THE EFFECTS OF TRADE AND FINANCE ON INDUSTRIAL GROWTH IN ZAMBIA, 1985 – 2016.

By

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DECLARATION

I, Wiza Ng'ambi, declare that this dissertation

a. Represents my own work;
b. Has not been previously submitted for a degree at this or any other University; and
c. Does not incorporate any published work or material from another dissertation.

Signed ……..

Date ……..

APPROVAL

This dissertation of Wiza Ng'ambi has been approved as a partial fulfillment of the requirements for the award of the degree of Master of Arts in Economics by the University of Zambia.

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ABSTRACT

Post-industrial prosperity requires industrialization, otherwise the economy becomes unsustainable. This is evident in the budget and current account deficits of developing countries that attempt to import high end consumption commodities without industrial bases to finance them. As such, Zambia like other developing countries has over the past half-century attempted to industrialize, albeit unsuccessfully. The relatively rapid industrialization of the newly industrialized countries has shown that not only can countries move from underdevelopment to development but they can do so in a relatively short period provided their trade, finance and industrial policy is effective and coordinated.

This study attempted to address the foregoing by assessing the effects of trade and Finance on industrial growth in Zambia. Time series data running from 1985 to 2016 obtained from the World Development Indicators were used, utilizing Stata 14 for analysis and Microsoft Excel for data management. The literature identified trade openness as the appropriate trade indicator and FDI and lending interest rate as indicators for foreign and domestic finance, respectively. Industrial growth was primarily indicated by manufacturing share of GDP with broad industry share of GDP being a comparative indicator, culminating in a parallel analysis of two models. Stationarity tests found that the variables were integrated at order one, optimal lag tests further identified four lags for each model while Johansen's tests for cointegration found one cointegrating equation for each model, prompting the fitting of Vector Error Correction Models and further Granger Causality analyses. The generated models passed the relevant postestimation tests of normality, autocorrelation, stability as well as specification.

Trade openness and lending interest rate were found to individually granger cause industrial growth in the short run. On the contrary FDI was not found granger cause industrial growth. Further, long run analysis showed that trade openness had a positive long run relationship with industrial growth while FDI and lending interest rates were found to have negative long run relationships with industrial growth. Furthermore, comparative analysis showed that while FDI granger caused broad industry it did not granger cause manufacturing, a result rationalized by the composition of FDI in Zambia. The study made three key recommendations; efforts towards FDI should be spread across mining and non-mining sectors to facilitate industrial growth and promote diversification. Further, international trade should be promoted as it has positive effects on industrial growth. Lastly, policy needs to keep interest rate low to enhance industrial growth.

Key Words: Industrial Growth, Trade, Finance, Vector Error Correction, Zambia

DEDICATION

To positive impact volunteers across the world.

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ABBRIVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
AFDB	African Development Bank
AIC	Akaike's Information Criterion
BSAC	British South Africa Company
CEEC	Citizens Economic Empowerment Commission
CSO	Central Statistical Office
DBZ	Development Bank of Zambia
EMCCA	Economic and Monetary Community of Central Africa
FDI	Foreign Direct Investment
FINDECO	Finance and Development Corporation
FPE	Final Prediction Error
GDP	Gross Domestic Product
HQIC	Hannan and Quinn Information Criterion
IDC	Industrial Development Corporation
INDECO	Industrial Development Corporation
LM	Langrage Multiplier
LR	Likelihood Ratio
ML	Maximum Likelihood
NIC	Newly Industrialized Countries
PP	Phillips-Perron

SBIC	Scharz's Bayesian Information Criterion
SIDO	Small Industry Development Organization
SME	Small and Medium Enterprises
UNECA	United Nations Economic Commission for Africa
VECM	Vector Error Correction Model
VIS	Village Industry Services
ZIMCO	Zambia Industrial and Mining Corporation

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Post-industrial prosperity requires industrialization, otherwise the economy becomes unsustainable. This can be seen in the budget and current account deficits of countries that attempt to import high end consumption commodities without developed industrial bases to finance them. As such, Zambia like other developing countries has over the past half-century attempted to industrialize, albeit unsuccessfully. The relatively rapid industrialization and economic development of the East Asian tigers has refocused the industrialization debate. It has shown that not only can countries move from underdevelopment to development but that they can do so in a relatively short period provided their finance, trade and industrial strategies are coordinated and effective.

This study addresses the foregoing by attempting to understand the effects of trade and finance on industrial growth in Zambia. The thesis is organized as follows. Chapter one motivates the topic: giving its background, research problem, aim, objectives, hypotheses and rationale. Chapter two then critically analyzes the literature on the subject, both theoretical and empirical with careful synthesis of the current study. Chapter three follows with the methodological framework of the study, briefly highlighting the conceptual framework and then detailing the econometric models, data sources as well as the estimation techniques. Chapters four and five present and discuss the results. Lastly, chapter six gives a conclusion to the study as well as its policy recommendations and study limitations.

1.2 Background

1.2.1 Industrialization and Industrial Growth

Davis (1955; 255), defines industrialization as “the use of mechanical contrivances and inanimate energy (fossil fuels and water power) to replace or augment human power in the extraction, processing, and distribution of natural resources or products derived therefrom”. In a similar context, UNDP (2016; 4) argues that “Industrialization represents a marked departure from a subsistence agrarian economy towards a more mechanized system of production that involves more efficient and highly technical exploitation of natural resources in a highly formal and commercialized setting”. Other scholars have more narrowly defined it as a shift from an

agricultural economic base to an industrial one. Industrialization can also be interpreted as a structural shift from labor intensive economic activity to one that uses technology and machinery. The general theme is clear, industrialization involves a shift from primarily agricultural focused subsistence systems. This study without cluttering literature adopts the definition presented by Davis above. Further, Industrial Growth, defined as share of industry in Gross Domestic Product, is a mechanism through which the process of industrialization is achieved. Industrialization is therefore operationalized using this measure. Industrialization and industrial growth will thus be used interchangeably in this study.

The importance of industrialization to an economy cannot be overemphasized, Szirmai (2009) and Thirlwall (1994) argue that industrialization is the appropriate engine of economic growth for developing countries, a result empirically investigated and concluded much earlier by Chenery (1982). Other studies have further linked industrialization directly to human development, a much broader measure of development. These results have various theoretical underpinnings, Szirmai et al in 2013 argued that the diversification resulting from industrialization is higher relative to mining or agriculture because of the relatively higher direct forward and backward linkages as well as spillover effects. This was further augmented by UNDP (2016), stating that not only does industrialization diversify the economy it also enhances private sector development and wages - leading to higher household incomes.

Industrialization has other desirable outcomes beside economic growth including; job creation, efficiency in production, broader selection of commodities on the market, creation of new opportunities for growth, reduction of prices due to increased supply and generally results in higher standards of living (McMillan and Rodrik, 2011). Industrialization however does present environmental pollution and displacement of labor when poorly managed.

Various strategies towards industrialization exist, caution at application is however necessary as misapplication has been observed to lead to social and economic stagnation in some developing countries. Broadly summarized, industrialization strategies include; Import Substitution, Export Promotion, Indigenization, Technology Transfer and Local Resource Utilization (Ogundele, 2010). Notwithstanding, optimal execution of any of the foregoing strategies requires that specific preconditions are met and strong institutions exist. Development scientists have augmented the latter with the proposition that not only does optimal industrialization require strong institutions,

but that it requires the existence of a developmental state as opposed to a passive one (Johnson, 1982).

The significance of industrial growth has for the above reasons preoccupied policy makers and academicians alike. This is evidenced by the recurring industrialization theme in the Seventh National Development Plan (7NDP) in Zambia; 2016 Human Development Report for Zambia; the 2013, 2014, 2015, 2016 and 2017 United Nations Economic Commission for Africa (UNECA) Economic Reports on Africa; the 2018 African Development Bank (AFDB) Annual Meetings as well as the 2017 and 2018 Zambia International Trade Fairs, among many other examples.

1.2.2 Industrialization in Zambia

Current literature generally tracks Zambia's economic progress by era, particularly; colonial, post-independence and post liberalization. In analyzing industrialization, further partitions are made by industrial policy in this study.

1928 – 1964: Colonial Model

Colonial era industrialization was that propagated by the British through their administrative systems, independent mining companies as well as white settlements. The main financiers of industrial growth in this era were the British South Africa Company (BSAC), Rhodesian Anglo-American, Rhodesian Selection Trust and the white settlements operating commercial farms. Much of this funding was directed towards the primary economic sector; mining and agriculture. Profits were however generally not reinvested, Lanning and Mueller (1979) note that in the forty years prior to independence, Zambia experienced an outflow of over 400 million British Pounds, mostly generated from copper mines. On financial intermediation, Brownbridge (1996) records that the main form of financial intermediation were three foreign owned banks, namely; Standard Chartered, Barclays and Grindlays. Mattoo and Payton (2007) further argued that these banks mostly catered for foreign entities.

Pre-independence skilled human capital was imported from Europe with the indigenous population serving as labor reserves for unskilled work. As mines and farms grew, more expertise was imported with local labor migrating from rural communities into industrial centers. Simson (1985) notes that by 1954 there were 44,000 Africans and 6,840 Europeans working on the Copperbelt, from 20,000 and 4,000 in 1937, respectively.

1964 – 1967: Transition from the Colonial Model

In 1964, manufacturing accounted for only 6% of Zambia's Gross Domestic Product (GDP) with mining and agriculture representing 47% and 11.5% respectively. The economy had operated a core-periphery structure in which about 90% of income was generated in industrial centers and along the line of rail (Simson, 1985). The economy inherited by the new government was mostly foreign owned, with locals mainly involved in small scale agriculture. It is estimated that at independence the entire country had only 107 university graduates resident within its borders (Government of Zambia, 1996).

In the initial four years of independence, Zambia attempted to transition from the colonial model to enable the economic participation of indigenous Zambians. This transition however did not improve the welfare of indigenous Zambians, the plight of whom further deteriorated when Zimbabwe, then Zambia's major trading partner terminated trade relations with the country. Economic outlook in this period nonetheless retained resilience, having exhibited good economic fundamentals relative to those observed within the region. This was enabled by high copper prices, in this era, copper accounted for about 90% of the country's export revenue (Carmody, 2009 and Jansen, 1988). The industrial base however remained relatively small, with manufacturing accounting for about 6.9% of GDP (World Bank, 2017).

The objectives and guidelines of the Country's industrial policy over this period as recorded by Mudenda (2009) included; Development and diversification of the economy, Reduction of imports and saving of foreign exchange, Emphasis on labor intensive industries and promotion of employment, Expanding linkage effects, Production of surplus for export and Dispersion outside the main production centers. Mudenda (2009), however argues that the policies were rather ambitious given that the capitalist strategy to industrial development was unchanged.

1968 – 1991: State Led Import Substitution Industrialization

With the foregoing background, the government through the First National Development Plan (1966 – 1970), the Mulungushi Declaration (1968) and the Second National Development Plan (1972 – 1976) embarked on; diversification, reducing income inequality and, education and health sector development (Brownbridge, 1996). To this effect, the government undertook a

nationalization strategy in mining, industry and transport among other sectors, a move complimented by import substitution.

A key milestone was the launch of the Mulungushi Economic Reforms in April 1968, targeting dominant state participation in the economy by gaining control of the major sectors of the economy. These reforms and subsequent development plans centered on Humanism, a socialist philosophy focused on self-reliance. This theme coupled with the termination of trade with Zimbabwe, then its major source of manufactured products led to an import substitution industrialization strategy. Other push factors included Zambia's poor foreign exchange performance, which meant the economy could not maintain its import bill (Seshamani, 1994). This departure from the free market economy while realizing the need for indigenous entrepreneurial initiatives resulted in direct investments and nationalizations by government as well as promotion of Zambian entrepreneurs. The scale of this entrepreneurship was nonetheless limited to small and medium enterprises, as they would be operating in a state led economy. Mudenda (2009) highlights that this indigenous entrepreneurship promotion was implemented through among other mechanisms issuance of licenses and reservation of some geographical and business areas to only Zambians.

