MACROECONOMIC DETERMINANTS OF GROWTH IN THE MANUFACTURING AND SERVICE SECTOR IN ZAMBIA

By

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A dissertation submitted to the University of Zambia in partial fulfilment of the requirements for the degree of Master of Arts in Economics

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STUDENT DECLARATION

This Research is my original work and has not previously been presented for a degree, diploma or other qualifications in any other University.

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ABSTRACT

The growth of economies has historically been coupled with structural change. However, despite countries seemingly undergoing diverse structural changes, there is a disparity in how this translates to economic growth. Zambia is one among many African countries which has not experienced sustained high economic growth in the recent years despite having gone through the stereotypical agriculture to manufacturing to services transition. Thus, this study sets out to understand the macroeconomic drivers of output growth in the manufacturing and service sectors of Zambia. It uses secondary time series data for the period 1970 to 2017. Manufacturing value-added and service sector value-added are regressed on a number of macroeconomic variables which are identified as potential drivers of output growth in the two sectors. These include gross fixed capital formation, foreign direct investment (FDI), net exports, exchange rates, money supply and employment. The data was first tested for stationarity using Augmented Dickey Fuller (ADF) test and for structural breaks using Zivot Andrews test for structural breaks and then proceeded to test the relationship between the dependent and independent variables using the Autoregressive Distributed Lag (ARDL) method. The findings of the study are that gross fixed capital formation, employment and net exports are long run drivers of output growth in the two sectors whilst money supply and exchange rate are short run drivers of output growth. The findings show that whilst domestic physical capital accumulation is good for an economy, employment is a key player and should be given significant focus in macroeconomic growth prospects and targets. In addition, FDI which received significant focus in the past should not be given so much emphasis as it did not have a significant impact on both sectors.

Keywords: Manufacturing output growth, Service output growth, ARDL, Short Run and Long Run

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ABBREVIATIONS AND ACRONYMS

ADF Augmented Dickey Fuller

ARDL Autoregressive Distributed Lag

FDI Foreign Direct Investment

GDP Gross Domestic Product

GFCF Gross Fixed Capital Formation

WDI World Development Indicators

ZDA Zambia Development Agency

CHAPTER ONE

INTRODUCTION

1.1. Background of Study

The growth of economies has historically been coupled with structural change (Jha and Afrin, 2016). This theory which was argued by Ranis and Fei in 1961 has been adopted by many developed and developing countries (McMillan et al, 2016). However, despite countries going through structural changes, the results of these changes have not yielded the same amount of growth from country to country. Whilst many developed economies were successful in achieving vast growth through structural transformation, many African countries have experienced diverse structural change which has not been successful in yielding the much desired growth but in a few countries such as Botswana. Thus, where structural transformation was expected to be the norm, it turned out to be the exception (Rodrick, 2013).

Structural change is involved with moving resources from traditional low productivity activities into modern high productivity activities (McMillan et al, 2016). The developed countries of today moved from being primarily agricultural economies to primarily manufacturing and then primarily services. The increase in productivity is explained as being the result and to some extent the cause of the shift in domestic production (Jha and Afrin, 2016). Contrary to this, the neoclassical view as expounded by Solow in 1956 view the increase in growth of domestic production as being caused by the ability to save and accumulate physical and human capital as well as the ability to innovate and develop new products and services (Rodrick, 2013).

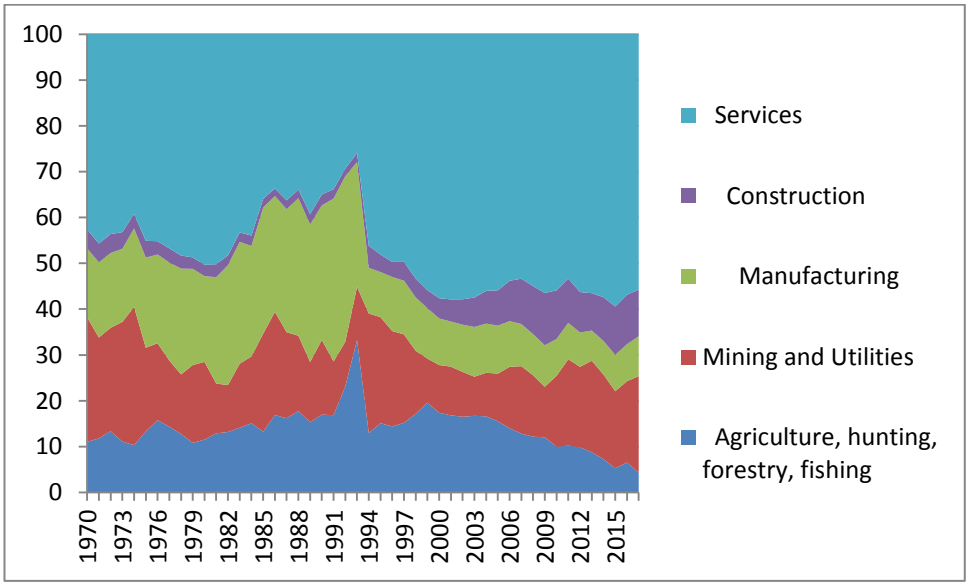
The consensus between the two schools of thought as argued by some economists is that they both work together to produce sustained growth in an economy (Jha and Afrin, 2016; Rodrick, 2013). In addition, studies have shown that there are various macroeconomic variables at play which influence growth in output. These variables include domestic and foreign investments, exchange rates, net exports and money supply among others (Singh and Kaur, 2014; Chizonde, 2016).

Economists have further explained the features of structural change as being a process by which (a) the shares of agriculture in GDP and employment fall over time, (b) there is increased migration as people move from rural to urban areas, (c) an agriculture and rural sector based economy is replaced by an industrial and urban sector based economy, and (d) a demographic transformation whereby high birth and death rates are replaced by low birth and death rates. Any existing dualism between the agricultural and the non-agricultural sectors gradually disappears over time triggered by economic growth. Thus they view economic growth as a long term-phenomenon which engineers structural change and is in turn affected by it (Jha and Afrin, 2016). A fundamental feature of growth has been pointed out as a decline in the agriculture sector and labour share in total value-added, an increase in the service sector in value-added and labour, while industry's share may rise or fall depending on a number of factors (Mulungu and Ng'omb, 2017).

Zambia has seemingly followed the developmental stereotype described above as can be observed in figure 1. The share of value-added in agriculture diminished from 1970 to 2017 with that of services increasing in the same period. Mining and utilities has more or less been consistent whilst manufacturing significantly dropped in 1993 at about the same time the service sector value-added began to rise. However, as is the experience with many other African countries, Zambia has not experience long

term sustained growth but rather episodic growth. This study therefore endeavours to explain from a long term macroeconomic perspective growth from a sectoral level taking the case of the manufacturing and service sector. What are the macroeconomic determinants of manufacturing and service sector growth in Zambia? To what extent do domestic capital and net exports affect growth in the manufacturing sector? Where growth in this context refers to the increase in value-added in the named sectors.

Figure 1: Gross Value-added by Sector (% of GDP), 1970-2017



Source: constructed by Author from UNCTAD Statistics

In addition, the study focuses on the manufacturing and the service sectors of Zambia because the manufacturing sector despite experiencing significant drop in production over the years has not yet fully exhausted its potential to produce sustained long run growth as highlighted by economists (Mulungu and Ng'ombe, 2017; Rodric, 2013). Contrary to this, the service sector in Zambia has experienced significant growth consistent with global trends hence the need to look at the macroeconomic drivers of growth in the two sectors. Furthermore, Sokunle (2016) argues that although many studies have been done to look at the effect of FDI for instance on Sub-Saharan

countries, it is equally important to study the effect of other macroeconomic variables in these countries. Hence, the study analyses the macroeconomic drivers of growth at a sectoral level.

The rest of this study is organized as follows. Chapter one will continue with the problem statement, general and specific objectives of the study and hypothesis followed by justification and significance of the study. Chapter two will give an overview of the Zambian economy in line with the study whilst chapter 3 will look at the literature review, both theoretical and empirical. Further, chapter 4 will present the methodology and chapter 5 the empirical analysis. Finally chapter 6 will conclude and present the policy implications and recommendations.

1.2. Problem Statement

Economists have argued that a change in the composition of GDP can produce sustained economic growth and rise incomes. Zambia has not experienced sustained long run growth despite having undergone structural adjustment programmes which were aimed at addressing the economic crisis which began in 1975. The service industry has however experienced significant growth whilst the manufacturing sector share has declined. Dependence on Mining activities has not produced sustained long run growth but rather periods of booms and slums depending on the rise and fall of copper prices. In addition, activities in agriculture have had a tendency to increase and decrease in periods of slums and booms respectively. A phenomenon Rodrik (2013) describes as producing growth-reducing structural change. This is owing to the fact that the agriculture sector is still highly labour intensive and does not employ much technology in Zambia.

The question that still remains to be addressed is what has driven growth in the service sector and stagnated growth of the manufacturing sector whose growth potential has not been fully realized?

Given the above, there is need to analyse from a long term perspective the macroeconomic drivers of growth in the manufacturing and service sector that are responsible for the growth of first the manufacturing sector and then the service sector in Zambia. This is so that policy makers can alter the sectoral pattern in the economy in favour of the manufacturing sector whose potential has not yet been fully realized even as the service sector experiences growth.

