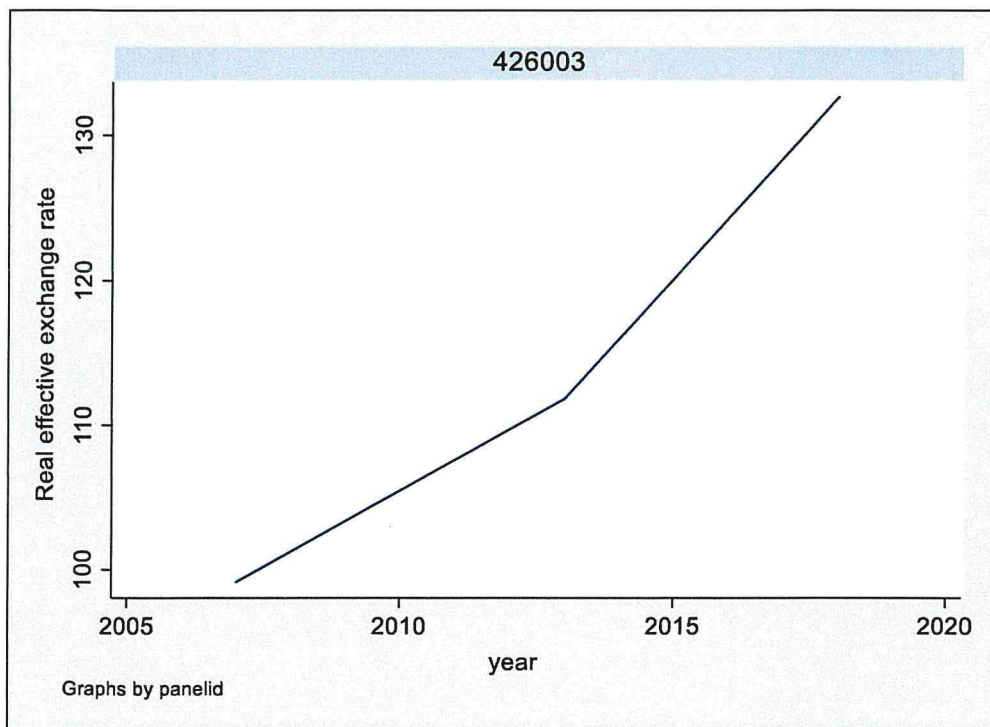
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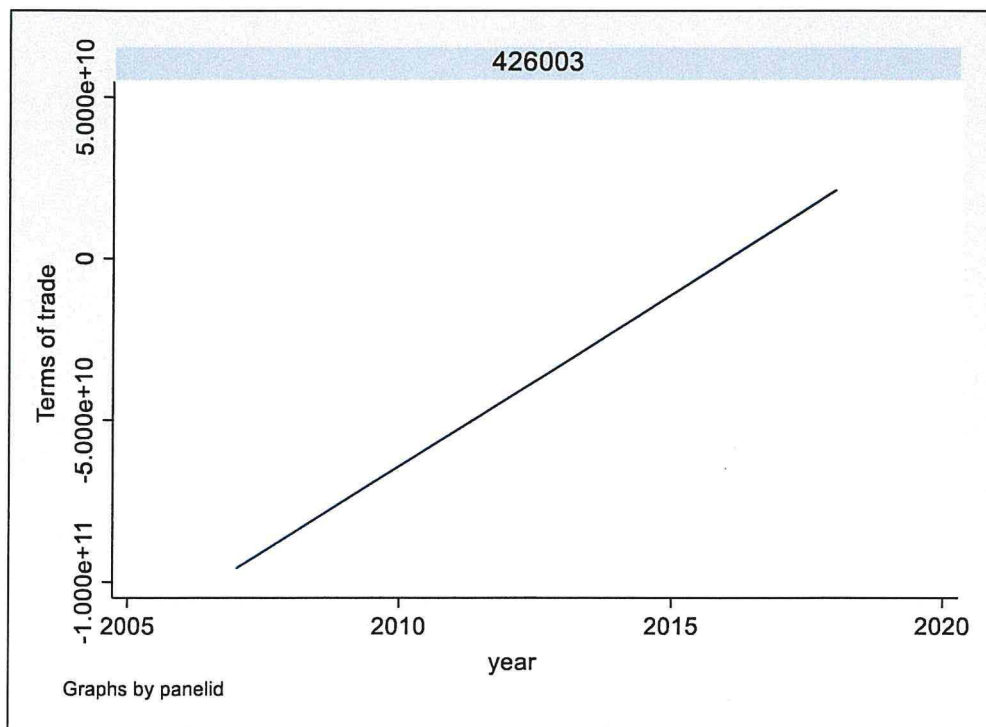
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APPENDICES