The Mulungushi Reforms requested that private non-mining entities surrender 51% shares in their enterprises to the State. To support the strategy, the Zambia Industrial and Mining Corporation (ZIMCO) and subsidiaries; Finance and Development Corporation (FINDECO) and Industrial Development Corporation (INDECO) were instituted to manage the State's assets in the manufacturing, finance, service and construction sectors. It is noteworthy that this structure remained susceptible to political influence as Ministers were directly involved in the operation of ZIMCO as well as sat on Boards of INDECO's subsidiaries. Organizational reforms of 1979 however led to the reduction of political representation on INDECO's board as well as those of its subsidiaries. Political representation was however maintained on the ZIMCO board (Turok, 1981).

This structure was initially intended to complement the private sector in that institutions such as INDECO would invest in sectors that the private sector would not due to such factors as risk and magnitude of capital investment required. By 1975 however, INDECO's focus was adjusted to exclude finance, transport, hotels, petroleum, distribution, trade and distribution, and fisheries but rather focus on industry, particularly heavy manufacturing (World Bank, 1984). The aftermath of

the Mulungushi Economic Reforms saw government further nationalize the mining sector through the Matero Reforms, advanced through the Mining Development Corporation (MINDECO). These institutions and their mandates were further supported by direct budget support as well as policy through tariffs, trade restrictions and exchange rate management (Mudenda, 2009). Cumulatively, government through ZIMCO controlled about 80% of the economy based on an account by Turok (1989). The import substitution in this era was complimented by protectionist strategies such as tariffs and import licensing (UNDP, 2016), and additionally subsidies to the manufacturing sector (Simatele, 2006).

On the small enterprises front, government enacted the Small Industrial Organization Act of 1981 to promote Small and Medium Enterprises (SMEs). This Act provided for the establishment of the Small Industry Development Organization (SIDO). Additionally, the Development Bank of Zambia (DBZ) and the Village Industry Services (VIS) were set up and would facilitate financing for the SME sector. These developments would then be engulfed in the Fourth National Development Plan (1989 – 1993). Mudenda (2009) however notes three shortcomings in the development plan as regards SME development; lack of specific targets and strategies to achieve them, underfunding and poor management and insufficient State intervention in the operations of private enterprises.

In the same way, Karmiloff (1987) argued that the nationalization and immediate pursuit of an import substitution strategy was unsustainable and inefficient. Stating that while these policies demonstrated to the new republic the structural transformations with which political independence came, the new administrators and managers were neither prepared nor technically empowered for the task. Further, the initial expansion in industry remained dependent on copper exports to finance the import of inputs. These inefficiencies were further exacerbated by the oil crisis of the 1970s and fall in copper prices, diminishing the efficacy of the import substitution strategy (UNDP, 2016).

The deficient outcomes of Zambia's import substitution industrialization as recorded by Seshamani (1994) can be summarized as follows. Firstly, import intensive industries were prioritized, as such production utilized imported technology, plant machinery, intermediate inputs and raw materials. This poor adaptability to local inputs resulted in an increased need for foreign exchange amid an unsustainable import bill. Additionally, output due to the high import content

became price uncompetitive with cost ineffective production processes. Cumulatively, this necessitated cuts in production leading to low plant utilization. Secondly, the goal of creating employment was counteracted by the high capital intensities of the technologies employed in the manufacturing industry. As such industry accounted for only 15 percent of the formal employment sector. Lastly, the import substitution industrialization contributed little to economic diversification in terms of foreign exchange earnings. Manufactured exports only contributed about 1.3 percent to foreign exchange earnings in 1984/1985 and less than 5 percent by 1988 while having accounted for 60 – 70 percent of total imports over the period 1980 – 1985.

Between the periods 1964 - 1974 and 1986 – 1990 the budget deficit increased from 5 to 12 percent; it became clear that this industrialization strategy was no longer sustainable (Mudenda, 2009). The deteriorating situation was further augmented by the suboptimal structural adjustment program implementation of the International Monetary Fund and World Bank in the 1980s; the combined effect of which led to the fall of the manufacturing sector (World Bank, 2017).

1991 – 2000: Market Liberalization and Privatization

The failing economy would then be radically transformed into a free market system under the hospice of the World Bank and International Monetary Fund. This shift principally implied deregulation of markets, institutional reform and privatization of state-owned assets, with the aim of market liberalization and macroeconomic stability (Simutanyi, 1996 and Mudenda, 2009). With markets deregulated, the occurrence of a drought in 1992 exacerbated inflation, reaching as high as 185% the following year (CSO, 2014). The ensuing period further saw the removal of exchange rate controls and subsequent depreciation of the kwacha.

An instance of the foregoing transformation is the Commercial Trade and Industrial Policy developed in 1994. The policy in departure from the heavily regulated import substitution industrialization had the specific objective of supporting industries that utilized local raw materials and promoted local industrial linkages. The policy further encouraged sectors that would promote exports based on natural resource, essentially a shift from import substitution industrialization to a hybrid of Private Sector Led and Export Oriented Industrialization (MCTI, 1994). Further, by 1997, 224 of the 275 state owned companies slated for sale had been privatized (Rakner, 2003).

2001 to Date: Export-Led Industrialization

From 2001 to date, industrialization policy has focused on export promotion industrialization while ensuring sufficient private sector development, vertical and horizontal linkages as well as copper mining beneficiation, little deviation from the 1994 policy. In this regard, various internal structures have been instituted with the major ones being; the Export Processing Zones Act of 2001, the Zambia Development Agency Act of 2006 and the establishment of Multi-Facility Economic Zones (Mudenda, 2009).

Government through the Ministry of Commerce, Trade and Industry revised the 2005 policy to focus on creating an Enabling environment that supports private investments, enables development of domestic capacities, and international trade. The objectives stated in the revised policy can be summarized as follows: stimulation and promotion of value addition, diversification, stimulation of investment in export-oriented industries and development and utilization of domestic capacities, among others (Mudenda, 2009).

1.2.3 Industrialization in Developed Countries: Initial Industrializers

The industrialization of the now developed world was characterized by two main revolutions, the industrial and technological revolutions. Industrial revolution here refers to the mechanization and invention induced efficient production systems that occurred in Europe in the early 1800s. The term is however ambiguous because it underscores the gradual nature with which industrialization occurred. In the second instance, the technological revolution implies, the late 1900s technological advances in production emanating from discoveries in computing, physics and chemistry (Pollard, 1973).

Prior to these revolutions, these countries were characterized by widespread subsistence agriculture and speculation for mineral resources (gold and oil), and in some cases proto industrialization – a household form of industry. The emergence of innovations such as mechanization and later electricity significantly increased efficiency in production leading to higher quality output and larger production volumes (Tilly, 2010).

Lin (2009), assessed industrialization paths of developed countries in the context of contribution to GDP and concluded that their GDPs were initially dominated by subsistence agriculture, after which industry dominated until eventually service and the high-tech industry. The latter stage is

generally referred to as the post industrialization phase, typified by high incomes and even greater human development.

It is worth exploring that financing for industrialization was initially provided by aristocrats through corporations. Governments nonetheless financed infrastructure development such as rail and utilities, additional finance to industries came in form of subsidies and tax breaks. The technical side of the industrialization process followed a similar pattern. An elite part of the population had industrial skills and utilized formerly agricultural labor, that moved to industrial centers in search for employment. It is worth a note that the initial stages of industrialization were characterized by low wages and high occurrence of industrial accidents. Physical capital emanated from large investment in research and development programs by the aristocrats, capital that could not be generated locally was nonetheless imported (Khanna, 1978).

Output from industry was generally traded on free markets with surpluses being exported. The organization of industry in this respect ensured optimal utilization of forward and backward linkages. External demand was serviced through trade treaties with governmental support. The role of government was generally infrastructure development, limited protectionism, security and enforcing property rights (Pollard, 1973).

Britain is argued to have utilized the above model during its industrialization process. In the early 1700s, the economy was characterized by widespread agriculture, where aristocrats owned the land and laborers worked for a wage. The late 1700s on the other hand were characterized by cottage industries, where laborers carried out production of textiles using household scale tools for sale to supplement their incomes, this form of industry became known as cottage or proto industry (Houston and Snell, 1984). The 1800s brought with them significant technological advancements that led to the establishment of large factories in industrial centers (Clark, 2005). The development of industry immediately prompted rural-urban migration, where workers moved to the industrial centers to work in the factories. These factories where typically financed by aristocrats for profit while governments ensured developed infrastructure such as rail networks for trade purposes and enforced a limited form of protectionism against international products (Allen, 2006). This system continued through the 19th century further being reinforced by the technological revolution, until the present-day economic superpower, Great Britain.

It should be emphasized that there exists two types of industrialized countries, the initial industrialisers such as Britain and the Newly Industrialized Countries (NICs) such as South Korea. While the former underwent the model summarized above, the latter used a combination of export promotion, financial development and technology transfer under the hospice of a developmental state (Kim, 1991).

1.2.4 Industrialization in Developed Countries: Newly Industrialized Countries

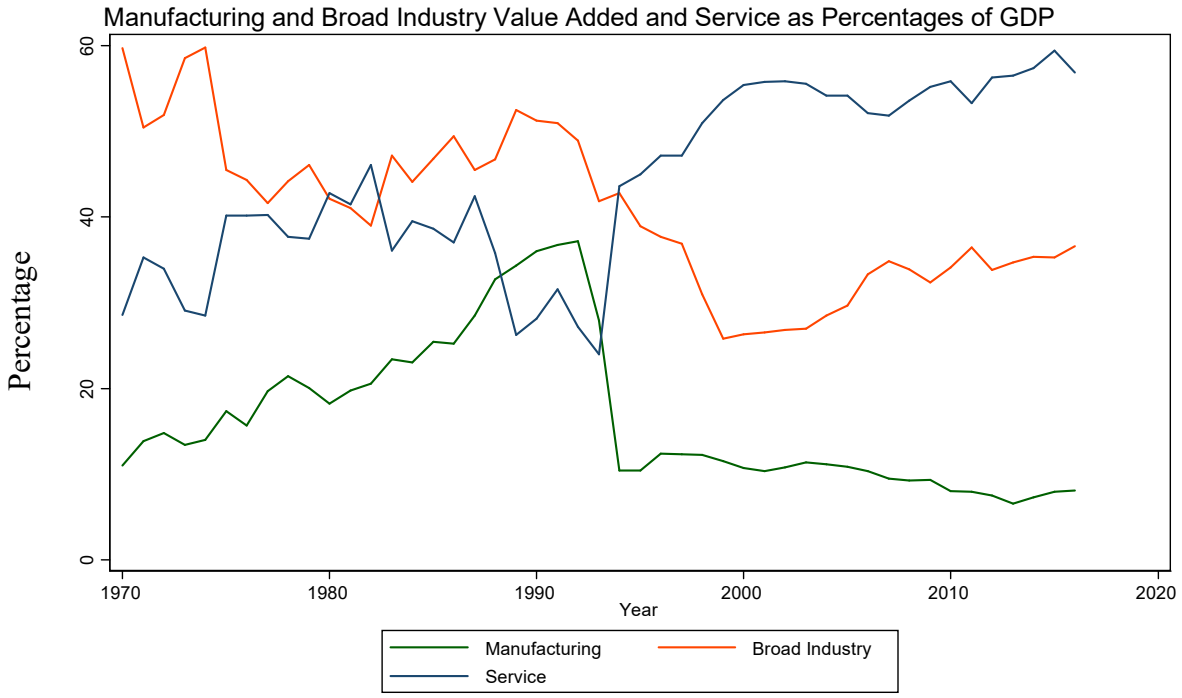
The key distinction between the NICs and the early industrializers lies in how technology was acquired. In the former case, technology was innovated through a gradual process of research and development while in the latter, technology is argued to have merely been learned and adopted from other countries (Wade, 1990). Further, state intervention in the industrialization process is argued to be another key distinction between late and early industrializers. In the former case, it is held that the State played a key role in an attempt to ensure that industrializations in their economies were not chocked by interference from previously industrialized economies. Specifically, the States in these countries enhanced the international competitiveness of their domestic industries by ensuring favorable terms of trade (Wade, 1990). They are also argued to have promoted the growth of large diversified companies in efforts to optimize efficiency in production in the absence of high-end technology. Further, deliberate State enhancement of production processes in the domestic industries through technical assistance, domestic technology sharing as well as investment in shared capital overheads were employed. The NICs include countries such as South Korea, Brazil, Hong Kong and Turkey among others.