1.3. Objectives

1.3.1. Main Objective

The main objective of this study is to identify the macroeconomic determinants of manufacturing sector and service sector value-added growth for the period 1970 to 2017 and how they differ for the two sectors at a macroeconomic level in Zambia.

1.3.2. Specific Objectives

- Determine the effect of domestic capital (measured by Gross fixed capital formation) on manufacturing and service sectors value-added and how it differs for the two sectors.
- Measure the impact of net exports on manufacturing and service sectors value-added and how it differs for the two sectors.

1.4. Hypothesis

i. Gross fixed capital formation has a positive impact on growth of manufacturing and service sector value-added

ii. Net exports and growth of manufacturing and service sector value-added are positively related

1.5. Justification of the Study

This paper attempts to carry out sectoral analysis of the macroeconomic determinants of growth in the manufacturing and service sector in Zambia. It builds on the study done by Mulungu and Ng'ombe (2017) who argue that it is cardinal to carry out sectoral studies in a country specific context and not only at a regional level. This is so that policy recommendations can address country specific issues which are diverse. The study uses parametric approach in its estimation which is argued to have greater statistical power than non-parametric methods and by doing so seeks to provide further insights on the subject matter.

1.6. Significance of Study

This study is relevant as there is need to have a closer look at which macroeconomic variables determine long run growth in the manufacturing and service sector in order for policy makers in Zambia to gear decisions towards boosting growth in the manufacturing sector and put the economy in a position where it can benefit from regional integration.

CHAPTER TWO

CONTEXT OF THE STUDY

2.1. Economic Performance

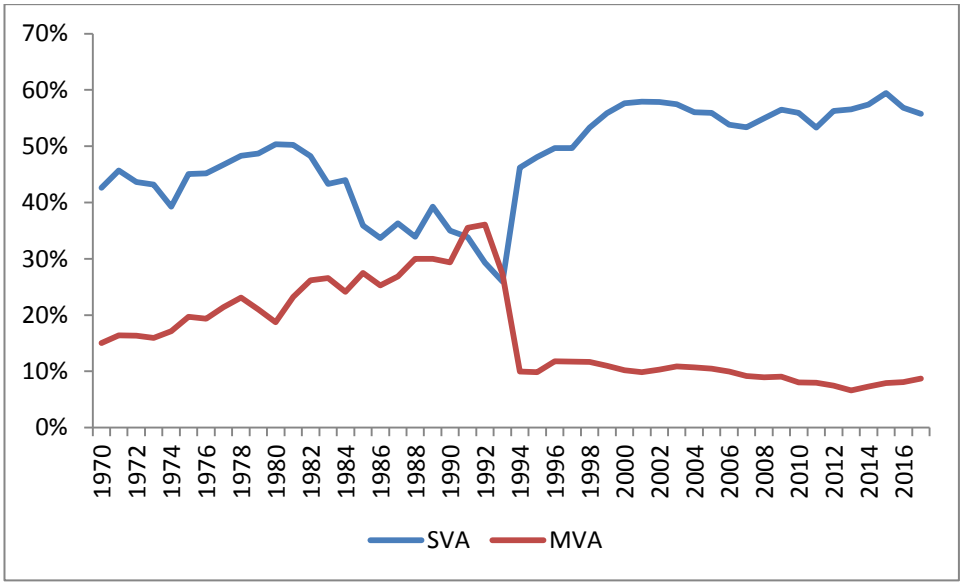
Zambia was able to sustain a high rate of real growth from independence in 1964 which was largely driven by high copper prices until about 1974, when it suffered a major external shock in the form of a drastic, 40 percent fall in the price of copper (Ndulo and Mudenda, 2010). Between 1970 and 2017, the country moved from being a closed economy to an open economy.

Between 1970 and 1990, Zambia had an industrial policy which was structured in favour of the manufacturing sector. This was done through the national budget, an elaborate structure of state-owned companies and through an incentive system biased in favour of the manufacturing sector. The key features were an industrial sector which was sheltered from external competition and an economy where the State determined the level, composition and quality of manufacturing (Ndulo and Mudenda, 2010).

However, in 1991 Zambia experienced a change of government. This shift in government brought about a number of changes for the economy. For instance, the new government undertook the Structural Adjustment Programmes (SAPs) which were intended to restructure the economy. Along with other changes such as liberalization, privatization undertaken in 1992 was a major component of SAPs. This involved privatising a number of firms which were previously State owned. Prior to this, industries benefitted from government support and funding, privatizing meant that these firms were to stand on their own. As a result, many industries struggled to survive. The change in government and government policy can partially

explain the growth in manufacturing share value-added in the 1970s and its decline post 1992 as seen in figure 2. The service sector on the other hand experienced massive growth post liberalization.

Figure 2: Gross Value-added by Sector (% of GDP), 1970-2017



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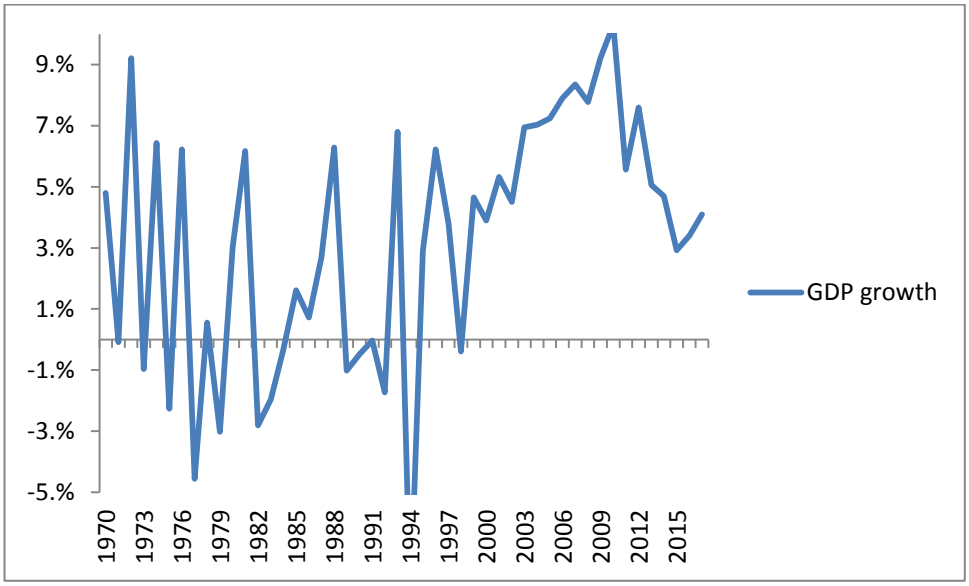
Presently, the Zambian economy still largely depends on copper exports as its major commodity and as such it has been characterized by episodic growth as shown in figure 3. The mining sector alone contributes to up to 70 percent of the country's exports but there have been debates about whether the economy benefits from these exports evident by the low contribution to taxes that emanate from mining sector and the small segment of the population it employs (Chizonde, 2016). As a result, there have been efforts by the government to diversify the economy by shifting attention to other sectors such as agriculture which has been a major target because of the land availability and large population that is engaged in agricultural activities. However, these efforts have still not yielded the needed growth and the little recorded growth within the sector has been mainly attributed to the limited number of commercial

producers (World Bank, 2018). Other sectors are the manufacturing and service sectors.

Figure 3: GDP growth in Zambia (%), 1970-2017



Source: constructed by author using World Bank (WDI) data

2.2. Agriculture

Agriculture is an important sector for employment in the Zambian economy. It accounts for over 85 percent of both formal and informal employment despite its share to GDP being roughly static around 8 percent of GDP (Ndulo and Mudenda, 2010; World Bank, 2018). The low levels of agriculture output are attributed to low productivity within the sector which has been at the heart of high rural poverty levels in the country. The low productivity is due to challenges faced such as limited access to water, machinery and a lack of diversification and technology adoption. Government policy to diversify activities in this sector, such as floriculture and the cultivation of other high value crops has had some success. However, output is still vulnerable to weather conditions (Ndulo and Mudenda, 2010; World Bank, 2018).

2.3. Manufacturing

The manufacturing sector activities in Zambia are private sector activities which contribute about 9 percent to GDP. According to ZDA (2013) the sector has an average growth rate of 3 percent. The growth in the sector is mainly attributed to agro processing (food and beverages) and textiles and leather. Other subsectors include, secondary processing of metals, fertilizers, chemicals, explosives, wood products and paper products and construction of materials such as cement. The sector is vital for the country's strategy for encouraging broad based growth (ZDA, 2013).