APPENDIX A : DESCRIPTIVE STATISTICS



Graph 1 - Real Effective Exchange Rate



Graph 2 - Terms of Trade

APPENDIX B : CORRELATION MATRIX

	Annual sales last FY	Annual sales 3 years ago	Sales growth	Number of employees last FY	Number of employees 3 years ago	Growth in number of employees	Capacity Utilization
Annual sales last FY	1.0000						
Annual sales 3 years ago	0.8173* (0.0000)	1.0000					
Sales growth	0.0013 (0.9897)	-0.0403 (0.6759)	1.0000				
Number of employees last FY	0.5258* (0.0000)	0.2744* (0.0039)	-0.0205 (0.8322)	1.0000			
Number of employees 3 years ago	0.5462* (0.0000)	0.3082* (0.0011)	-0.0309 (0.7495)	0.9837* (0.0000)	1.0000		
Growth in the number of employees	-0.0746 (0.4222)	-0.1014 (0.2943)	0.2803* (0.0032)	-0.0303 (0.7304)	-0.0952 (0.2869)	1.0000	
Capacity Utilization	0.0947 (0.4603)	0.1018 (0.4351)	0.1320 (0.3106)	0.0255 (0.8388)	0.0100 (0.9364)	0.2435* (0.0488)	1.0000

Note:

- Coefficients that have significant correlation (p-value less than 0.05) are boldly highlighted, with the levels of significance indicated below them in parentheses

	Annual sales last FY	Annual sales 3 years ago	Sales growth	Number of employees last FY	Number of employees 3 years ago	Growth in the number of employees	Capacity Utilization
Δ in real GDP per capita	-0.1600 (0.0809)	-0.1655 (0.0840)	-0.0446 (0.6434)	-0.0965 (0.2690)	-0.1109 (0.2144)	0.1230 (0.1601)	0.0970 (0.4385)
Inflation	-0.1427 (0.1201)	-0.1335 (0.1644)	-0.0224 (0.8159)	-0.0997 (0.2536)	-0.1093 (0.2213)	0.1363 (0.1192)	0.1105 (0.3771)
Δ in inflation	-0.1352 (0.1411)	-0.1205 (0.2099)	-0.0139 (0.8852)	-0.1001 (0.2518)	-0.1077 (0.2280)	0.1402 (0.1088)	0.1148 (0.3587)
Unemployment	0.1813* (0.0475)	0.2418* (0.0109)	0.1185 (0.2177)	0.0552 (0.5281)	0.0822 (0.3580)	-0.0363 (0.6794)	-0.0168 (0.8938)
Δ in unemployment	0.1752 (0.0557)	0.1977* (0.0384)	0.0696 (0.4703)	0.0889 (0.3088)	0.1082 (0.2261)	-0.1024 (0.2424)	-0.0773 (0.5371)
Net FDI	-0.2129 (0.0630)	-0.2451* (0.0379)	-0.1110 (0.3533)	-0.1222 (0.2566)	-0.1395 (0.2055)	0.0671 (0.5347)	0.0437 (0.7783)
Δ in net FDI	-0.2129 (0.0630)	-0.2451* (0.0379)	-0.1110 (0.3533)	-0.1222 (0.2566)	-0.1395 (0.2055)	0.0671 (0.5347)	0.0437 (0.7783)
Government expenditure	0.0966 (0.2937)	0.0581 (0.5463)	-0.0239 (0.8044)	0.0964 (0.2699)	0.0948 (0.2890)	-0.1499 (0.0862)	-0.1278 (0.3063)