In the case of South Korea, Amsden (1989) argues that discipline over business and labor played a key role in industrialization. Particularly, Amsden states that discipline over business and labor raised productivity allowing South Korea to borrow on the international capital markets and be able to manage repayments as the big push investments in heavy industry resulted in overall economic growth. Within the industrialization context Amsden, further highlights that other cultural and social factors led to the enhanced industrialization in South Korea, among them; meritocracy in the civil service, militarism, raw material scarcity as well as student movement hyperactivity.

1.2.5 Underlying Patterns in Industrial Growth: Trade and Finance

As shown in figure 1 below, the manufacturing sector has stagnated, this is argued to have given way to growth in the Zambian services sector. It has generally become evident that there has not been a significant structural transformation to pave way for an aggressive growth in the industrial base. Scholars argue that this lack of a structural transformation and industrialization has led to high poverty levels and the agricultural sector employing as much as 80% (a 2010 estimate) of the working population, in the face of moderate economic growth (CSO, 2010).

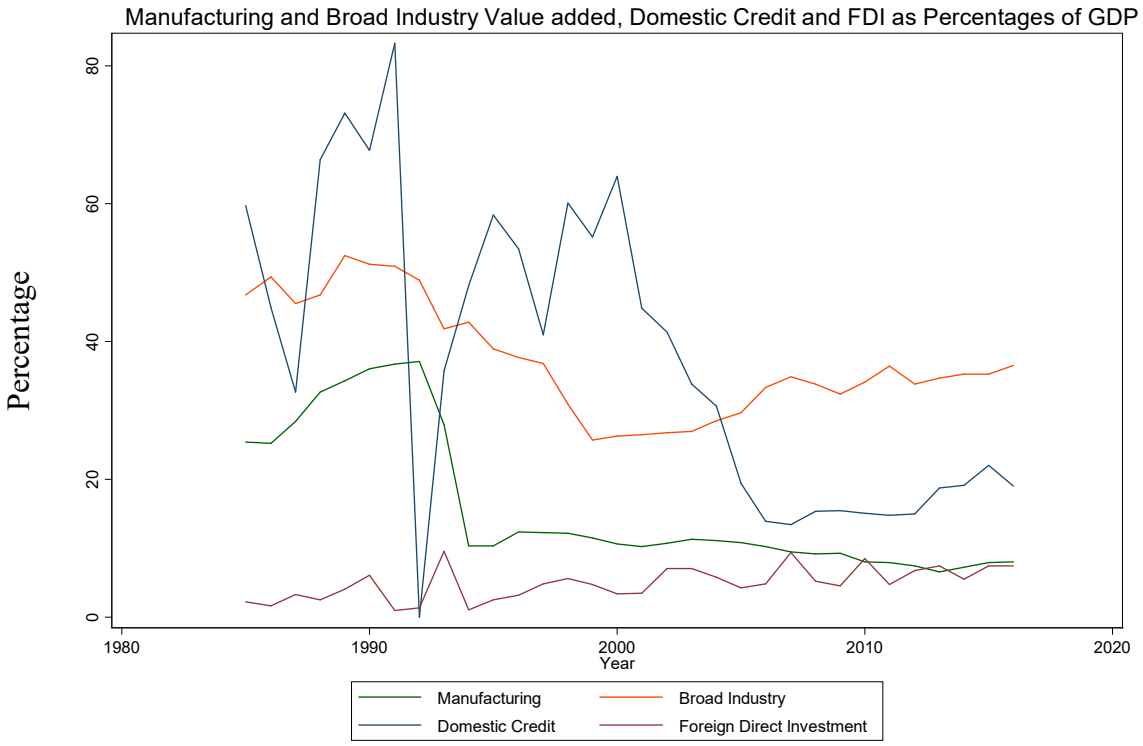
Further, the manufacturing sector measures poorly against comparable countries, recording a Manufacturing Value Added per Capita of about 10% that of Chile, South Africa, Brazil and Swaziland (UNDP, 2016). Furthermore, broad industry in Zambia as a share of GDP stands at about 38%, this while at par with comparable countries is a source of concern because it remains dominated by copper mining. Figure 1 below highlighting the trends of manufacturing, broad industry value added and services as percentages of GDP shows a clear stagnation in manufacturing with rises in the broad industry and services sectors.



(Source: World Bank, 2017)

Figure 1: Manufacturing and Broad Industry Value Added and Service as Percentages of GDP

Industrialization in Zambia has in recent years been funded in five ways: Foreign Direct Investment, local financial markets, government to government through bilateral loans and export credit and through government institutions such as Citizens Economic Empowerment Commission (CEEC), Development Bank of Zambia (DBZ) and Industrial Development Corporation (IDC). The relationship between finance and industrial growth is natural; industrial growth relative to labor-intensive sectors has high financing requirements. This finance is needed for investments in capital and technology to maintain competitive edges as well as efficiency in production. Trends of Industry, Foreign Direct Investment (FDI) and Domestic Credit by the Financial Sector presented as percentages of GDP are shown in figure 2 below. The figure shows that domestic credit has despite the drop in the 2000s been a superior financing tool relative to FDI. FDI on the other hand appears to have been on a steady rise since the mid-1990s.

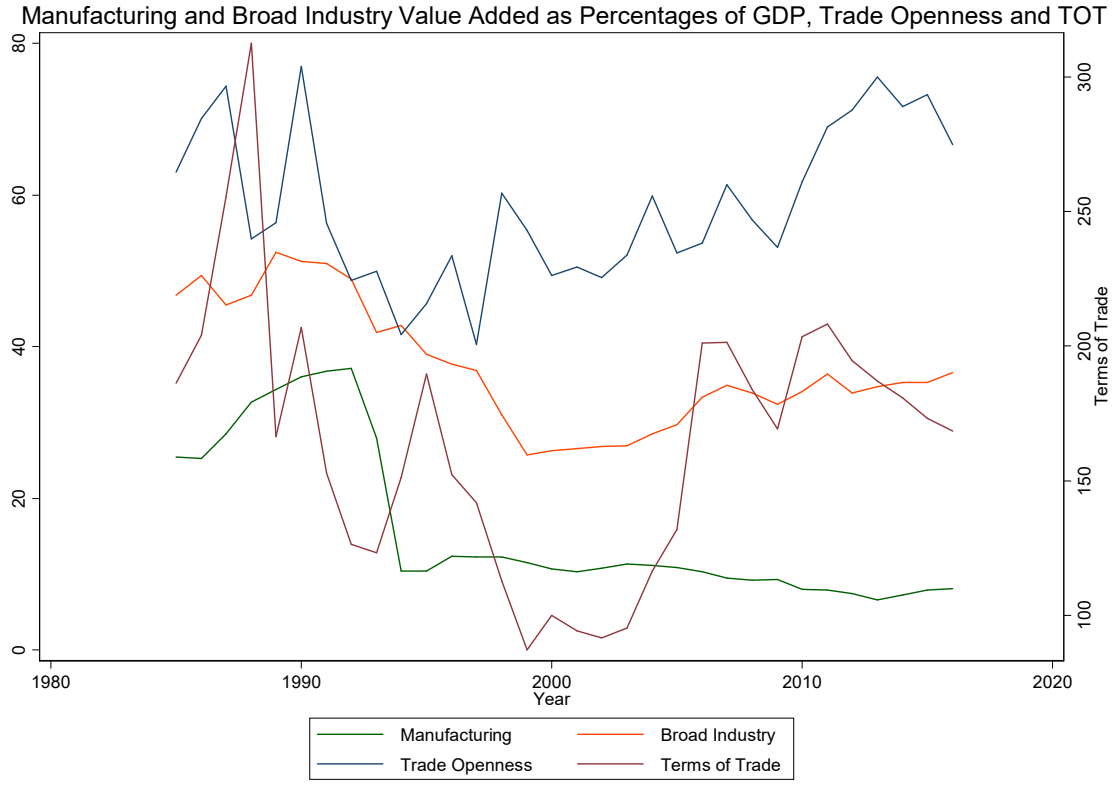


(Source: World Bank, 2017)

Figure 2: Manufacturing and Broad Industry Value added, Domestic Credit and FDI as Percentages of GDP

Zambia is part of various bilateral and regional trade agreements, utilization of these agreements and further optimization of backward and forward linkages in the domestic industry however

remains insufficient. Trade as regards industry allows for the importation of inputs as well as exports of output, it could however lead to stagnation of the domestic industry due to cheaper imports from the international markets. Two measures are particularly important to industry, firstly, merchandise trade openness representing the ease with which imports and outputs can be traded. Secondly, terms of trade, representing the price differences between exports and imports and therefore the amount of imports that can be made with given exports. Figure 3 below highlights the trends in industry, trade openness (as a share of GDP) and terms of trade (as an index). All three measures appear related in that downward trends in can be observed up to the late 1990s and further upward trends. Their economic relationships follow naturally, industrial output requires import inputs and export of output. On the other hand, the terms of trade matter as regards how much input can be imported and whether it is beneficial to export output.

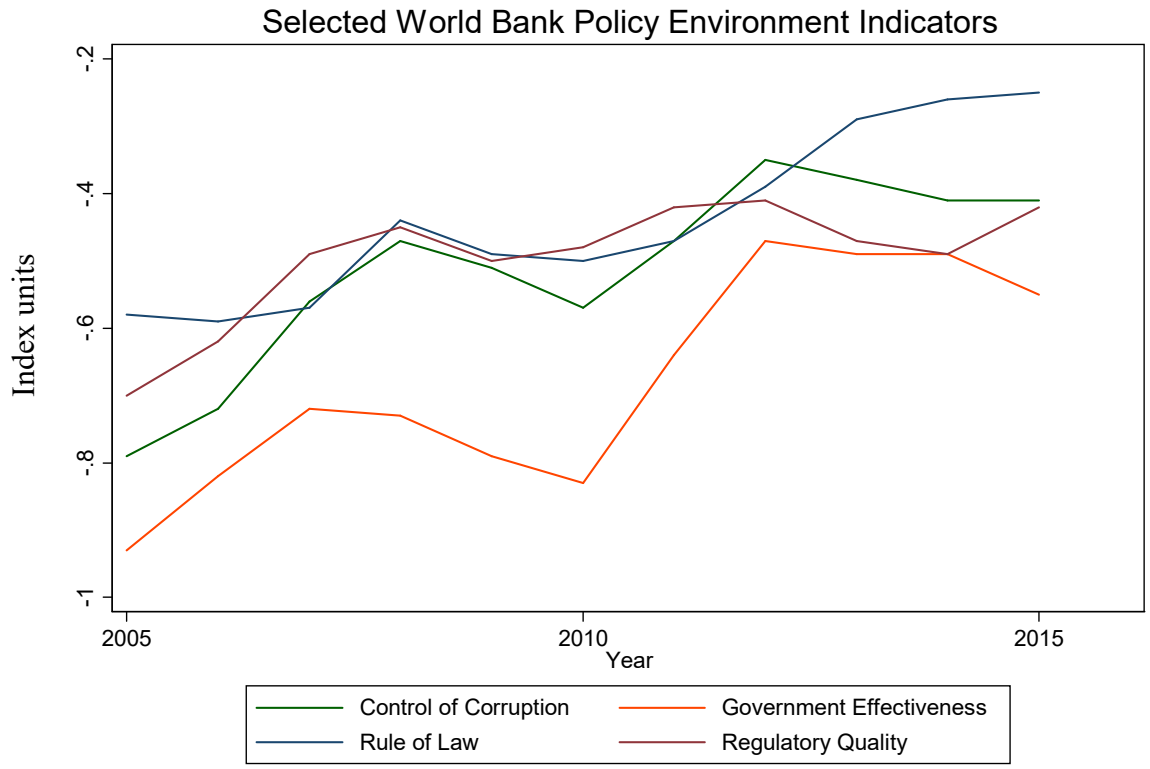


(Source: World Bank, 2017)

Figure 3: Manufacturing and Broad Industry Value Added as Percentages of GDP, Trade Openness and Terms of Trade

1.2.6 Role of the State

The role of the State in Zambia has in recent years been reduced to creating an enabling environment for the industrialization process primarily through policy. Notwithstanding, the state continues to participate in the financing of industries through institutions such as CEEC, DBZ and IDC as mentioned above. The key role however remains maintaining macroeconomic stability, enhancing trade relations, attracting foreign investment and minimizing structural bottlenecks in business operations. The significance of the role of the State in the industrialization of the NICs as shown above raises the significance of State intervention in industrialization, especially for late industrialization attempts such as those from Zambia. Figure 4 below highlights four policy environment indices as generated by the World Bank. The indices are presented on a scale of -2.5 to 2.5 with the former implying poor and the latter implying good. It can be seen that all four indices appear to be on an upward trend, implying the policy environment is improving in the economy. The industrial sector and the overall economy are thus expected to flourish in this positive policy environment. Further, government maintains control of the tariff structure subject to restrictions from trade agreements to which the country is party. In this respect, the government returns considerable ability to incentivize trade or to minimize it. It should also be stated that government through its specialized institutions such as the Bank of Zambia (BoZ) and the Zambia Development Agency (ZDA) return significant influence over the finance available for industrialization.