2.4. Service

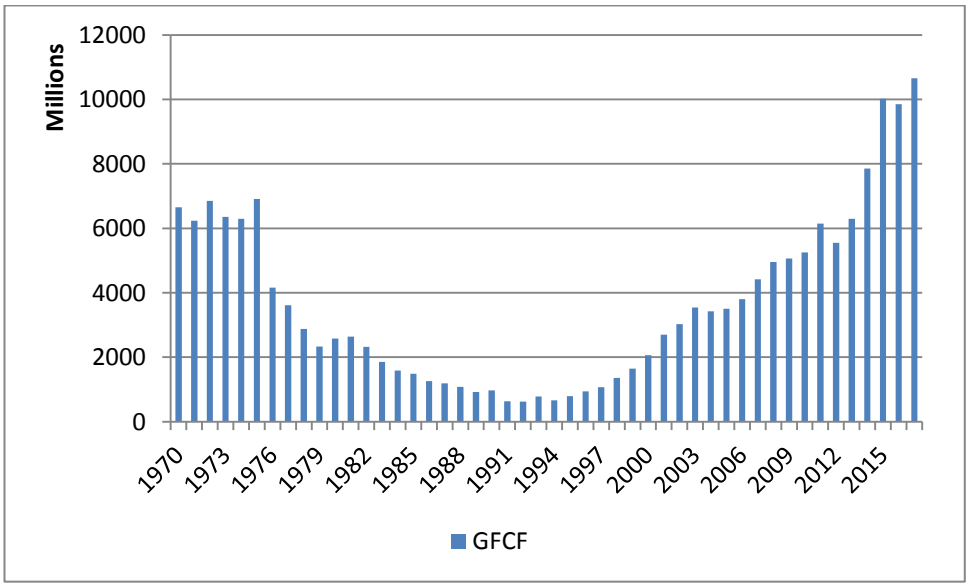
The services sector has gained importance over the years as can be observed by the increase in the service share of GDP from 42 percent in 1970 to 56 percent in 2017 (UNCTAD, 2017). Since 2000, the sector absorbs 25 percent of total employment although a third of this population is engaged in low productive informal service (World Bank, 2018). The service sector is an important sector in terms of GDP, employment and competitiveness. Many service industries have the potential to contribute significantly, not only to services exports but also to the competitiveness of domestic production of goods (Ndulo and Mudenda, 2010). Services such as telecommunications, transport, energy and finance are an intermediate input into production. Their efficient production should make Zambian products globally competitive (Ndulo and Mudenda, 2010). Other services include wholesale and retail which has been growing significantly, real estate, various administrative services, health, and education services.

2.5. Macroeconomic Variables

Gross Fixed Capital Formation (GFCF)

This macroeconomic variable is a proxy for measuring domestic investment in the economy which is important for stimulating growth in the economy. In the study period, GFCF began to drop in 1976 following the economic shock discussed earlier. It reached its lowest in 1991/92 and began to increase steadily reaching its highest in 2017. Thus it approximately follows a U-shape as seen in figure 4.

Figure 4: GFCF at USD constant prices, 1970-2017



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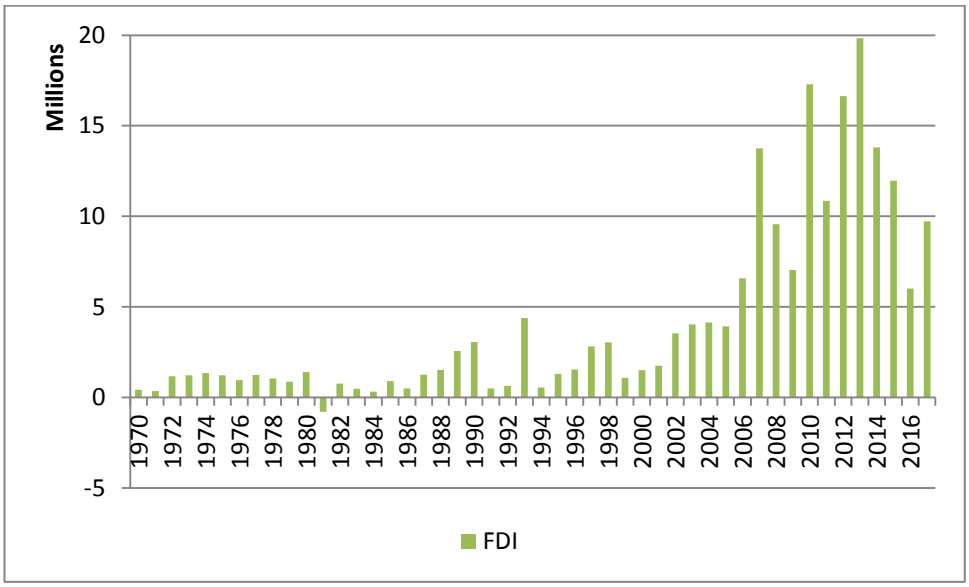
Foreign Direct Investment (FDI)

Contrary to GFCF, foreign investment inflows were not popular in the 70s and 80s due to the closed nature of the economy. It is in the 90s after liberalization that we observe an upward trend in FDI inflows as shown in figure 5 reaching its peak in 2013 and began to drop in 2015 when Zambia faced another economic shock.

Figure 5: FDI at USD constant prices, 1970-2017



Source: constructed by Author using UNCTAD data

Employment

The number of people engaged in work was on the increase in the study period as seen in figure 6.

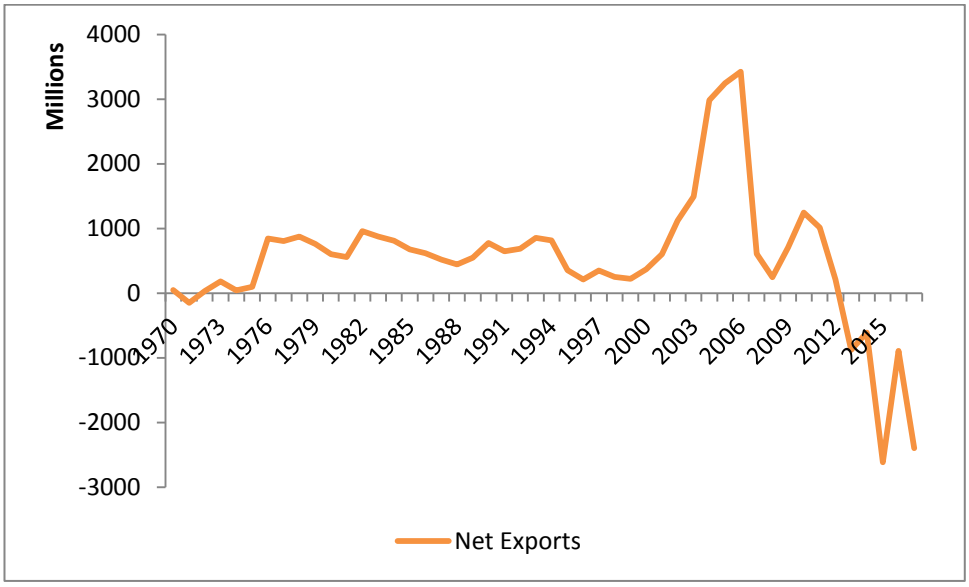
Figure 6: Number of people employed, 1970-2017

Source: constructed by Author using data from Penn World Tables

Net Exports

Net exports are the value of exports less imports. They were positive for most of the study period and began to be negative in 2013 (figure 7). This performance is attributed to copper exports which are the main export commodity. Other exports are sugar, tobacco, cotton and gemstones. The country mainly imports fuel and machinery.

Figure 7: Net exports at USD constant prices, 1970-2017



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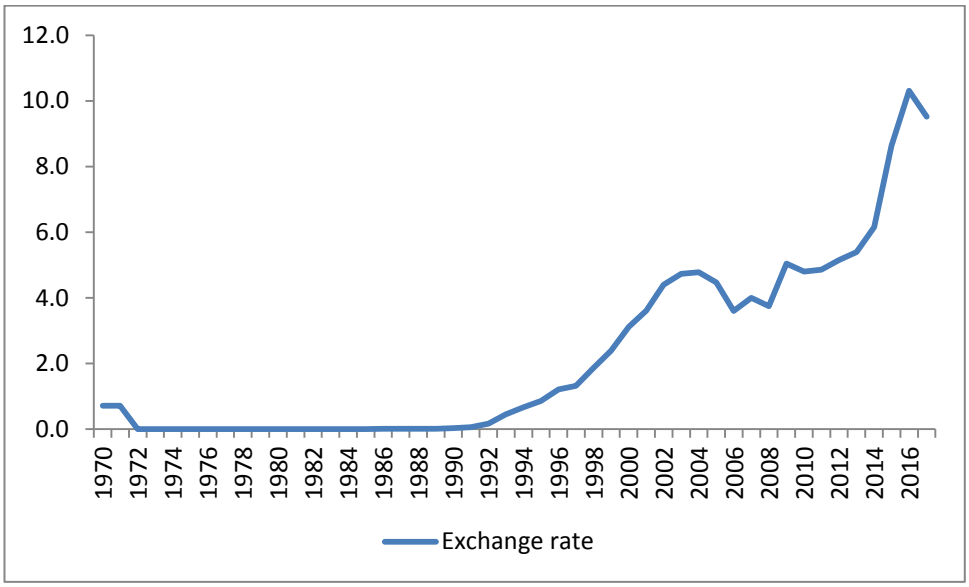
Exchange Rate

The exchange rate reflects a change in the policy stance in the economy. Before 1990, the country followed a fixed exchange rate regime and post this period it followed a flexible regime. Hence depreciation of the kwacha is observed from 1991 (0.1K/USD) to 2017 (9.5K/USD) as shown in figure 8.