Note:

- Δ represents the term “change”
- FY stands for Fiscal Year
- FDI stands for Foreign Direct Investment
- Government expenditure represents the general government final consumption expenditure

	Annual sales last FY	Annual sales 3 years ago	Sales growth	Number of employees last FY	Number of employees 3 years ago	Growth in the number of employees	Capacity Utilization
Δ in government expenditure	-0.1702 (0.0630)	-0.1864 (0.0511)	-0.0605 (0.5304)	-0.0922 (0.2910)	-0.1098 (0.2192)	0.1107 (0.2065)	0.0851 (0.4968)
Real effective exchange rate	0.0821 (0.3729)	0.0360 (0.7089)	-0.0363 (0.7066)	0.0932 (0.2859)	0.0885 (0.3223)	-0.1502 (0.0856)	-0.1299 (0.2984)
Δ in real effective exchange rate	-0.0070 (0.9397)	-0.0862 (0.3706)	-0.0963 (0.3170)	0.0622 (0.4771)	0.0425 (0.6349)	-0.1273 (0.1458)	-0.1201 (0.3366)
Real interest rate	0.1770 (0.0531)	0.2023* (0.0341)	0.0734 (0.4459)	0.0873 (0.3177)	0.1072 (0.2301)	-0.0987 (0.2603)	-0.0738 (0.5559)
Δ in real interest rate	0.0918 (0.3189)	0.0506 (0.5993)	-0.0281 (0.7704)	0.0954 (0.2747)	0.0928 (0.2995)	-0.1502 (0.0857)	-0.1287 (0.3031)
Terms of trade	0.1086 (0.2376)	0.0769 (0.4247)	-0.0130 (0.8928)	0.0983 (0.2602)	0.0995 (0.2657)	-0.1484 (0.0894)	-0.1251 (0.3169)
Δ in terms of trade	-0.0096 (0.9174)	0.0651 (0.4992)	0.0870 (0.3662)	-0.0691 (0.4293)	-0.0517 (0.5638)	0.1341 (0.1252)	0.1244 (0.3195)
Δ in broad money	-0.0733 (0.4261)	-0.0230 (0.8112)	0.0433 (0.6531)	-0.0910 (0.2976)	-0.0845 (0.3448)	0.1497 (0.0866)	0.1306 (0.2960)
Δ in claims on private sector	-0.0409 (0.6576)	0.0232 (0.8100)	0.0671 (0.4858)	-0.0809 (0.3544)	-0.0684 (0.4447)	0.1441 (0.0992)	0.1297 (0.2995)

	Δ in real GDP per capita	Inflation	Δ in inflation	Unemployment	Δ in unemployment	Net FDI	Δ in net FDI
Δ in real GDP per capita	1.0000						
Inflation	0.9839* (0.0000)	1.0000					
Δ in inflation	0.9695* (0.0000)	0.9977* (0.0000)	1.0000				
Unemployment	-0.7535* (0.0000)	-0.6240* (0.0000)	-0.5695* (0.0000)	1.0000			
Δ in unemployment	-0.9779* (0.0000)	-0.9249* (0.0000)	-0.8970* (0.0000)	0.8742* (0.0000)	1.0000		
Net FDI	1.0000* (0.0000)	1.0000* (0.0000)	1.0000* (0.0000)	-1.0000 (1.0000)	-1.0000* (0.0000)	1.0000	
Δ in net FDI	1.0000* (0.0000)	1.0000* (0.0000)	1.0000* (0.0000)	-1.0000 (1.0000)	-1.0000 (1.0000)	1.0000* (0.0000)	1.0000