(Source: World Bank, 2017)

Figure 4: Selected World Bank Policy Environment Indicators

1.3 Research Problem

Despite identifying the importance of industrialization and having pursued various industrial policies over the last 52 years, Zambia remains under industrialized with a stagnated manufacturing sector (UNDP, 2016). Notwithstanding, liberalized global financial flows and trade integration should have accelerated Zambia's industrialization as they did the NICs. While having liberalized its financial and capital markets in the early 1990s and constantly signing trade agreements and pursuing trade stimulating policies, the country continues to experience slugged industrial growth. There is thus need to understand the effects of trade and finance on industrial growth to inform industrial policy.

1.4 Aim and Objectives

1.4.1 Aim

To investigate the effects of trade and finance on industrial growth in Zambia.

1.4.2 Objectives

a) To assess whether trade, FDI and lending interest rate have respective effects on industrial growth.

b) To assess whether trade, FDI and lending interest rate have a joint effect on industrial growth.

1.5 Hypotheses

a) Trade openness has a positive industrial growth.

b) FDI inflows have a positive effect on industrial growth.

c) Higher lending interest rates lower industrial growth.

d) Trade openness, FDI and lending interest rate jointly granger cause industrial growth.

1.6 Rationale

Industrialization is a pre-requisite for economic and human development, an outcome associated with high income, low unemployment and generally high standards of living. Further, accurate manipulation of trade and finance policy by the newly industrialized countries significantly expedited the growth of their industrial bases and paved way for their economic development. In lieu of the foregoing, this research sought to investigate the effects of trade and finance on industrial growth in Zambia. To the academia, this research fills the empirical literature gap on the topic in Zambia. In the same way, this study offers the general public empirical evidence on whether efforts towards trade and finance have been misplaced in Zambia's industrialization and by extension economic development. Importantly, this research offers policy makers insight on the effects of trade and finance on industrial growth, with a view to validate or augment current trade, finance and industrial policies. Specifically, policy makers will gain from insight on whether efforts towards FDI promotion and trade openness lead to industrial growth in Zambia as well as whether reduction of lending interest rates enhances industrial growth.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The analysis in this section is divided into two main parts; theoretical review and empirical literature review. The theoretical review highlights the different theoretical perspectives on industrialization, trade and finance. The empirical review on the other hand analyzes various empirical work done on the causal effects of trade and finance on industrial growth with an articulate synthesis with the current study.

2.2 Theoretical Review

2.2.1 Precursors to the Industrialization Debate

Adam Smith in the *Wealth of Nations* argued that division of labor in industry had raised welfare for British workers. In contrast to Quesnay, while believing that agriculture had a higher surplus potential than industry, Smith did not agree that industry had no economic surplus. He instead believed that industry had the potential to provide important external benefits to the economy via productivity increases due to the division of labor. He noted however that optimization of these outcomes required that industrial development be left to market forces (Smith, 1776). Of particular interest in this respect is the role of regulators in domestic industrialization financing, specifically, Smith in this context argued that factors such as interest rates and output prices should be left to market forces to achieve industrial growth.

On the other hand, Francois Quesnay, argued that beginning 1759, the industrial sector was sterile, and that State support to the sector had negatively affected welfare in both standards of living and government revenue. He argued that industry as structured in France between the seventeenth and eighteenth centuries had no economic surplus, implying that it was not able to pay tax, a result that astonished his contemporaries. He hypothesized that because industry needed subsidies and protection, valuable growth resources were gotten from primary producers to finance these programs (Quesnay, 1767).

The foregoing argument has been generally accepted, many developing countries diverted funding from agriculture to promote industrial growth, supporting industries that could not compete internationally at the expense of agriculture, a sector which had a track record of economic surpluses. Eltis (1988) argued for instance that 20th century Argentina had an agricultural surplus

as high as 80 percent of output, the state nonetheless diverted a high fraction of the surplus towards industries. He further cites that 1980s Pakistan had negative value added in industry at world prices, proving that industry in this type could not be a net contributor to tax revenues. Eltis (1988) emphasized that besides reducing national income in the short term, protecting uncompetitive industries also led to lessened savings that translated into reduced capital accumulation.

Developing economies have nonetheless tended to pursue free market industrial development without paying due attention to the arguments postulated by Smith and Quesnay; with disappointing outcomes. It hence becomes important for industrialization analysis to actively internalize the arguments by Smith and Quesnay. Particularly, the role of market determined industrialization financing such as FDI and domestic financial credit becomes critical in the context of the current study.

2.2.1 Latter Theories of Industrialization

Key in 20th Century industrialization is the Big Push theory. This is a theory of industrialization and development that emphasizes that industrialization can be achieved by a large initial investment in multiple sectors at the same time, including infrastructure and industry. The theory argues the need for a coordinated approach when a country attempts to industrialize. Illustratively, when sectors in the economy adopt increasing returns technology at the same time, they simultaneously also create income and demand for goods in sectors with which they have forward and backward linkages. This process of income and demand creation enhances the market size leading to industrialization. The theory as proposed by Rosenstein-Rodan (1943) is premised on three indivisibilities: indivisibility of the production function, demand and supply of savings. Broken down, the indivisibilities imply small sectoral pushes are not sufficient to launch sustainable industrialization. Rosenstein-Rodan argued that small investments in the economy in an attempt to industrialize merely waste resources.

The three indivisibilities offer a lot of insight in industrialization analysis, particularly, they highlight the need for adequate demand for industrial output, adequate financing as well as sufficient production to fulfil the demand. The big push model however fails to adequately provide financing options capable of executing a big push in developing countries where national budgets are mostly running deficits. The model however provides insight on the need for market, production and financing. In the context of this study, trade enables the Zambian economy to

access sufficient demand for industrial output as well as access the supply of inputs. Further, financing addresses the third indivisibility which focuses on the demand and supply of savings. In agreement with the Big Push, this study recognizes the need for adequate demand for output. The Zambian population standing at about 16 million in 2018 does not offer the internal demand necessary for big push industrialization. In this view, external demand becomes critical in supplementing internal demand, this external demand is naturally achieved through trade: exporting domestic output to international output markets and similarly importing inputs from international input markets. In the same way, the Zambian economy does not offer the necessary savings and financing needs for big push industrialization. As such, international finance through loans and foreign direct investment become critical to industrial growth.

Another key theory attempting to explain industrial growth is the Stages of Growth Theory. This model of growth depicts five stages through which countries undergo. These stages begin with Traditional Society, mostly composed of subsistence agriculture, minimal infrastructure and limited technology. Stage two, Preconditions for Takeoff, involves commercial exploitation of natural resource. Stage three is the Take-Off, this involves a start of the industrialization process, increases in production of secondary goods and technology advances in production. Stage four is the Drive to Maturity, this involves growth and diversification of the industrial base. Stage five is Age of Mass Consumption, in this stage the industrial base dominates, consumption of high value goods and consumers have high disposable incomes (Rostow, 1960).

This study focuses on the Take-Off stage, and is hence preoccupied with the preceding stage, Preconditions for Take-Off . Particularly of interest are the recommendations that during this stage, investment should carry a sufficient portion of national income and necessary social overhead capital needs to be put in place (Kuznets, 1963). This recommendation is particularly important in the analysis of industrialization financing and brings into question whether the private sector and foreign investment would be sufficient to motivate the take off stage in Zambia. In line with the stages of growth theory, this study hypothesizes the significance of financing in industrial growth and thus seeks to understand the causal effects running from finance to industrial growth in Zambia.

Worth a mention in the industrial growth debate is the Dependency theory. The theory is premised on the disparity between the Periphery Countries that generally receive less of the world's wealth

and the core countries that generally exploit the periphery for their prosperity. An instance usually depicted in the literature is one where the periphery cheaply supplies the core with raw materials, the core then processes the raw materials and sales them back to the periphery at high prices. This theory rationalizes that provided the periphery continue interacting with the core in this fashion, they will remain stuck in a vicious underdevelopment cycle (Johnson, 1981)

This theory becomes key in analyzing effects of trade on industrialization in Zambia because of the country's reliance on copper to earn foreign currency. In this view, the theory brings into focus the role of terms of trade in the industrialization debate. Particularly, the theory proposes that declining terms of trade in the long term affects development in periphery countries, industrial growth along with it. The foregoing view is called the Prebisch-Singer Hypothesis (Sapsford and Chen, 1998).

The last industrial growth perspective worth considering is that of Lewis (1954). In his paper, *Economic Development and Unlimited Supplies of Labor*, Lewis focused on the interaction between development and labor. He argued that demand for labor in developing countries did not translate into a rise in wages but that workers merely moved to areas with a high demand for labor leaving wages fairly flat. He also argued that capital formation raised profits and not wages for the same reason. Lastly, Lewis argued that a protectionist strategy in industry from international competition could be used to exhaust excess labor supply and perhaps more quickly lead to increases in wages (Lewis, 1954).

In the context of this study, the Lewis model, introduces a key component in the protectionist debate – the possibility of quickening wage increases. From this perspective, regulating the openness of trade yields industrial growth as well as raises wages. It as such raises the cost benefit analysis question of whether the possible industrial growth benefits of trade outweigh the foregone wage rises as suggested by Lewis. This then raises the importance of understanding the effects of trade on industrial growth in Zambia.

2.2.2 Theories of Industrialization Financing

This section highlights two categories of industrialization financing views; domestic and international industrialization financing. The former refers to theories that relate to domestically raised finance through the financial sector while the latter refers to foreign funds. For ease of exposition, the latter theories presented in this study are aligned to foreign direct investment

theories. Using FDI as an indicator for international finance into the industry follows naturally, FDI represents financial inflows of funds sourced externally and invested directly into the host economy. FDI thus serves the function of getting external funds invested into the domestic economy, implicitly increasing funds available on the domestic market.

In analyzing domestic financing, the first model worth a note is the Mckinnon – Shaw Model. The basic proposition in the model by Mckinnon (1973) and Shaw (1973) is that the market determined interest rates lead to higher investments by enhancing and channeling savings into the real sector such as industry leading to overall economic growth. The theory argues that repressive practices that distort the market such as interest rate ceilings and directed credit lead to market inefficiencies and inhibit investment. This view contends that such financial repression as ceilings lead to reduced savings and therefore less investment, which leads to low capital accumulation and consequently lower growth.