Figure 8: Exchange rate, K/USD, 1970-2017

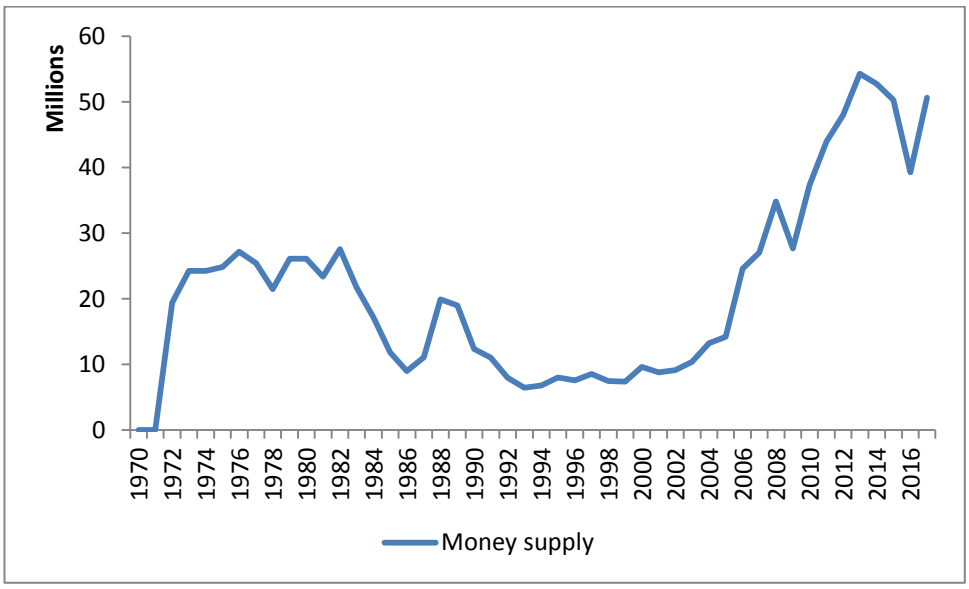


Source: constructed by author from UNCTAD statistics

Money Supply

Money supply in the economy increased from 1970 to 1971 declined in the 80s and 90s and began to increase in the 2000s reaching its peak in 2013 (figure 9).

Figure 9: Money supply at USD constant prices, 1970-2017



Source: constructed by author from World Bank (WDI) data

2.6. Conclusion

This chapter has looked at Zambia's economic growth between 1970 and 2017 and how it underwent the structural adjustment programs aimed at addressing its economic crisis which was as a result of the massive decline in copper prices. It has also shown that Zambia still largely depends on the performance of the mining industry to drive its economy and hence it is characterised by episodes of booms and slums. The chapter further describes the performance of other sectors broadly grouped into three being the agriculture, manufacturing and service sector. It shows how the agriculture sector employs a large number of the labour force but contributes least to total value-added as compared to the other two sectors. The manufacturing sector experienced a period of growth which declined post liberalization whilst the service sector experienced significant growth post liberalization of the economy. Further, the chapter shows the performance of various macroeconomic variables of interest to the study.

CHAPTER THREE

LITERATURE REVIEW

3.0. Introduction

This chapter surveys the theoretical and empirical literature review of the study. It begins by looking at various neoclassical theories of growth which comprise the exogenous and endogenous growth theories. From there is looks at various studies that have been conducted that explain the macroeconomic determinants of value-added growth in various sectors in different regions and countries and finally it concludes.

3.1. Theoretical Literature Review

3.1.1. Solow-Swan Model

The key component of the Solow-Swan model is the production function, given below, which relates output to capital and labour (Romer, 1996). It is the starting point of all theories of growth in that all growth theories are best understood with comparison to this model. In this model, labour and capital do not determine long run growth because they are constrained by diminishing returns to scale. Rather, growth is driven by technological progress which is exogenously determined. The fact that technological advancement is not explained by the Solow model creates a need to explore other theories of growth.

(1) $Y = f(K, L)$

Where, Y is output, K is capital and L is labour. In its intensive form, the production function is given by:

(2) $y = f(k)$ Or $y = k^{\alpha}$ assuming a Cobb Douglas production function

3.1.2. Ramsey-Cass-Koopmans Model

Also known as the Ramsey model, this model resembles the Solow model but differs in the sense that the dynamics of aggregates are determined at a household level and not outside the model (Romer, 1996). Thus the Ramsey model arrives at a slightly different conclusion from the Solow model in that it identifies both technological progress and capital accumulation as being drivers of growth (Chizonde, 2016). However, it equally does not explain the source of technical progress and considers it exogenous.

3.1.3. The Diamond Model

The Diamond model like the Ramsey model has dynamics of aggregates being determined at a micro level. The key difference between the two models is that whilst the Ramsey model assumes an infinitely fixed number of households that supply labour, the Diamond model assumes that there is continual entry of new households into the economy and exit of old ones (Romer, 1996). This alone has different implications for the conclusion arrived at, for instance, whilst the Solow model and Ramsey model take saving as given, in the Diamond model, savings are made by households in one period and they are consumed in the next period (Intertemporal choice). The level of savings of households is affected by interest rates which are affected by money supply. This implies that since the level of national savings influence growth, and savings by interest rates and money supply. Then economic growth can be influenced by monetary policy.

3.1.4. Endogenous Growth Theories

These are models that model A rather than take it as given. Thus the long run growth rate per capita is determined within the model rather than exogenous technological progress. According to Spear and Young (2016), some of the first models of

endogenous growth are Arrow's 1962 model of learning and doing, Uzawa's 1965 model of human capital driven productivity improvements and Shells' 1967 model of innovative technological activities. They postulate that investment knowledge, human capital and innovation are significant contributors to growth. However, it was Romer's 1990 paper that developed the theory emphasizing that technological change is the result of efforts of researchers and entrepreneurs who respond to economic incentives. The implication of his findings is that what affects the efforts of researchers and entrepreneurs such as government policy and incentives affects growth (Jones, 2019). Given the above, it is important for macroeconomic conditions to be favourable in order to drive growth. In addition, the models show that labour and capital are not limited by diminishing returns but produce sustained long run growth.

3.2. Empirical Literature Review

A vast number of studies in the literature both cross-section and country specific studies have investigated the determinants of economic growth at an economy wide level. However, there has been a growing demand to analyse the drivers of growth from a sectoral perspective in order to provide greater insights on the subject matter. Thus this section focuses on studies that have conducted sectoral analysis. That is, both cross-section and country specific studies.

Dabla-Norris et al (2013) studied the determinants of structural transformation in 168 advanced, emerging and low income countries worldwide for the period 1970-2010. It used both linear and quantile regression to measure what drove value-added in agriculture, manufacturing and service sectors in the various countries. Its findings showed that country characteristics which included GDP per capita, demographic structure and population size affected the share of value-added. In addition, policy

variables such as trade openness, human and physical capital and finance accounted for variation in sectoral shares across countries.

Singh and Kaur (2014) studied India's service sector and its determinants using an empirical approach. They used annual time series data for the period 2000 to 2013 and used the VAR methodology for their analysis. In their study, they regressed the share of service sector to GDP on a number of explanatory variables which included; increase in GNP per capita, Domestic investment, trade openness and FDI. Their findings showed that Domestic investment, trade openness and an increase in GNP per capita positively impacted the share of service sector to GDP whilst FDI reduced it.

Similarly, Jain et al (2015) analysed the macroeconomic factors affecting three major components of GDP (manufacturing, services and industry). They used secondary data for the period 2000-2001 and 2011-2012. The explanatory variables in the study included FDI, net foreign institutional investment in equity (FII equity), net foreign institutional investment in debt (FII debt), imports and exports whilst the dependent variables were manufacturing, services and industry share of GDP. The analysis was done using multiple regression analysis and the findings showed that FDI, net FII equity, import and export and a significant impact on all the GDP components whilst net FII debt had an insignificant relationship with the GDP components. Further, FDI, net FII equity and imports had a positive impact on both services and manufacturing share of GDP but net FII debt and exports had a negative impact on both services and manufacturing share of GDP.

In Africa, Jha and Afrin (2016) analysed the pattern and determinants of structural transformation in 53 African countries including Zambia. The sectors of interest

were agriculture, manufacturing and service. Using time series data from 1970 to 2014, they regressed the share of value-added by sector on various explanatory variables of value-added in these sectors using various methods which included panel effects, pooled OLS and quantile regression among others. Their findings showed that rent from mining increases agriculture and lowers manufacturing, secondary school education helps growth in agriculture and services but not manufacturing whilst FDI was positively related with agriculture and manufacturing in some models and negatively related to services in other models. Furthermore, external debt was positively related to agriculture and services and negatively related to manufacturing. Finally, the structural adjustment programmes lowered the share of manufacturing.

Similarly, in 2016, Sokunle el al studied the determinants of manufacturing sector growth in 26 Sub-Saharan economies (including Zambia) in the period 2008 to 2010. Their aim was to measure how the manufacturing sector varied relative to other components of economic development including interest rates, FDI, inflation, labour costs and government incentives. Its methodology was based on the theoretical framework of the accelerator and the neoclassical theories of investment and growth. Manufacturing sector growth was regressed on FDI, inflation, interest rates, labour costs and government incentives. The results showed that all the variables were negatively related to growth of the manufacturing sector.