	Δ in real GDP per capita	Inflation	Δ in inflation	Unemployment	Δ in unemployment	Net FDI	Δ in net FDI
Government expenditure	-0.8532* (0.0000)	-0.9326* (0.0000)	-0.9550* (0.0000)	0.2999* (0.0004)	0.7254* (0.0000)	-1.0000* (0.0000)	-1.0000* (0.0000)
Δ in government expenditure	0.9913* (0.0000)	0.9519* (0.0000)	0.9288* (0.0000)	-0.8335* (0.0000)	-0.9969* (0.0000)	1.0000* (0.0000)	1.0000* (0.0000)
Real effective exchange rate	-0.7966* (0.0000)	-0.8917* (0.0000)	-0.9204* (0.0000)	0.2028* (0.0183)	0.6527* (0.0000)	-1.0000 (1.0000)	-1.0000 (1.0000)
Δ in real effective exchange rate	-0.3789* (0.0000)	-0.5308* (0.0000)	-0.5940* (0.0000)	-0.3230* (0.0001)	0.1772* (0.0398)	1.0000* (0.0000)	1.0000* (0.0000)
Real interest rate	-0.9703* (0.0000)	-0.9115* (0.0000)	-0.8814* (0.0000)	0.8902* (0.0000)	0.9994* (0.0000)	-1.0000* (0.0000)	-1.0000 (1.0000)
Δ in real interest rate	-0.8348* (0.0000)	-0.9197* (0.0000)	-0.9442* (0.0000)	0.2671* (0.0017)	0.7014* (0.0000)	-1.0000* (0.0000)	-1.0000* (0.0000)
Terms of trade	-0.8954* (0.0000)	-0.9605* (0.0000)	-0.9772* (0.0000)	0.3818* (0.0000)	0.7826* (0.0000)	-1.0000* (0.0000)	-1.0000 (1.0000)
Δ in terms of trade	0.4625* (0.0000)	0.6133* (0.0000)	0.6656* (0.0000)	0.2344* (0.0000)	-0.2671* (0.0017)	-1.0000 (1.0000)	-1.0000 (1.0000)
Δ in broad money	0.7604* (0.0000)	0.8641* (0.0000)	0.8963* (0.0000)	-0.1460 (0.0912)	-0.6080* (0.0000)	1.0000* (0.0000)	1.0000* (0.0000)
Δ in claims on private sector	0.6184* (0.0000)	0.7457* (0.0000)	0.7892* (0.0000)	0.0554 (0.5235)	-0.4364* (0.0000)	1.0000* (0.0000)	1.0000* (0.0000)

	Government expenditure	Δ in government expenditure	Real effective exchange rate	Δ in real effective exchange rate	Real interest rate	Δ in real interest rate	Terms of trade
Government expenditure	1.0000						
Δ in government expenditure	-0.7771* (0.0000)	1.0000					
Real effective exchange rate	0.9950* (0.0000)	-0.7101* (0.0000)	1.0000				
Δ in real effective exchange rate	0.8060* (0.0000)	-0.2537* (0.0030)	0.8612* (0.0000)	1.0000			
Real interest rate	0.7015* (0.0000)	-0.9937* (0.0000)	0.6266* (0.0000)	0.1436 (0.0967)	1.0000		
Δ in real interest rate	0.9994* (0.0000)	-0.7551* (0.0000)	0.9978* (0.0000)	0.8258* (0.0000)	0.6767* (0.0000)	1.0000	
Terms of trade	0.9962* (0.0000)	-0.8289* (0.0000)	0.9825* (0.0000)	0.7514* (0.0000)	0.7609* (0.0000)	0.9926* (0.0000)	1.0000
Δ in terms of trade	-0.8571* (0.0000)	0.3417* (0.0000)	-0.9044* (0.0000)	-0.9957* (0.0000)	-0.2341* (0.0063)	-0.8742* (0.0000)	-0.8090* (0.0000)
Δ in broad money	-0.9875* (0.0000)	0.6683* (0.0000)	-0.9983* (0.0000)	-0.8891* (0.0000)	-0.5806* (0.0000)	-0.9923* (0.0000)	-0.9701* (0.0000)
Δ in claims on private sector	-0.9359* (0.0000)	0.5055* (0.0000)	-0.9665* (0.0000)	-0.9628* (0.0000)	-0.4055* (0.0000)	-0.9474* (0.0000)	-0.9017* (0.0000)

	Change in terms of trade	Change in broad money	Change in claims on private sector
Δ in terms of trade	1.0000		
Δ in broad money	0.9275* (0.0000)	1.0000	
Δ in claims on private sector	0.9836* (0.0000)	0.9797* (0.0000)	1.0000