Further, because of the limited funds available for investment in cases of repressive practices, other non-price mechanisms have to be employed in allocating credit. Particularly, rationing systems such as bidding and queuing have to be introduced, which not only imply prevalence of financial malpractices such as corruption but entail that the quality of investments become suboptimal (Struthers, 2003). The Mckinnon-Shaw model introduce the importance of financial policy in industrial growth, particularly because industry generally requires investment into costly technology to setup and further costs in scaling up production. Because interest rates directly affect finance available in the financial intermediary system and it are at the same time directly influenced by policy through the monetary policy rate, its inclusion in the current study is critical.

Among the earliest attempts to explain FDI was Aliber (1970), His theory of FDI focused on the strength of currencies and imperfect capital markets. He argued that countries with relatively weaker currencies had an advantage as regards attracting FDI because of the variation in the market capitalization rate. Aliber (1970 and 1971) further postulated that multinational corporations in countries with relatively stronger currencies had a financing advantage as they faced lower interest rates with which they would use to invest in countries with weaker currencies. Aliber's theory has however been challenged to have failed to explain investment that occurs between countries with equally strong currencies (Nayak and Choudhury, 2014). Further, Nayak and Choudhury (2014) argued that the theory hardly explains the occurrence of foreign direct investment from countries

with weaker currencies to countries with stronger currencies as in the case of FDI running from India and China to the United States of America. This theory is however sufficient in explaining the FDI inflows into Zambia over the last two decades from Europe and North America, among other countries with relatively stronger currencies. Notwithstanding, an argument by Lall (1979) contends that the theory would not be optimally applied to countries that lack capital markets with regulated foreign exchange markets. The reasoning behind this argument is that the superiority of stronger currencies would be eliminated in the face of fixed exchange rates. This argument while not directly apparent in figure 2 above may be applied to Zambia's fixed exchange rate regime over the period 1987 to 1991.

Another foreign direct investment approach worth assessing is the Industrial Organization Approach. The approach as proposed by Hymer (1976), attempted to explain international production in the face of imperfect markets. The approach is based on the understanding that FDI implies competition with domestic firms that may be culturally and legally advantaged. Multinational Corporations (MNCs) are further faced with foreign exchange risks when they undertake FDI. In Hymer's view, MNCs pursuing FDI would have to take advantage of the imperfect markets by establishing monopolies through cheaper finance, patent-protected superior technology, brand names, economies of scale as well as superior expertise. Hymer further argued that technology was the most important tool in establishing such monopolies as it facilitates more efficient production as well as instigates the creation of new products. The efficient production and introduction of new products naturally becomes the source of industrial growth in the FDI host economy. This approach has however been criticized by Robock and Simmond (1983) for not adequately explaining why MNCs would prefer foreign investment relative to simply exploiting exports, keeping production in the home country. Other studies have however argued for FDI relative to exports for among other reasons the ability to exploit all the rents MNCs would otherwise forego such as trade and transport costs. Furthermore, Sodersten and Reed (1994) argued that licensing may facilitate for leakage of technology to competitors. Notwithstanding, while Hymer's approach does not explain the factors affecting the destinations of FDI, it does provide the link between FDI and industrial growth.

2.2.3 Trade Theories

Among the earliest theories explaining trade was Mercantilism. Mercantilism was an economic system popularized between the sixteenth and eighteenth centuries. It proposed that world wealth was static and that economic prosperity required positive trade balances, an outcome propagated by limiting imports and maximizing exports. This view inherently promoted development of the domestic industry and accumulation of foreign currency reserves. Agriculture was encouraged in this system as it reduced food imports (Irwin, 1991). While eventually discredited, mercantilism does highlight the importance of trade in industrial growth, a key facet of the current study.

In 1776, Adam Smith argued against mercantilist views, advocating instead for free trade. Particularly, Smith believed that absolute advantage was the motivating factor for two countries to engage in trade. He showed that if one country could produce a commodity using lesser resources than another country, and this second country could produce a commodity using lesser resources than the first country there existed gains from trade. Specifically, each country could produce a commodity to which it had absolute advantage and the two countries could trade. Arguments have since arisen against absolute advantage as the basis of trade among countries. Particularly, absolute advantage explains only a small proportion of international trade and further fails to explain the bulk of trade among developed countries (Salvatore, 1983).

Later in 1817, David Ricardo (1817) in his book *On the Principles of Political Economy and Taxation* extended the absolute advantage argument to include comparative advantage. The basic argument of comparative advantage is that countries should produce commodities for which they have the least opportunity cost. While a country may have absolute advantage over another country, the two countries could still engage in mutually beneficial trade by producing commodities for which they have the least opportunity cost (Salvatore, 1983). This view makes several assumptions: two countries, two commodities, free trade, perfect labor immobility across countries but perfect labor mobility within each country, constant costs of production, no transportation costs, no technical change and the labor theory of value.

Further, Heckscher (1919) and Ohlin (1924) developed a comparative advantage trade model with adjustments made in two spheres, it allows for capital as the second factor of production and exposes that comparative advantage is determined by the varying levels of endowment among countries (Leamer, 1995 and Findlay, 1998). The model highlighted that a country will produce

and export the commodity whose production uses the country's most abundant resource and import the commodity whose production uses the country's scarcer resource. The foregoing models highlight the efficiencies associated with trade, which generally translate into higher overall output as well as lower costs. In the context of the current study, the foregoing views imply that the Zambian industry need not produce all industrial output but rather specialize in producing commodities for which it has comparative advantage. Further, the theories also imply decentralization of production when it makes economic sense, such that the Zambian industry could produce final consumption commodities by importing intermediate consumption commodities or similarly, produce intermediate consumption commodities from raw inputs and export them in that state. Notwithstanding the appropriate case, this study makes a case for understanding the effects of trade on industrial growth in Zambia.

Worth a comment is the contribution of Friedrich List in the trade debate, while mostly popularized for his critique on international trade, Friedrich List's contributions to development economics are much broader. List argued that the industrial system as observed in the English practice of economy was an ideal path to growth and industrialization. He highlighted the following as preconditions for industrialization: strong manufacturing and domestic industry, developed infrastructure, strong state and immunity from invasion, internal free markets, sufficient external demand and strong work culture. List further argued that the state needed to support domestic manufacturing and secure competitive foreign trade, he in this view advocated for a limited form of protectionism. Specifically, he emphasized that growing industries for a limited period needed to be protected from international products through import tariffs, insisting that these tariffs needed to be removed when these industries had attained critical mass to compete favorably on international markets (List, 1841).

The argument against protection of infant industries is that eventual removal is difficult in practice due to the impact of special interests, additionally industries may never attain critical mass to stand on their own because protectionism harnesses inefficiencies in production. Irrespective of the effect protectionism has on industrial growth, initial analysis requires an understanding the effect trade has on industrial growth, a key component of this study.

2.3 Empirical Review

This section presents empirical studies that focus on the relationship between trade and finance, and industrial growth. Four categories of empirical studies are analyzed; cross country studies, developed country studies, developing country studies and studies done in Zambia. A synthesis of the analyzed studies is then presented.

2.3.1 Cross Country Studies

Fongang et al (2017) investigated the effect of trade openness on manufacturing growth. The study used panel cointegration as well as the dynamic ordinary least squares method on panel data over the period 1984 – 2014. The key findings were that FDI and investment had a positive and significant relationship with manufacturing growth while trade openness was found to have an ambiguous effect. Particularly, the study concluded that trade openness either affected manufacturing negatively or did not have an effect at all. The study went on to recommend that EMCCA proceeds to developing their manufacturing sectors before completely opening up to external trade.

Guadagno (2012) studied the determinants of industrialization in developing countries. He applied the Cornwall Model (1977) on 74 developed and developing countries over the period 1960 – 2005. The study found that trade openness, inflation, undervaluation, market size, skills and knowledge accumulation were positively related to industrialization. This study further highlighted the evolutionary nature of industrial growth determinants, stating that the industrialization drivers between 1970 and the mid-1990s were undervaluation and technology while investment in knowledge accumulation has been the key driver since then.

Wacker et al. (2014) analyzed the integration of South and East Asia onto the global markets. The study focused on the relationship between FDI and terms of trade in development. It showed both theoretically and empirically that South and East Asia approached trade integration in different ways, in part due to the different types of FDI they allowed and the time they industrialized. The study argued that East Asia pursued quality competitiveness while South Asia penetrated the world market through price competitiveness. Wacker et al. further argued that South Asia did not achieve the same growth as East Asia on account of adjusting prices downwards, further recommending the importance of customized industrial strategy as opposed to assimilating preexisting blueprints. They asserted that South Asia could have used the productivity increases they attained through

FDI without having to adjust the pricing as much as they did. This study raises a key component in the industrialization strategy; FDI analysis in industrial growth need not only consider the quantity of FDI but the type as well.

Baldwin and Venables (2015), studied how linkages between production of intermediate goods and final goods influence industrial output and industrialization in a developing economy. The study built a model by mathematically analyzing the production of intermediate and final goods and how trade and industrial policy can enhance industrialization. Specifically, the model was developed from the optimization of a small open economy subject to a larger more advanced economy through appropriate manipulations of industry linkages. The study concluded that linkages create multiplier effects capable of enhancing or stagnating industrialization, these effects are in turn influenced by policy accuracy. Despite the inadequate analysis of technology spillovers, the study does facilitate for statistical analysis of the role of trade in industrial growth. Further, the analysis of a small open economy relative to a larger one can easily be adapted to Zambia, this is because the country's top five trading partners (which account for over 80% of total exports) are significantly larger economies (IMF, 2016).

2.3.2 Developed Country Studies

Jayawickrama and Thanguvelu (2010) examined the effect of FDI on manufacturing sector growth in Singapore. They used a panel sample of 14 manufacturing industries running from 1975 to 2004. The study found that FDI was positively related to manufacturing output growth, particularly, Jayawickrama and Thanguvelu (2010), found that a percentage increase in FDI results in manufacturing growth of about 0.4 percent. The case of Singapore is particularly important to the current study, the country being among the Newly Industrialized Countries.

Da Rin and Hellman (2002), examined the role of banks as catalysts for industrialization in emerging markets. Their study built a historically informed model using a generic two rankable - equilibria big push model as a starting point and evidence from the industrializations of Belgium, 1830 – 1850; Germany, 1850 - 1870, and Italy, 1894 - 1914. They concluded that, provided banks are sufficiently large and command enough market power, they can catalyze industrialization. They argued that banks in emerging markets do not seem to catalyze industrial growth because the foregoing condition is not satisfied. The study verified this model by contrasting economies in which the conditions were satisfied and unsatisfied, and additionally analyzed other

industrialization financing mechanisms. This study highlights the importance of internal finance in the industrialization debate, a key facet of the current research.

Chandran and Munusamy (2009) investigated the relationship between trade openness and manufacturing growth in Malaysia. The study used the autoregressive distributed lag method and established that trade openness was positively related to manufacturing growth. It further argued that analysis of trade openness needed to be sector specific as opposed to overall economic growth. This was because sector specific analysis gave more insight to policy making. Chandran and Munusamy emphasized the need to understand whether the trade liberalized sectors had comparative advantage against trading partners. The study at hand also follows the approach of focusing on the industrial sector as opposed to analyzing the entire economy.

2.3.3 Developing Country Studies

Umer and Alam (2013) studied the effects of trade openness and foreign direct investment on industrial sector growth in Pakistan. They used annual time series data for the period 1960 – 2011 and fitted a Vector Error Correction Model. Key results from the study were that in the long run FDI and Real GDP had a positive and significant relationship with industrial growth while trade openness and inflation had negative relationships with industrial growth. Further, real effective exchange rate was found to be statistically insignificant in the long run. Furthermore, short run analysis found that lagged industrial sector values, FDI, REER and Real GDP had a positive and significant impact on industrial growth, with inflation and trade openness showing insignificant short run relationships.