At a country specific level, in 2013, in a time series analysis, Odior measured the impact of macroeconomic factors on manufacturing productivity in Nigeria for the period 1980-2011 using the error correction mechanism. The explanatory variables in the study included exchange rates, consumer price index, interest rate, credit to the manufacturing sector, broad money supply and foreign direct investments. The results showed that credit to the manufacturing sector measured by loans and

advances had both a short run and long run positive impact on manufacturing production. FDI and broad money also had a positive impact although that of broad money was less. In addition, the consumer price index had a negative impact as well as the exchange rate and interest rate.

In addition, Enu and Havi (2014) examined the macroeconomic factors that influence performance of the manufacturing sector of Ghana using the Vector Autoregressive (VAR) model and time series data for the period 1980-2012. They examined the extent to which macroeconomic variables such as private sector credit, consumer price index, infrastructure, labour force, real exchange rate and fixed capital formation influence manufacturing value-added output in Ghana. The results showed that in the long run, private sector credit, labour, real exchange rate had a negative impact on manufacturing sector production whilst in the short run, past years' consumption, consumer price index and the real exchange rate had a negative impact.

Furthermore, a survey based study was conducted by Uwitonze and Heshmati (2016) on service sector development and its determinants in Rwanda. The dependent variable of interest in the study were total sales growth, innovation and turnover of service firms and the independent variables were; use of internet, dummy variable on employees development activities , dummy variable on spending on formal research. The study used micro data collected from two studies in 2011 and 2014 on 241 firms and establishments. The econometric analysis used was the linear and limited dependent variable technique. The results showed that employment costs, size of approved loan and use of internet had a positive impact on change in sales. In addition, employees' development and research and development had a negative impact on the change in sales. Further, new methods impacted innovation of firms

positively and turnover of a firm was impacted by gender of manager, openness and taxes as measured by a logistic model.

In a recent study, Raboloko (2018) studied the determinants of service sector growth in Botswana using annual time series data from 1980 to 2015. The method of analysis was the Autoregressive Distributed lag model (ADRL). In this study, the share of service sector as a percentage of GDP was regressed on inflation, domestic credit to the private sector, FDI, gross national expenditure, gross fixed capital formation and trade openness. The results showed that domestic credit to the private sector, gross fixed capital formation and gross national expenditure had a positive impact on the share of service sector whilst trade openness had a negative impact.

Meanwhile in Zambia, Mulungu and Ng'ombe (2017) explain growth in agriculture, industry and service sector as well as growth of the economy as a whole. The study estimated total factor productivity (TFP) using time series data for the period 1970-2013 which it divided into two time periods that is pre liberalization and post liberalization. It modelled TFP based on the production function with the inclusion of land in agriculture. Their findings for the economy as a whole showed that agriculture had the least contribution to GDP and that structural transformation has been slow hence contributing to the inefficiencies. In addition, Capital and labour have been the main drivers of growth with capital being the least in all the three sectors. The results also showed that the pre reform period had at most zero TFP in the service sector and rose significantly in the post reform period, near zero in both periods for agriculture and moved from negative to positive in the industrial sector.

3.3. Conclusion

The preceding discussion on the theoretical and empirical literature reveals that there are various macroeconomic factors that drive output that go beyond capital and labour as described by the Solow model and other Exogenous Growth theories. Variables such as FDI, exchange rate, money supply, gross fixed capital formation, government incentives, private sector credit among others. It also shows that rather than be limited by diminishing returns these variables can produce long run growth in output. The empirical studies have arrived at different conclusions of how the variables have played out in different regions and countries. For instance, studies have arrived at different consensus on the impact of FDI at a sectoral level whilst other studies are generally agreed that factors such as gross fixed capital formation and human capital positively impact output growth.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter presents the build-up of the models used in the study to measure the determinants of output growth in the manufacturing and service sector. It comprises the theoretical framework of the model, followed by the hypothesis and the model specification. From there it looks at the measurement of variables and expected signs, estimation and technique of analysis and finally the data type and sources.

4.1. Theoretical Framework

The model has its basis in the neoclassical production function where output is a function of capital and labour (Romer, 1990).

(3) $$Y_t = A_t f(K_t, L_t)$$

Where, Y is output, A is technology, K is capital formation, L is labour and t is time. The Cobb Douglas production function is given below

(4) $$Y_t = A_t(K_t^{\sigma} L_t^{(1-\sigma)})$$

Assuming social marginal products are equal to private ones and perfect competition we obtain the log of the production function according to the growth accounting literature as follows:

(5) $$y_t = \sigma k_t + (1-\sigma) l_t + a_t$$

Where σ and $(1-\sigma)$ are shares of capital and labour and k_t, l_t and a_t are growth rates.

Based on the theoretical and empirical literature reviewed, capital and labour were identified as determinants of growth in output along with other variables considered for the study as potential drivers of output growth which included money supply, exchange rate, net exports and FDI.

4.2. Model Specification

The model used in this study is a variant of the model by Roboloko (2018) who used the ARDL bounds test to analyse the macroeconomic determinants of growth in the service sector of Botswana as well as other studies that have analysed growth from a sectoral perspective.

The ARDL cointegration technique or bound test of cointegration is a method that was developed by Pesaran and Shin in 1999 and further developed by Pesaran in 2001 as a solution to determine the long run relationship between series that are non-stationary as well as reparametrizing them to obtain the Error Correction Model (ECM). The reparametrized result gives the short-run dynamics and long run relationship of the underlying variables (Nkoro and Uko, 2016).

The model is specified below

$$MVA = f(GFCF, EMP, FDI, NEXP, EXC, M2)$$

$$SVA = f(GFCF, EMP, FDI, NEXP, EXC, M2)$$

Consequently, the short run and long run specification of the model is as follows:

Model 1: $\Delta \log(MVA) = \delta_0 + \sum_{i=0}^{n} \alpha_{1i} \Delta \log(MVA_{t-i}) + \sum_{i=0}^{n} \alpha_{2i} \Delta \log(GFCF_{t-i}) + \sum_{i=o}^{n} \alpha_{3i} \Delta \log(EMP_{t-i}) + \sum_{i=o}^{n} \alpha_{4i} \Delta(FDI_{t-i}) + \sum_{i=o}^{n} \alpha_{5i} \Delta(NEXP_{t-i}) + \sum_{i=o}^{n} \alpha_{6i} \Delta \log(EXC_{t-i}) + \sum_{i=o}^{n} \alpha_{7i} \Delta \log(M2_{t-i}) + \beta_1 \log(MVA_t) +$

$\beta_2 \log(GFCF_t) + \beta_3 \log(EMP_t) + \beta_4(FDI_t) + \beta_5(NEXP_t) + \beta_6 \log(EXC_t) +$

$\beta_7 \log(M2_t) + \mathcal{E}_i$

Model 2: $\Delta \log(SVA) = \delta_0 + \sum_{i=0}^{n} \alpha_{1i} \Delta \log(SVA_{t-i}) + \sum_{i=0}^{n} \alpha_{2i} \Delta \log(GFCF_{t-i}) +$

$\sum_{i=o}^{n} \alpha_{3i} \Delta \log(EMP_{t-i}) + \sum_{i=o}^{n} \alpha_{4i} \Delta(FDI_{t-i}) +$

$\sum_{i=o}^{n} \alpha_{5i} \Delta(NEXP_{t-i}) + \sum_{i=o}^{n} \alpha_{6i} \Delta \log(EXC_{t-i}) + \sum_{i=o}^{n} \alpha_{7i} \Delta \log(M2_{t-i}) + \beta_1 \log(SVA_t) +$

$\beta_2 \log(GFCF_t) + \beta_3 \log(EMP_t) + \beta_4(FDI_t) + \beta_5(NEXP_t) + \beta_6 \log(EXC_t) +$

$\beta_7 \log(M2_t) + \mathcal{E}_i$

Where;

MVA Is manufacturing value-added, SVA service sector value-added, GFCF is gross fixed capital formation, EMP is employment, FDI is Foreign Direct investment, NEXP is net exports, EXC is exchange rate and M2 is broad money.

Bounds Test

After running the ARDL model, the bounds test is conducted to determine if the variables are cointegrated in order to validate the long run and short run estimates. The bounds test is a test that relies on the Wald test (F statistic) and is hypothesised as below:

$$H_0: B_1 = B_2 = B_3 = B_4 = B_5 = B_6 = B_7 = 0$$

Against the alternative hypothesis which is that at least one of the coefficients is not equal to 0 as shown below

$$H_a: B_1, B_2, B_3, B_4, B_5, B_6, B_7 \neq 0$$

The rejection of the null hypothesis is an indication that variables have a long run relationship. This occurs when the estimated F statistic is higher than the upper

bound. Contrary to this, the null hypothesis is not rejected if the computed F statistic is smaller than the upper bound and is inconclusive if it lies anywhere in between (Chizonde, 2016; Roboloko, 2018).