Nwandu (2016) analyzed the impact of interest rate on the Nigerian manufacturing sector. The study used the ordinary least squares method to analyze data over the period 1981 – 2015. The study found an inverse relationship between the lending interest rate and manufacturing sector performance; arguing that rising interest rates contributed to the poor performance of the manufacturing sector in Nigeria. The current study benefited from the insight in the study by Nwandu, the Zambian manufacturing sector as shown in figure 1 has stagnated. Further financial sector credit has declined significantly since the 1980s with a drastic fall occurring after 2000 as shown in figure 2. It hence raises the significance of understanding the causal effect of local finance on manufacturing and industrial growth in general.

Umoh and Effiong (2013) studied the relationship between trade openness and manufacturing sector performance in Nigeria and revealed that trade openness had a significant and positive relationship with manufacturing sector performance. The study found that exchange rate had a positive long run relationship with manufacturing sector performance while interest rate spread had a negative relationship. The study made the assumption that an increase in the interest rate spread is analytically the same as an increase in the lending rate. It used data for the period 1970 – 2008, applying the Autoregressive Distributed Lag method. In the same way, a study by Adofu and Okwanya (2017) aimed at examining the linkages between trade openness, productivity and industrialization in Nigeria found that trade openness had a positive effect on industrial output while productivity was found to be insignificant. The study used the vector autoregressive model based on data covering the period 1981 – 2015. A similar result was obtained by Ogu, Aniebo and Elekwa (2016), with the latter obtaining a negative short run result but a positive long run relationship between trade openness and manufacturing output.

Bell and Rousseau (2000) examined the role of financial intermediation in India's economic performance. The study utilized both Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) models to assess the strength of the relationship between financial intermediation and economic performance. Key results from the study were that the financial sector not only raised aggregate output and investment but played a significant role in deepening the industrial base. Specifically, Bell and Rousseau noted that industrialization occurred through debt accumulation rather than total factor productivity improvements. They argued that the expansion of the financial sector played a catalytic role in capital accumulation, with the caveat that this expansion had no influence on total factor productivity in organized manufacturing. Bell and Rousseau decisively concluded that financial development can promote industrialization and growth even in the face of high industrial and financial regulation.

2.3.4 Zambian Studies

While the current study was unable to find recent empirical work on the specific topic in Zambia, this section presents a summary of some related Zambian discussions on the topic.

Seidman (1974), attempted to explain the apparent failure of the rapid expansion of manufacturing to significantly contribute to productivity across all sectors of the Zambian economy. She argued that while manufacturing in the post-independence era grew at a faster rate than had been predicted

by the United Nations, this growth did not contribute to the spread of productive employment opportunities, further arguing that it did not improve the standard of living. Seidman asserted that institutional changes needed to be made for an optimal execution of long-term industrial strategy. Later, Seshamani (1994), provided an analysis of Zambia's industrial strategies. He argued that wrong prices and exchange rates, inappropriate tariff structures and poor protectionist strategies, and capital intensity and non-development of the capital goods industry were among the key hindrances to Zambia's industrial growth.

More recently, a study by Fessehaie,et al. (2015) aimed at analyzing growth promotion through industrial strategies. The study in assessing the impact of regional integration on Zambia's manufacturing reiterated that regional economic integration was important for domestic manufacturing. The study went on to recommend that cooperation on industrial development within the region was an important step towards industrialization. Fessehaie, et al. (2015) further highlighted that lack of access to finance was a significant bottleneck to growth, pointing out that increased interest rates as a result of large premiums significantly hindered growth in the manufacturing sector. A manufacturing sector study by the Ministry of Commerce Trade and Industry (2014) covering the period 2006 – 2010 highlighted that Zambia had the capability to penetrate the international market and this would lead to growth in manufacturing. It noted however that manufacturers rather preferred to pursue markets that were backed by international trade policy.

2.3.5 Empirical Literature Synthesis

Evidently, the studies reviewed above had varying outcomes. The cross-country studies appeared to show that finance, proxied by FDI and investment and industrial growth were positively related. On the other hand, the response of industrial growth to trade openness provided mixed results. Cross country studies while able to give an overview of relationships across various countries ignore salient country specific properties relevant for policy formulation.

Further, the review of developed country studies revealed that finance, proxied by FDI and domestic credit were positively related to industrial growth. Similarly, trade had a positive relationship with industrial growth. Developed countries generally have more functional and organized systems of both trade, finance and industry such that analysis of these relationships in

these countries gives a perspective of how the variables would relate in an ideal situation. This information is however not sufficient for policy formulation in developing countries.

Lastly, developing country studies revealed varying results on the effects of trade and finance on industrial growth. While trade openness was mostly positively related to industrial growth, it did record some negative and insignificant relationships, respectively. Similarly, finance while proxied by various variables did not seem to maintain consistency in its relationship with industrial growth. This outcome highlights that the effects of trade and finance on industrial growth in developing countries are country specific.

It can thus be hypothesized that the effects of trade and finance on industrial growth is dependent on among other things, indicators used and structure of the economy. It can also be observed that the statistical methods employed varied across studies, this could be a result of the stationarity behavior of the individual series or varying familiarity and preference of the individual researchers with the methods. Notwithstanding, policy needs country specific results and thus justifies the current research to understand the causal effects of trade and finance on industrial growth. Other results of the review worth noting are the importance of monetary policy on the topic as well as the importance of customizing industrial strategy to country specific trends as opposed to adopting the blueprints from the newly industrialized countries.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This section highlights the methodology used to implement the study. Based on both the theoretical and empirical reviews, this study employed merchandise trade openness as an indicator of trade while FDI and lending interest rate were used as indicators of international and domestic finance respectively. Further, two indicators of industrial growth were applied; broad industry share of GDP and manufacturing share of GDP. This approach enabled the analysis of trade and finance effects in cases of both overall and pure industry, the former referring to industry when mining, electricity, construction and water are included. As shown in the background above, mining has been a major driver of Zambia's economy but has not been able to translate into a structural transformation that would lead to industrialization. Further, the mining sector in Zambia is highly integrated with the other heavy industrial sectors, for instance the mining sector has accounted for over 50 percent of national electricity consumption since 2015 (ERB, 2016 and 2017), a similar case can be made for the construction sector (Phiri, 2011). Furthermore, Zambia's 2010 input and output tables further show strong links between mining and construction and water (CSO, 2017). Use of manufacturing share of GDP has been advocated for by scholars such as Wade (1990) and Amsden (1989), as they have argued that it provides a much more informed measure of industrial depth in an economy. Due to the foregoing, two models were developed, one with manufacturing share of GDP as the dependent variable and another with broad industry share of GDP. The effects of trade and finance on industrial growth was then analyzed through short run granger causality tests as well as the properties of the long run models, supplemented by impulse response analysis.

3.2 Mathematical Model

Taking from the literature review, the study adopted with modification the model specification by Tan and Tang (2016), in their causality analysis among trade, interest rate, domestic investment and economic growth. They modelled growth as a function of FDI, trade, interest rate and domestic investment, thus;

$$growth_t = F(to_t, fdi_t, lir_t, di_t)$$

The current study however based on its aims and literature review rationalized the exclusion of domestic investment and substitution of overall growth with industrial growth. The modified general form model thus became;

$$ind_t = F(to_t, fdi_t, lir_t)$$

Whose specific form was an additive model as in the case of Tan and Tang (2016) as follows;

$$ind_t = \beta_1 to_t + \beta_2 fdi_t + \beta_3 lir_t + \varepsilon_t$$

As previously highlighted, industrial growth, ind_t was indicated by two variables, manufacturing share of GDP (man_t) and broad industry share of GDP (bi_t), the former being the primary indicator. Specifically, broad industry represents division 10 to division 45 of the International Standard Industrial Classification of All Economic Activity (ISIC) Revision 3, it includes; mining, manufacturing, construction, electricity, water and gas. On the other hand, manufacturing excludes from broad industry, mining, construction, electricity, water and gas. The operationalization of industrial growth as share of industry in GDP is popular in the academia as an increase not only implies its relative importance to the economy but in most cases also implies growth in the sector as well. The former justification is particularly important in developing countries as it indicates a structural shift of the entire economy to more advanced forms of production. Such an operationalization of industrial growth has been used in studies by Ezeaku et al (2018), Enu et al (2013), Otalu and Anderu (2015), Sokule and Harper (2017) and Umer and Alam (2013) among many others.

Secondly, trade openness, to_t, was defined as a sum of merchandise exports and imports divided by the value of GDP. The rationale for the indicator is that the combined effect of merchandise exports and imports represents how much of domestic products were transported and utilized by the rest of the world and similarly how much of output from the rest of the world was transported and utilized by the domestic economy. The foregoing can thus be interpreted as the importance of trade to the economy. Interpretation of the indicator follows naturally; an increase implies increased importance of trade to the economy. The indicator can to a lesser degree also be used to indicate the relative ease with which trade takes place in the economy; encompassing trade and customs requirements, quality of the transport sector and efficacy of trade policy. Studies utilizing this indicator in the analysis of industrial growth include Umoh and Effiong (2013), Umer and

Alam (2013), Otalu and Anderu (2015), Fongang, et al (2017), Ejaz, et. al. (2017) and, Adofu and Okwanya (2017) among many others.

Thirdly, foreign direct investment, fdi_t, was defined as foreign direct investment net in-flows, in US dollars. These are net inflows of investment from the rest of the world into Zambia to acquire a lasting management interest of at least 10 percent in firms established or that would be established in Zambia. This indicator in this analysis represented foreign finance aimed at production, the interpretation of which follows naturally; an increase represents increased finance from the rest of the world in Zambia for production purposes. Studies using FDI inflows in industrial growth analysis include; Sokule and Harper (2017), Jayawickrama and Thanguvelu (2010), Umer and Alam (2013), Fongang, et al (2017), Aiyedogbon and Anyanwu (2015) and Ejaz, et. al. (2017), among others.

Lending interest rate, lir_t, was defined as interest rate at which economic units could borrow from the domestic financial market. Contrasted with FDI this indicator was employed to represent the domestic availability of financial resources. The interpretation of this variable in analyzing the effects of finance on industrial growth follows naturally; an increase represents a higher cost of borrowing and implies liquidity challenges in the economy. The foregoing means economic units will not invest as much as they would have at lower interest rates. Because of the efficacy of the indicator in representing the domestic financial properties, interest rates have been used in multiple empirical studies that focused on industrial growth including; Sokule and Harper (2017), Aiyedogbon and Anyanwu (2015), Nwandu (2016), Ezeaku et al (2018) and Imoughele and Ismaila (2014), among others. Lastly, ε_t, implied the error term.

3.3 Empirical Models

Based on the empirical and theoretical review, the econometric tools on which the causalities were assessed are shown in sections 3.2.1 through to 3.2.8.

3.3.1 Assessment of Level Data

3.3.1.1 Graphing Level Data

The entire series were graphed to retrieve their salient properties, which were further used in defining the unit root tests as well as determining the graphical configuration of the empirical models.

3.3.1.2 Unit Root Tests of Level Data

This research used the Augmented Dickey Fuller (ADF) to test for stationarity as well as the Phillips-Perron (PP) test to confirm the results. What follows is hence the operationalization of the ADF test with the PP test omitted, using industrial growth for exposition.

The Dickey Fuller test for stationarity assesses the model,

$$ind_t = \alpha + \beta_1 ind_{t-1} + \varepsilon_t$$

On the assumption that it is the true model of industrial growth. Where ε_t is independently and identically distributed with zero mean (Stata, 2014). The test then attempts to fit the model,

$$ind_t = \alpha + \beta ind_{t-1} + \delta t + \varepsilon_t$$

With assumptions made about the values of α and δ, the former indicating the presence of a constant and the latter indicating a trend. These assumptions are made on the analysis and plotting of the level and differenced series. Fitting the foregoing model may present serial correlation, as such the ADF test fits the following model,

$$\Delta ind_t = \alpha + \beta ind_{t-1} + \delta t + \Delta\pi_1 ind_{t-1} + \Delta\pi_2 ind_{t-2} + \cdots + \Delta\pi_k ind_{t-k} + \varepsilon_t$$

Assumptions being made on the constant and trend as highlighted above. The test then determines stationarity by testing the null hypothesis that $\beta = 0$: ind_t is non-stationary with the corresponding alternative hypothesis being $\beta < 0$: ind_t is stationary (Stata, 2014). This test was applied to all the series in dataset, making the necessary case specific assumptions.

3.3.2 Assessment of Differenced Data

The methods in section 4.2.1 were further applied on differenced data to determine the order of integration as well as to give insight on the graphical specification of the manufacturing and broad industry models.

3.3.3 Selection of the Number of Lags

The selection of the number of lags employed the methodology developed by Hamilton (1994). The analysis is based on the log likelihood of the vector autoregression, given as

$$LL = \left(\frac{T}{2}\right)\left[ln\left(\left|\hat{\Sigma}^{-1}\right|\right) - Kln(2\pi) - K\right]$$

Where; T, K and $\hat{\Sigma}$ are the number of observations, number of equations and maximum likelihood estimate of $E[\boldsymbol{u}_t\boldsymbol{u}_t']$, respectively, further $\boldsymbol{u}_t$ is a K x 1, vector of disturbances (Stata, 2014). A simple transformation yields,

$$LL = -\left(\frac{T}{2}\right)\left[ln\left(\left|\hat{\Sigma}\right|\right) + Kln(2\pi) + K\right]$$

Now, the value of the log likelihood with j lags, $LL(j)$, yields a Likelihood Ratio (LR) statistic given by,

$$LR(j) = 2[LL(j) - LL(j-1)]$$

Given the foregoing framework, selection of the number of lags was based on the Final Prediction Error (FPE), and three criteria, Akaike's Information Criterion (AIC), Scharz's Bayesian Information Criterion (SBIC) and Hannan and Quinn Information Criterion (HQIC) given by the respective formulae;

$$FPE = |\Sigma_u|\left(\frac{T + \bar{m}}{T - \bar{m}}\right)^K$$

$$AIC = -2\left(\frac{LL}{T}\right) + \frac{2t_p}{T}$$

$$SBIC = -2\left(\frac{LL}{T}\right) + \frac{\ln(T)}{T}t_p$$

and,

$$HQIC = -2\left(\frac{LL}{T}\right) + \frac{2\ln\{\ln(T)\}}{T}t_p$$

Where, $\bar{m}$ and t_p are the average number parameters of the K equations and the total number of parameters in the model respectively (Stata, 2014).

3.3.4 Cointegration Tests

Johansen's "trace" statistic method was used to determine the number of cointegrating equations. The trace statistic method is based on Johansen's Maximum Likelihood (ML) estimator of the parameters of the underlying VECM (Stata, 2014). Given the basic VECM defined as,

$$\Delta y_t = \alpha\beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \epsilon_t$$

Where, y is a $(K\ x\ 1)$ vector of variables with order of integration one and α and β are $(K\ x\ 1)$ matrices of parameters with rank $r\ <\ K$. Further, Γ_i, running from 1 to $p-1$ are $(K x K)$ parameter matrices and ϵ_t is a $(K\ x\ 1)$ vector of normally distributed errors. The errors should be serially uncorrelated but have a contemporaneous covariance matrix Ω.

Johansen (1994) building on the work of Anderson (1951) derived a ML estimator for the parameters in the VECM. The analysis used the trace statistic and maximum-eigenvalue statistic developed by the former in the determination of the rank, the number of cointegrating relations.

Now, let, λ_i, be the K eigenvalues used in the calculation of the log likelihood at the optimum. Further assume λ_i are sorted in descending order, such that λ_k is the largest. Following Johansen's analysis, if there are r < K cointegrating relations, the parameter matrices α and β have rank r with eigenvalues λ_{r+1} and over, equal to zero. The distribution of the trace statistic as derived by Johansen (1995) follows,

$$-T \sum_{i=r+1}^{K} \ln\left(1 - \widehat{\lambda_i}\right)$$

Where T and $\widehat{\lambda_i}$ are the number of observations and estimated eigenvalues respectively. The null hypotheses were be set as there being no more than r cointegrating equations, such that large values of the trace statistic for any given value of r increases the chances of rejecting the null hypothesis (Stata, 2014).

The outcome of the cointegration test further determined fitting the VECM as opposed to fitting the VAR.

3.3.5 Vector Error Correction Models

Having found the cointegrating relations the study fit the VECMs. The general VECM can be presented as follows,

$$\Delta y_t = \alpha\beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + v + \delta t + w_1 s_1 + \cdots + w_2 s_2 + \epsilon_t$$

Where,

y_t is a $K x 1$ vector of endogenous variables

α and β are respective $K x r$ parameter matrices

Γ_i are $K x K$ parameter matrices, i = 1, 2, …, p – 1

v is a $K x 1$ parameter vector

δ is a $K x 1$ trend coefficients vector

t is a linear time trend

s_j are orthogonalized seasonal indicators, $j = 1, 2, \ldots, \mathrm{m}$

w_j are $K x 1$ vectors of coefficients on the orthogonalized seasonal indicators

ϵ is a $K x 1$ vector of normally distributed errors.

Two deterministic features are apparent in the model; the trend, $v + \delta t$ and the orthogonalized seasonal terms, $w_1 s_1 + \cdots + w_2 s_2$ (Stata, 2014).

Now, since α is a $K x r$ rank matrix, the trend can be broken down as follows,

$$v = \alpha\mu + \gamma$$

$$\delta t = \alpha\rho t + \tau t$$

Such that μ and ρ are $r x 1$ parameter vectors and γ and τ are $K x 1$ parameter vectors. Further, γ and τ are orthogonal to $\alpha\mu$ and $\alpha\rho$, respectively. The foregoing implies that,

$$\gamma' \alpha\mu = 0$$

and,

$$\tau' \alpha\rho = 0$$

Furthermore, excluding the seasonal indicators for simplicity, the reparametrized model can be stated as,

$$\Delta y_t = \alpha(\beta' y_{t-1} + \mu + \rho t) + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \gamma + \tau t + \epsilon_t$$

Now, the foregoing equation is the functional form of the research model. Results from sections 4.2.1 and 4.2.2 further informed the restrictions on the parameters, μ, ρ, γ and τ. Specifically, five options could have been borne out of the model;

Case one: unrestricted trend, no restrictions placed on the parameters.

Case two: restricted trend, τ=0.

Case three: unrestricted constant, $\tau = 0$ and $\rho = 0$.

Case four: restricted constant, $\tau = 0$, $\gamma = 0$ and $\rho = 0$, and

Case five: no trend, all parameter equal to zero.

3.3.6 Granger Causality

After fitting the models, granger causality tests were carried out to ascertain whether the indicators of trade and finance could be used to explain the indicators of industrial growth. Wald tests in this regard were carried out to test the null hypothesis that trade and finance did not jointly granger cause industrial growth. Further, individual granger causality tests were carried out to test whether each indicator used for trade and finance granger caused industrial growth.

3.3.7 Impulse Response

Now, the VECM is a reparameterization of the VAR, it fits VARs with cointegrating relations. Due to the foregoing, parameters estimated by a VAR can be backed out from those estimated by its corresponding VECM. To this effect, the corresponding VAR to the VECM is used to expose the impulse response approach.

Suppose the underlying VAR of our VECM is,

$$y_t = v + A_1 y_{t-1} + \cdots + A_p y_{t-p} + u_t$$

Where, y_t are the variables under analysis, A_i are the parameters and u_i are serially uncorrelated innovations. The foregoing VAR can be transformed into,

$$\Delta y_t = v + \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \Gamma_{p-1} \Delta y_{p-2} + \epsilon_t$$

Now, the VECM would estimate Π and the Γ_i. From Johansen (1995), the parameters from the two equations can be linked thus,

$$A_1 = \Pi + \Gamma_1 + \mathrm{I}_K$$

$$A_i = \Gamma_i - \Gamma_{i-1} \text{ for } i = 2, \ldots, p-1$$

$$A_p = -\Gamma_{p-1}$$

On obtaining the estimates of the VAR, A_i's and Σ, they would be applied in the simple impulse response functions and orthogonalized impulse response functions, represented respectively as,

$$\widehat{\Phi}_i = \sum_{j-1}^{i} \widehat{\Phi}_{i-j}\widehat{\mathrm{A}}_j$$

$$\widehat{\Phi}_i^o = \widehat{\Phi}_i\widehat{\mathrm{P}}_c$$

Where, $\widehat{\mathrm{A}}_j = O_K$ for $j > p$ and $\widehat{\mathrm{P}}_c$ is the Cholesky decomposition of $\hat{\Sigma}$. This study utilized only orthogonalized impulse response functions because interest was to understand responses from shocks that affected one and only one finance and trade indicator at a time.

3.3.8 Post Estimation Tests

After fitting the models, four post estimation tests were carried out specifically; Specification, Autocorrelation, Normality and Stability tests.

3.3.8.1 Specification Test

As an initial step, the cointegrating equations were predicted and graphed to test them for stationarity. Specifically, these tests predict one step ahead forecasts based on the estimated parameters, conditional on the specified exogenous variables and graph them for comparison (Stata, 2014).

3.3.8.2 Autocorrelation Test

Given the VECM without a trend,

$$\Delta y_t = \alpha\beta y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \epsilon_t$$

Further, with the parameters in the cointegrating vectors being identified or over identified, it is expected that the said parameters will be super-consistent (Stata, 2014). As such the estimates of the cointegrating relations

$$\widehat{E_t} = \hat{\beta} y_t$$

Can be used as data, applying standard estimation and inference methods. Now, substituting these outcomes in the VECMs yield,

$$\Delta y_t = \alpha \widehat{E_t} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \epsilon_t$$

These models were thus tested for autocorrelation, executed as the Langrage Multiplier (LM) test.

3.3.8.3 Normality Test

The normality test follows a similar transformation as in the autocorrelation test, and as such been excluded from this exposition.

3.3.8.4 Stability Test

Now, the VECM is a reparameterization of the VAR, it fits VARs with cointegrating relations as stated earlier (Stata, 2014). Due to the foregoing, parameters estimated by a VAR can be backed out from those estimated by its corresponding VECM.

Suppose the underlying VAR of the VECM is,

$$y_t = v + A_1 y_{t-1} + \cdots + A_p y_{t-p} + u_t$$

Where, y_t are the variables under analysis, A_i are the parameters and u_i are serially uncorrelated innovations. The stability test forms the companion matrix shown below and computes its eigenvalues.

$$A = \begin{pmatrix} A_1 & A_2 & \dots & A_{p-1} & A_p \\ I & 0 & \dots & 0 & 0 \\ 0 & I & \dots & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \dots & I & 0 \end{pmatrix}$$

Stability is confirmed if the modulus of each eigenvalue of A is strictly less than 1 (Stata, 2014).

3.4 Data

The study used time series data running from 1985 to 2016, this was secondary data obtained from the World Bank's World Development Indicators (WDI) database. Supporting data was obtained from the Central Statistical Office (Zambia). Further, discussions with industry experts and government planners were carried out for insight during the study, particularly, experts from the Central Statistical Office (CSO), Ministry of Finance (moF) and Ministry of National Development Planning (MNDP) were consulted.

3.5 Estimation

All econometric analysis utilized Stata 14 with Microsoft Excel 2016 serving as the main data management tool.

CHAPTER FOUR: PRESENTATION AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter shows the results of the analysis, applying the methods highlighted in chapter three. It additionally provides interpretations of the observed results with a detailed discussion following in chapter five.