4.3. Measurement of Variables and Expected Signs

Manufacturing/Service Value-added

This is the measure of the value of goods and services produced in the respective sectors. It includes subsidies but not taxes. The variables are used as the dependent variables and measured the share of each sector in monetary terms.

Domestic Capital (Gross Fixed Capital Formation)

Gross fixed capital formation captures the monetary value of capital investments made in the domestic economy such as land improvements, plant, machinery, equipment purchases, construction of roads and various infrastructures such as schools and hospitals. Gross fixed capital formation is used as a proxy for domestic capital and is expected to be positively related to growth of the share of value-added in both sectors

Employment

This is a variable that measures the number of people in the working age who are engaged in labour and received pay for it either cash, in kind, barter system or family gain. It is expected to have a positive relationship with both manufacturing and service sector value-added growth.

Foreign Direct Investment

This variable represents foreign investment inflows. It is used as a control variable and expected to impact growth positively in services and negatively in manufacturing

Exchange Rate

The exchange rate is defined as the amount of kwacha per US dollar. It is assumed that a depreciation of the kwacha will have a positive impact on both sectors. This is because depreciation in the kwacha makes tradable goods cheaper thereby stimulating growth (Chizonde, 2016).

Net Exports

Net exports are obtained by subtracting the monetary value of imports from exports. The expectation is that net exports were positively related to an increase in value-added in both sectors.

Money Supply (M1)

This is the measure of broad money supply. The growth in money supply is expected to have a positive impact on output in the two sectors.

4.4. Estimation and Technique of Analysis

In analysing the data, descriptive statistics were done to look at various characteristics of the data. From there stationarity tests were conducted using the Augmented Dickey Fuller (ADF) test and Phillips Perron test not as a prerequisite to running the model but to ensure that there were no I (2) variables. This was because the ARDL model would not have been valid in the presence of I (2) variables. The Zivot Andrews test was then conducted to test for structural breaks before running any regression.

From there, the data was analysed using the ARDL model and the bounds test described above to test if the variables were cointegrated. Finally, various post diagnostic tests were conducted including normality, auto correlation, and heteroscedasticity, goodness of fit, stability and model significance which are explained in detail below.

All analysis was done using STATA 15.

4.5. Post Diagnostic Tests

i. Model Significance

This test was conducted using the F statistic. The null hypothesis states that the model is not significant in that the model without independent variables fits the data just as well. The alternative hypothesis is that the model is significant that is, it fits the data better. A p-value less than significance level leads to rejection of the null hypothesis.

ii. Heteroscedasticity

This is a test for unequal variance of the errors. In the presence of heteroscedasticity, the standard errors although linear and unbiased would not be considered efficient. This test was conducted using the Breusch-Pagan-Godfrey Test. The null hypothesis states that the error variances are equal and the alternative is that they are not equal. The test follows a Chi-square distribution.

iii. Autocorrelation

This test was done to ensure that the t, F and chi-squares obtained from the regression were valid. In the presence of autocorrelation of the errors, the inferences made from the results of the model would be invalid (Gujarati, 2004). The test was conducted using the Durbin Watson and Durbins alternative test. The null hypothesis states that the residuals from the regression are not auto correlated against the alternative that they are auto correlated. The decision rule is made based on the probability of the F test for Durbins alternative test and the DW for Durbin Watson test. The DW can be between 0 and 4. A DW below 2

indicates positive autocorrelation and one between 2 and 4 indicates no autocorrelation.

iv. Goodness of Fit

The R-Square Test was used to test for the goodness of fit of the models. The value of the R-square shows how much of the variability in the outcome is explained by the model. Thus if the value was 0.5 for instance it would mean that 50 percent or half of the variability is explained by the model.

v. Stability of Model

The stability of the model was determined by the CUSUM test. In this test, the model is considered stable if the graphs generated fall within the defined boundaries.

4.6. Data

The data which was used in the study was secondary, time series data for the period 1970 to 2017. The data was obtained from valid and authentic sources, these were, UNCTAD Statistics, World Bank (WDI) and Penn World tables for employment data. The period of study selected was due to the availability of data.

4.7. Conclusion

This chapter presented the methodology used in the study to measure the macroeconomic determinants of growth in the manufacturing and service sector in Zambia. It looked at the theoretical framework of the study which was based on the neoclassical framework followed by the ARDL model specification. It then looked at how the variables are measured and their expected signs followed by the estimation and techniques, post diagnostic tests and finally the data used.

CHAPTER FIVE

EMPIRICAL ANALYSIS

5.0. Introduction

This chapter presents the data analysis that was undertaken. It will begin with the descriptive statistics of the data, followed by the analysis and results section which covers both the long run and short run model as well as the bounds tests and post estimation results. Finally, it will discuss the findings and conclude.

5.1.Descriptive Statistics

The study focused on the following macroeconomic variables; manufacturing value-added (MVA), service value-added (SVA), gross fixed capital formation (GFCF), foreign direct investments (FDI), net exports (NEXP), exchange rate (EXC), broad money supply (M2) and employment (EMP). The tables below show the descriptive statistics of the data

Table 1: Descriptive Statistics

Variable*	MVA	SVA	GFCF	FDI	NEXP	EXC	M2	EMP
Mean	1050	5670	3680	4.157	525	184.304	21.2	2.67347
Median	860	3880	2950	1.51	603	6.59858	19.7	2.48808
Maximum	2260	15400	10700	19.8	3430	4538.79	54.3	5.05783
Minimum	525	1700	621	-0.7978	-2620	3.53984	0.01882	1.28266
Std. Dev	474	4040	2700	5.1356	1040	862.214	14.3	1.01294
Skewness	1.16468	1.26086	0.84373	1.58776	-0.0465	4.61882	0.79477	0.72935
Kurtosis	3.23177	3.30645	2.90506	4.45964	6.41323	22.4375	2.7978	2.65644
Jarque-Bera(JB	10.9593	12.9061	5.71302	24.4289	23.3175	926.301	5.13502	4.49165
JB Prob	0.00417	0.00158	0.05747	5E-06	9E-06	0	0.07673	0.10584
Observations	48	48	48	48	48	48	48	48

*The variables are in $ millions

The table above showed that all the variables had 48 observations. All variables had positive values except FDI and NEXP which contained some negative values as seen by their minimum values. In addition, the skewness and kurtosis measures as well as the JB P-value showed that most of the variables were not normally distributed in

their levels except gross fixed capital formation, money supply and employment. Thus a transformation of the variables was done to improve their normality.

5.2. Analysis and Results

5.2.1. Unit Root Test

The ADF test and the PP test were first conducted to ascertain stationarity and later the Zivot Andrews test was conducted on all I (1) variables to check if there were any structural breaks in the data. The results were presented in the table below

Table 2: ADF Unit Root Test Results

Variable	Levels		First Difference	
	Intercept	Order	Intercept	Order
LMVA	0.928		-6.899	I(1)
LSVA	1.322		-5.579	I(1)
LGFCF	-0.152		-4.731	I(1)
FDI	-1.967		-9.752	I(1)
NEXP	-1.671		-7.633	I(1)
LEXC	-6.118	I(0)		
LM2	-5.335	I(0)		
LEmp	0.749		-5.245	I(1)
5% Critical	-2.938		-2.941	

Table 3: Philips Perron Unit Root Test Results

Variable	Levels		First Difference	
	Intercept	Order	Intercept	Order
LMVA	0.924		-6.899	I(1)
LSVA	1.012		-5.736	I(1)
LGFCF	-0.648		-4.918	I(1)
FDI	-1.704		-10.243	I(1)
NEXP	-1.714		-7.636	I(1)
LEXC	-7.444	I(0)		
LM2	-5.626	I(0)		
LEmp	0.476		-5.283	I(1)
5% Critical	-2.938		-2.941	

Table 4: Zivot Andrews Unit Root and Structural Breaks Test Results

Variable		Chosen Break	Conclusion
	Intercept		
LMVA	-7.780	1996	No structural break
LSVA	-5.337	1996	No structural break
LGFCF	-7.776	1993	No structural break
FDI	-7.127	2002	No structural break
NEXP	-7.367	2007	No structural break
Emp	-7.074	1991	No structural break
5% Critical	-4.80		

The results of the tests showed that all the variables except EXC and M2 were stationary after first difference whilst EXC and M2 were stationary in levels. The Zivot Andrews test results showed that there were no significant structural breaks in the data at 5 percent level of significance. Given that the data was a combination of I (0) and I (1) variables, the ARDL model was appropriate for the analysis.

The ARDL model has an advantage over other methodologies such as Engle Granger and Johansen cointegration for various reasons given below

Firstly, it is applicable in cases where variables are integrated of order I (0), I (1) or both (Nkono and Uko, 2016).

Secondly, it is robust when analysing a single long run relationship in a small sample size. According to Raboloko (2018), ARDL bounds testing approach actually performs better than Engle and Granger 1987, Johansen and Juselius 1990 and Philips and Hansen 1990 co-integration test in small samples.

In addition, the major advantage of this approach lies in its identification of the cointegrating vectors where there are multiple cointegrating vectors (Nkono and Uko, 2016).

Finally, the technique generally provides unbiased estimates of the long run model and valid t-statistics even when some of the regressors are endogenous; moreover, the endogeneity bias tends to be irrelevant and very small (Raboloko, 2018)

5.2.2. ARDL Results

Short Run Model

Table 5: Short Run Results

Variable	Manufacturing Sector	Service Sector
DLSVA((-1))		0.1410
		(1.06)
DLSVA((-2))		0.1906
		(1.61)
DLGFCF	-0.1045	-0.0750**
	(-1.55)	(-2.31)
DLGFCF((-1))	-0.1705***	-0.0365
	(-2.98)	(-1.12)
DLGFCF((-2))	-0.0665	-0.0910***
	(-1.16)	(-3.06)
DFDI		0.0000
		(1.57)
DNEXP		-0.0000
		(-0.02)
DNEXP((-1))		-0.0000***
		(-3.24)
DNEXP((-2))		-0.0000**
		(-2.34)
DLEXC	-0.1170	0.0924**
	(-1.75)	(2.21)
DLM2	-0.0705605	0.0325
	(-1.33)	(1.02)
DLM2((-1))	0.0758**	-0.0044
	(2.56)	(-0.94)
DLM2((-2))	0.0132	0.0057
	(1.29)	(1.69)
DLM2((-3))	0.0221***	
	(2.90)	
DLEMP	-0.0485	1.3414**
	(-0.05)	(2.52)
DLEMP((-1))	1.4330	-0.6684
	(1.58)	(-1.38)
DLEMP((-2))	-0.6967	0.7179
	(-0.85)	(1.54)
DLEMP((-3))	2.3508***	
	(2.84)	
ECT(-1)	-0.8023***	-0.7087***
	(-5.48)	(-5.64)
P-values of Coefficients:	***p<0.01 , ** p<0.05	

The outcome was that gross fixed capital formation lagged two periods had a negative and significant impact on manufacturing output growth, whilst money supply lagged one period and three period as well as employment lagged three periods had a positive and significant impact on output growth in the short run. Similarly, in the service sector, gross fixed capital formation in the current period and lagged two periods as well as net exports lagged one period and two periods had negative and significant effects on output growth whilst exchange rate and employment had positive and significant effects. The error correction term for both sectors was negative and significant.

Long Run Model

Table 6: Long Run Results

Variable	**Manufacturing Sector**	**Service Sector**
LGFCF	0.0960***	0.0851***
	(3.58)	(5.65)
LFDI	0.0000	0.0000
	(0.37)	(1.23)
NEXP	0.0000	0.0000***
	(0.48)	(2.94)
LEXC	0.0841	0.0506
	(1.24)	(1.21)
LM2	-0.0252	0.0452
	(-0.34)	(1.14)
LEMP	1.1323***	1.6155***
	(17.44)	(29.46)
C	14.2055	12.7400
	(5.19)	(5.65)
Adjusted R squared	0.64	0.79
Observations	44	44
P-values of Coefficients:		
***p<0.01 , ** p<0.05		

The results showed that gross fixed capital formation and employment had a positive and significant impact on output growth in the long run in both sectors whilst net exports had a positive and significant impact in the service sector.

Table 7: Bounds Test

Critical Value	Lower bound	Upper bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43
Manufacturing: Calculated F-statistics = 6.206 k=6 **Service**: Calculated F-statistics = 6.012 k=6		

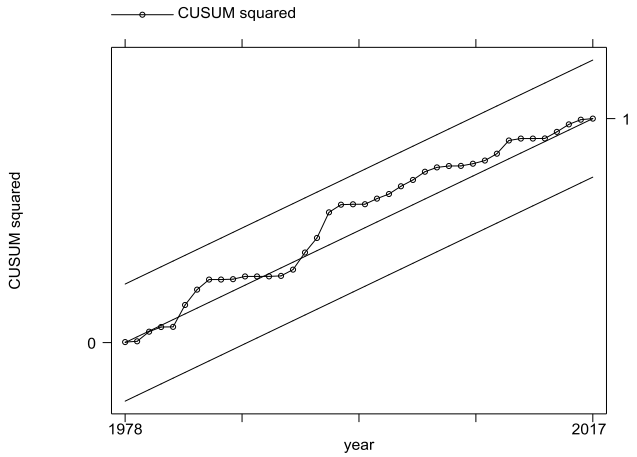
Ho: No Long run relationship exists

From the table above, the decision rule was that if the computed F statistic was lower than the lower bound then there was no long run relationship but if the computed F was higher than the upper bound then there was a long run relationship. The results were that the F statistic for both sectors were higher than the upper bound, this showed that there was a long run relationship or the variables were cointegrated.

5.2.3. Post Diagnostic Tests

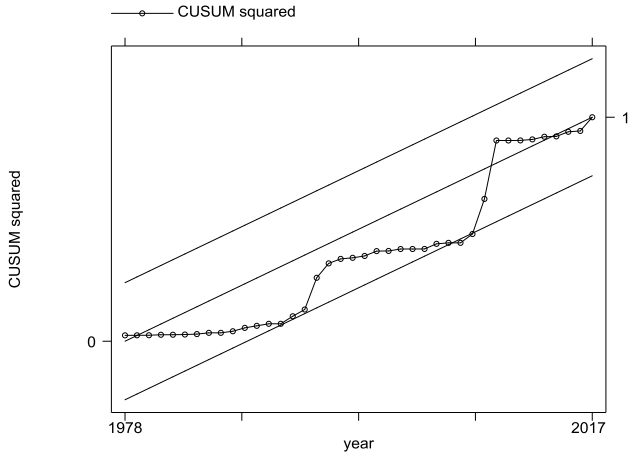
The p-values of the F test 0.000 were less than the level of significance; this led to a rejection of the null hypothesis thus concluding that the models were significant. Similarly, the chi-squares of the Breusch-Pagan-Godfrey Test had p-values larger than 0.05 thus the null hypothesis of homoscedasticity could not be rejected. In addition, The DW was greater than 2 in model 1 and approximately 2 in model 2 along with probabilities of the F test larger than 0.05 led to a failure to reject the null hypothesis of no autocorrelation. Further, the R-square values were 0.64 and 0.79 showing that 64 percent and 79 percent of the variability in the outcome was explained by model 1 and model 2 respectively. Finally, the CUSUM graphs presented in figure 5.1 and 5.2 indicate stability of the model as earlier explained. The summary of the post-tests is presented in table 8 for both models.

Figure 10: Model Stability 1



Source: generated by author using regression output

Figure 11: Model Stability 2



Source: generated by author using regression output

Table 8: Post Tests

Test	Model 1	Model 2
Model significance		
F Test	357.85	2252
Probability	0.0000	0.0000
Conclusion	significant	significant
Heteroscedasticity (Breusch-Pagan-Godfrey Test)		
Chi2	0.87	0.23
Probability	0.3503	0.6309
Conclusion	No Heteroscedasticity	No Heteroscedasticity
Autocorrelation(DWatson and Durbins alternative test)		
DW	2.550873	1.993847
F test	- 3.758	0.002
Probability	0.0649	0.9652
Conclusion	No Serial Correlation	No Serial Correlation
Goodness of Fit (R-Square Test)	0.64	0.7946
Conclusion	Well fit	Well fit
Stability (CUSUM Graph)		
Conclusion	Model is stable	Model is stable

Based on the post estimation tests above, there was no autocorrelation and heteroscedasticity in both models, both models were significant and well fit and the residuals of the models were normally distributed. In addition, the models were stable as evidenced by the CUSUM graphs.

5.3.Discussion of Results

5.3.1. Long Run Adjustment

The results from both models showed that output growth of the manufacturing and service sector converged towards a long run equilibrium. This was evidenced by the error correction terms which were both negative and significant for both sectors. The speed of adjustment towards long run equilibrium in the manufacturing sector was 80 percent and 71 percent for the service sector. This means that 80 percent and 71 percent of the disequilibrium in the respective sectors was dissipated in a year and 20

percent and 29 percent carried over to the next year in the two sectors respectively. Further, it took approximately 5 months in the manufacturing sector and $6^{1}/_{2}$ months in the service sector to correct half the disequilibrium.

5.3.2. Macroeconomic Variables

Gross fixed capital formation (GFCF) appeared to have a negative and significant impact on manufacturing output growth in the short run and a positive and significant growth in the long run. A 1 percent increase in GFCF in the past year reduced output growth in the current year by 0.17 percent in the short run whilst in the long run a 1 percent increase in GFCF increased output by 0.96 percent. Similar results were obtained for the service sector in that a percentage increase in GFCF in the current period and two years ago had a negative and significant impact on service sector output growth of 0.07 percent and 0.09 percent in the short run respectively whilst in the long run a percentage increase in GFCF had a positive and significant impact of 0.85 percent. The outcomes of the findings were in line with the expectations of the study as well as studies by Enu and Havi (2014), Singh and Kaur (2014) and Roboloko (2018). Although Roboloko (2018) found no long relationship with service sector output but a short run positive and significant relationship, all authors concluded that domestic capital investment measured by GFCF was essential for growth of manufacturing and service sector output growth respectively.

Foreign direct investment (FDI) had no short run relationship with manufacturing sector output growth and a positive but insignificant relationship in the long run. Similarly, it had a positive relationship with service sector output growth in both the long run and shot run but the relationship was not significant in both cases. The findings were in line with the expectations of the study for the manufacturing sector

due to poor linkages in the economy but were to some extent counter intuitive for the service sector which is expected to have a degree of linkages with FDI. This was however not surprising as studies have had mixed results. For instance, Odior (2013) and Jha and Afrin (2016) found a positive and significant relationship for the manufacturing sector whilst Sokunle (2016) and Sigh and Kaur (2014) found a negative relationship for the manufacturing sector. Similarly, both Jha and Afrin (2016) and Roboloko (2018) found a negative relationship for the service sector. It therefore appears that FDI did not drive output growth in the two sectors in Zambia during the study period.

Net exports (NEXP) had no relationship with manufacturing sector output growth in the short run and had a positive but insignificant relationship in the long run. In the service sector, this variable had a negative but significant relationship in the short run in that a dollar increase in the previous year's net exports had a 0.00 percent decline in service sector output growth in the current year and a dollar increase in net exports two years ago had a 0.00 percent decline in the current year's output growth. In addition, the variable had a positive and significant relationship in the long run. This meant that a dollar increase in net exports increased service sector output by 0.00 percent. Although this was a minimal/negligible positive impact, it showed that net exports impact service sector output growth in the long run in line with the study expectations.

The Exchange rate (EXC) turned out to have a negative relationship in the short run and a positive relationship in the long run in the manufacturing sector although the relationship was insignificant in both cases. However, the relationship was positive and significant at 5 percent in the short run for the service sector in that percentage depreciation in the kwacha against the dollar increased service sector output growth

by 0.09 percent. This relationship was equally positive in the long run but it was not significant. The outcome of the findings on the inverse relationship between depreciation of the kwacha and growth in output was inconsistent with the findings of Odior (2013) but in line with theory and study hypothesis.

Money supply (M2) in the manufacturing sector model had a positive and significant impact on output growth. A percentage increase in money supply in the previous year had a 0.68 percent increase on output growth in the current year and a percentage increase in money supply 3 years ago had a 0.02 percent increase on the current year increase in output. In the long run, money supply had a negative but not significant effect. Similarly, in the service sector model, money supply was not a significant driver in both the short run and the long run model. The results are consistent with other findings such as Odior (2013) and the expectations of the study. This however does not downplay the importance of monetary policy as a tool for boosting economic growth and mitigating shocks.

Employment coefficients (EMP) had the largest impact on output growth in both sectors in the long run and short run. In the manufacturing sector, a percentage increase employment 3 years ago affected output growth by 2.35 percent in the short run whilst in the long run, a percentage increase in employment affected output growth by 1.13 percent. In the service sector model, a percentage increase in employment affects output growth by 1.34 percent in the short run and 1.62 percent in the long run. The coefficients were all significant and larger for the manufacturing sector in the short run but in the long run were larger for the service sector. Despite the results not being consistent with the findings of Enu and Havi (2014) in Ghana, these results indicated the importance of employment in driving output growth in

Zambia as found by Mulungu and Ng'ombe (2017). They were also in line with theory and study expectations.

5.4. Conclusion

This chapter presented the empirical findings as well as the discussion of the findings. It began by ascertaining whether the variables were stationary after which it tested the relationship between the dependent and independent variables using the ARDL bounds testing methodology. This approach obtained both the short run and long run coefficients as well as the error correction term and showed that the variables were cointegrated in both models. Further, it showed that employment, gross fixed capital formation and net exports had a long run significant impact whilst exchange rate and money supply were significant in the short run.

CHAPTER SIX

CONCLUSION, POLICY IMPLICATION AND RECOMMENDATIONS

6.0. Introduction

The study set out to understand the macroeconomic drivers of output growth in the manufacturing and service sectors of Zambia. It used secondary time series data for the period 1970 to 2017. Manufacturing value-added and service sector value-added were regressed on a number of macroeconomic variables which were identified as potential drivers of output growth. These included gross fixed capital formation, foreign direct investment, net exports, exchange rates, money supply and employment.

6.1. Main Findings of the Study

The findings of the study showed that gross fixed capital formation and employment influenced long run growth in both the manufacturing sector and service sector. Thus it can be concluded that in order to boost output in the two sectors, there should be focus given not only to domestic capital accumulation but also to the labour force. In addition net exports had a positive significant long run impact on the service sector, although this coefficient was zero, it shows that improving net exports can boost service sector output. Furthermore, exchange rates and money supply impacted growth in output in the short run but had no significant long run impact. Finally, variables such as FDI which did not impact output growth. The findings of the study were consistent with theory and some other studies conducted on the two sectors.

6.2. Policy Implications and Recommendations

The finding of the study discussed above highlighted some areas that could be of use in the policy space. To begin, domestic capital accumulation measured by GFCF was essential for ensuring long run growth of output in both the manufacturing and

service sector. Thus the government must continue to accumulate domestic physical capital in order to boost the performance of the two sectors.

Secondly, the coefficients of employment which were the largest for both sectors indicated that employment was a key driver for generating long run growth in output of the two sectors. It is therefore expedient for the government to strengthen efforts for employment creation in both sectors. For instance, the statistics presented in chapter two showed that the share of employment in industry was low relative to agriculture and service. The government must also continue to track employment as a key macroeconomic variable and must not lose track of its employment targets.

Further, net exports played out to have a minimal positive long run impact on output growth of the service sector. This finding points to the need for the government to ensure an increase in net exports in the country in order to boost service sector output growth. There is also need to revisit the long told diversification story and consider various commodities that Zambia can export in addition to the major copper exports to boost the impact of net exports on output growth in services.

Finally, although money supply and exchange rate played out as short term drivers of growth but had no significant long tern effects, it pointed to the important of the role of the central bank in responding to economic shocks. The central bank must thus maintain the independent role of controlling money supply and exchange rates to respond to shocks in the economy that can impact the economy negatively in the short run. In addition, FDI which had no significant impact on both sectors in both the long run and short run should not be given so much emphasis but only as it affects employment creation in the host economy.

6.3. Limitations of the Study

The limitations of this study were related to insufficient data points which did not allow for the inclusion of other variables that could have been of interest to the author such as private sector credit. This is because adding many variables on a limited data set would have resulted in loss in degrees of freedom given the methodology adopted for the study. In addition, there is lack of reliable data for measuring human capital which would have been of interest to the study.

There is still room for further research on the topic as data points increase as well as the adoption of other methodologies. In addition, greater insights can be drawn beyond the study if data can be disaggregated by sector which was not available to the researcher.

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APPENDICES

Appendix A

Summary Statistics of transformed variables

Table 9: Transformed Variables

VAR	LMVA	LSVA	LGFCF	LEXC	LM2	LEMP
Mean	20.68511	22.24782	21.7268	2.126221	16.43318	0.9156272
Median	20.57209	22.07774	21.80642	1.88664	16.79496	0.9115049
Max	21.53822	23.45935	23.08961	8.420417	17.80938	1.620937
Min	20.07973	21.25274	20.24635	1.264083	9.842519	0.2489385
Std. Dev.	0.4031162	0.6334084	0.8280155	1.355563	1.510493	0.3710039
Skewness	0.6606562	0.5178851	-0.211809	4.134081	-3.338512	0.1273354
Kurtosis	2.301386	2.202713	1.866802	19.42909	15.11365	2.118143
Observations	48	48	48	48	48	48

Appendix B

Table 10: ARDL Output

Variable	Manufacturing Sector	Service Sector
LMVA	0.1977	0.1411
	(1.35)	(1.06)
DLSVA((-2))		0.1906
		(1.61)
LGFCF	-0.0275	-0.0750**
	(-0.52)	(-2.31)
LGFCF((-1))	-0.0660	-0.0365
	(-1.16)	(-1.12)
LGFCF((-2))	0.1040*	-0.0910***
	(1.81)	(-3.06)
LGFCF((-3))	0.0665	
	(1.16)	
FDI	0.0000	0.0000
	(0.37)	(1.57)
NEXP	0.0000	-0.0000
	(0.48)	(-0.02)
NEXP((-1))		-0.0000***
		(-3.24)
NEXP((-2))		-0.0000**
		(-2.34)
LEXC	0.1170*	0.0924**
	(1.75)	(2.21)
EXC((-1))	0.1170	
	(1.75)	
LM2		0.0325
		(1.02)
DLM2((-1))	0.1463**	-0.0044
	(2.67)	(-0.94)
DLM2((-2))	-0.0625*	0.0057
	(-1.91)	(1.69)
DLM2((-3))	0.0089	
	(0.85)	
DLM2((-4))	-0.0221***	
	(-2.90)	
DLEMP	-0.0485	1.3414**
	(-0.05)	(2.52)
DLEMP((-1))	1.4814	-0.6684
	(1.05)	(-1.38)
DLEMP((-2))	-2.1296	0.7179
	(-1.54)	(1.54)
DLEMP((-3))	3.0474**	
	(2.36)	
DLEMP((-4))	-2.3508***	-0.7087***
	(-2.84)	(-5.64)
P-values of Coefficients:	***p<0.01 , ** p<0.0	
Number of Obs 44	R squared 0.9965	
F 357.84***	Adj R squared 0.9937	