4.2 Descriptive Statistics

Table 1 below highlights the descriptive statistics of the variables under analysis. As shown, the analysis used a series of 32 observations, running from 1985 to 2016 with four endogenous variables in each of the two models. It can be observed that the mean of broad industry is more than twice that of manufacturing, implying that on average, the combined effect of mining, construction, electricity, water and gas was higher than that of manufacturing in broad industry. Specifically, on average, manufacturing accounted for only 43 percent of broad industry over the analysis period compared to NICs such as South Korea and Brazil where manufacturing carry about 70 percent of broad industry (World Bank, 2017). This finding reinforces the need to analyze the effects of trade and finance on industrial growth in Zambia in both contexts: manufacturing and broad industry respectively. Notwithstanding, the year 1992 over the sample period recorded the highest share of manufacturing in broad industry with manufacturing accounting for 76 percent while 1994 recorded the least with manufacturing accounting for only 24 percent. This drastic fall is generally attributed to the labor retrenchments and establishment closures that succeeded the July 2nd 1992 Act of Parliament that provided for the privatization and commercialization of state-owned enterprises (Szirmai, et. al., 2002). It can further be noted that over the review period, in 1990 when trade openness was highest at 76.68 percent of GDP, broad industry recorded its second highest value at 51.27 percent of GDP while manufacturing recorded its third highest value at 36.06 percent of GDP. Furthermore, over the review period, in 2013 when FDI recorded its highest value at 2 billion US dollars and lending interest rate recorded its least value at 9.52 percent, manufacturing recorded its lowest value at 6.59 percent of GDP while broad industry remained resilient but was below its mean value at 33.86 percent of GDP. It can further be observed that manufacturing had a higher volatility than broad industry based on the standard deviations,

implying that manufacturing and consequently its causes fluctuate more than broad industry and its causes.

Table 1: Descriptive Statistics: Manufacturing, Broad Industry, Trade Openness, FDI and LIR.

S/n	Variable	Mean	Minimum	Maximum
1.	Manufacturing	15.95 (10.33)	6.59	37.16
2.	Broad Industry	37.28 (8.14)	25.78	52.48
3.	Trade Openness	58.53 (10.15)	40.29	76.98
4.	Foreign Direct Investment (million)	574 (639)	28	2,100
5.	Lending Interest Rate	32.98 (20.98)	9.52	113.31

n = 32. Standard deviations in parentheses

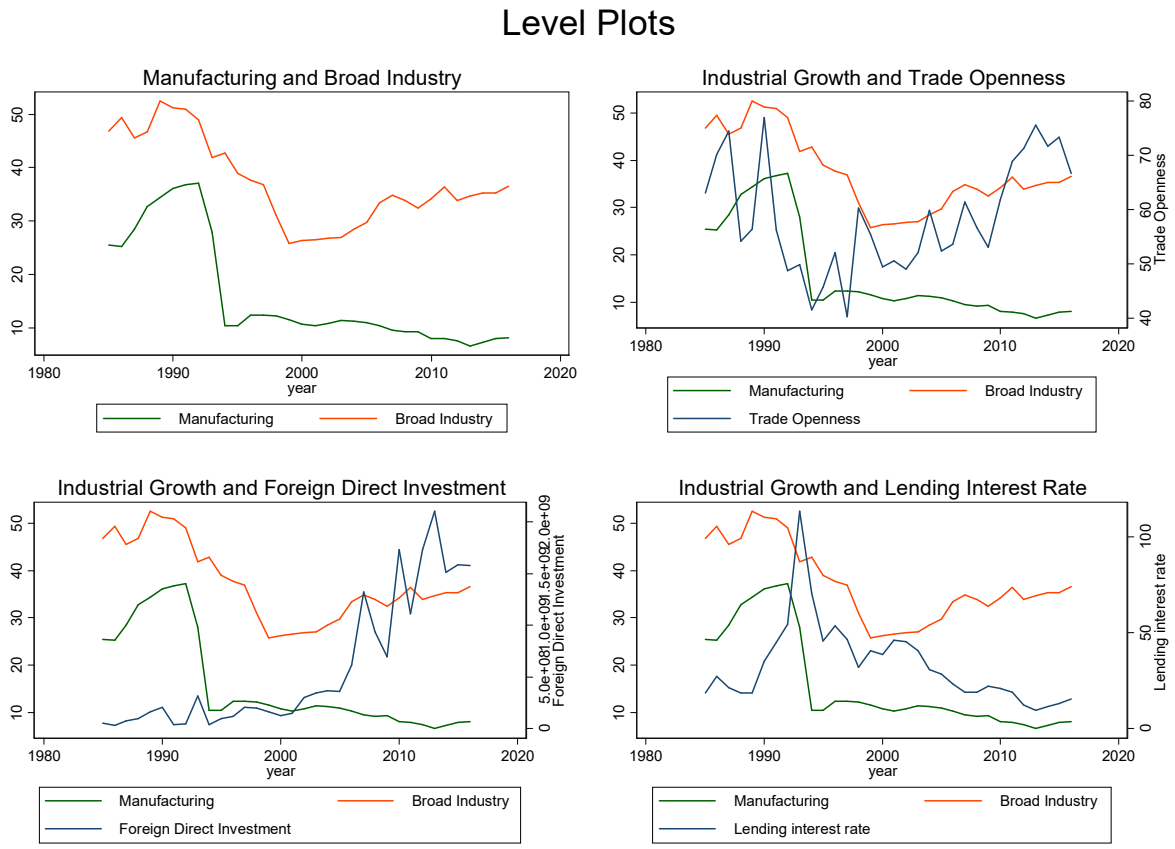
(Source: Author's computations based on, World Bank, 2017)

4.3 Assessment of Level Data

4.3.1 Level Data Graphs

In understanding the data, figure 5 below presents level data plots of industrial growth (Manufacturing and Broad Industry, respectively) against each of the independent variables. This informed the decision on the trend configuration of the respective models. The first quadrant of figure 5 shows that the shares of manufacturing and broad industry have similar configurations but differ in their levels. It can be seen that in the early 1990s there was a smaller difference between broad industry and manufacturing, implying that manufacturing had the highest share of broad industry. It can further be observed that the late 1990s saw the start of the increase in the disparity between manufacturing and broad industry. This can be attributed to an increase in the other shares industry such as mining and quarrying and a general decline in the manufacturing sector as well as manufacturing sector policy, as highlighted in section 4.1 above. Further, with the exception of trade openness in quadrant two, there does not appear to be any immediately discernable relations between industry and its hypothesized causes in this study. Furthermore, intermittent linear and quadratic trends in the data can be observed in the data in all the five variables. Notwithstanding, defined graphical configurations can be observed in FDI where, an upward approximately quadratic trend can be observed over the review period. Further, respective approximate linear

trends can be traced in the industrial growth variables and lending interest rate in partitions of the period under review.



(Source: World Bank, 2017)

Figure 5: Level Data Plots

4.3.2 Unit Root Tests

Further, unit root tests were carried out on the variables using the Augmented Dickey-Fuller unit root test, supplemented by the Philips-Perron unit root test (not reported). Table 2 below shows that none of the variables were stationary in level form at 5 percent level of significance.

Table 2: Augmented Dickey-Fuller Unit Root Tests, Level data

S/n	Variable	P - Value	Status (at 5 %)
1.	Manufacturing	0.7291	Not Stationary
2.	Broad Industry	0.6283	Not Stationary
3.	Trade Openness	0.0806	Not Stationary
4.	Foreign Direct Investment	0.7065	Not Stationary
5.	Lending Interest Rate	0.2462	Not Stationary

4.4 Assessment of First Differences

The analysis then assessed the first differences for stationarity as well as trend configuration.

4.4.1 First Differences Graphs

Figure 6 below shows that the first differences did not exhibit linear trends.

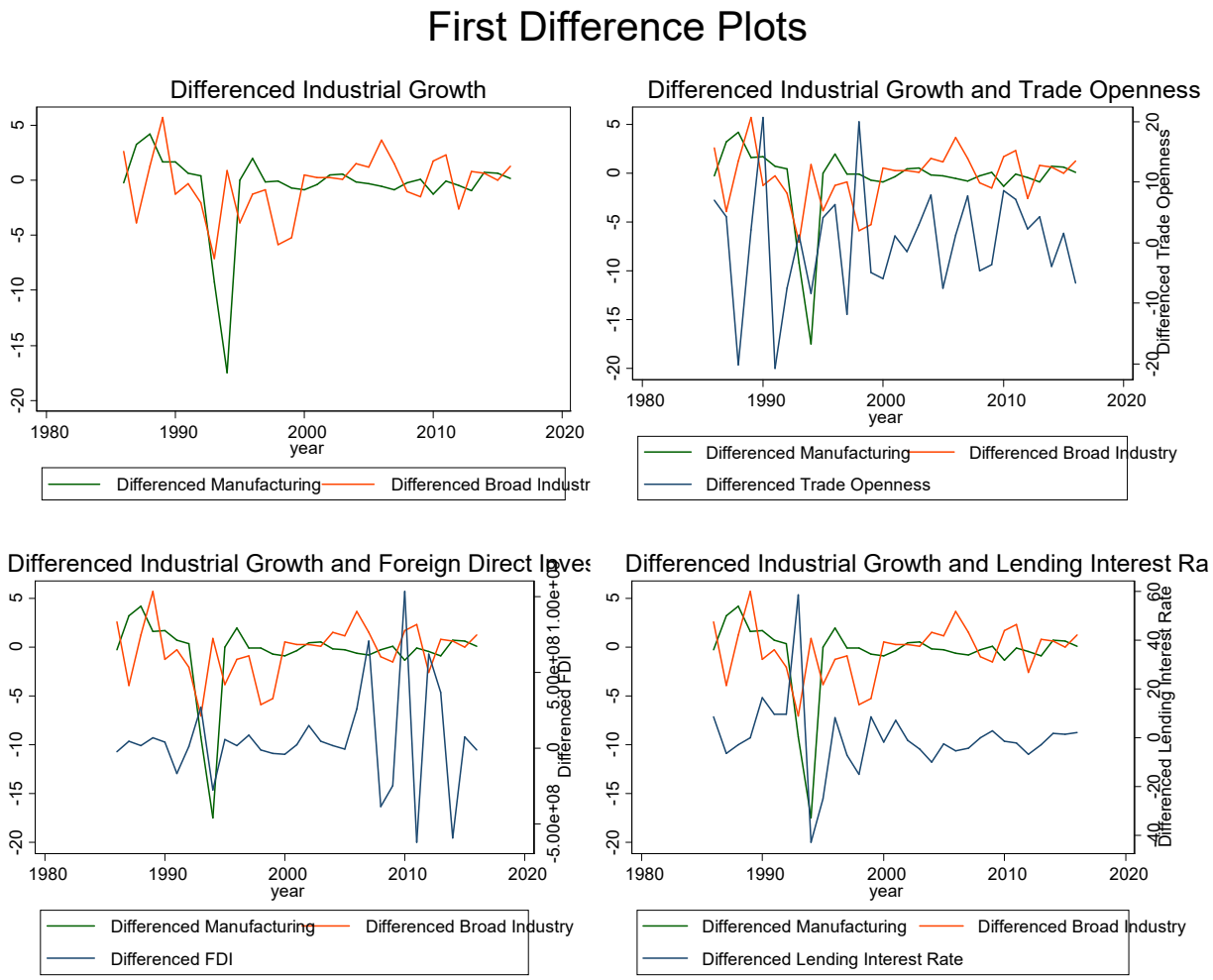


Figure 6: First Difference Data Plots

4.4.2 Unit Root Tests

Applying the same tests of stationarity as in section 4.2.2 above revealed that all the endogenous variables became stationary when differenced. This implied that the variables under investigation were integrated at order one.

Table 3: Augmented Dickey-Fuller Unit Root Test, Differenced data

S/n	Variable	P - Value	Status (at 5%)
1	Manufacturing	0.0099	Stationary
2	Broad Industry	0.0001	Stationary
3	Trade Openness	0.0000	Stationary
4	Foreign Direct Investment	0.0000	Stationary
5	Lending Interest Rate	0.0000	Stationary

4.5 Selection of the Number of Lags

Based on the outcome of section 4.4, the analysis used the LR, FPE, AIC, HQIC and SBIC tests to ascertain the optimal number of lags in the two models. The LR, FPE, AIC and HQIC tests highlighted that the optimal number of lags for each of the two models was four lags, results are shown in Tables 4 and 5 respectively. These lags where then applied in subsequent analyses.

Table 4: Lag Selection, Manufacturing Model

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-912.076				3.1e+23	65.434	65.4922	65.6243
1	-837.042	150.07	16	0.000	4.6e+21	61.2173	61.5082	62.1689*
2	-820.495	33.095	16	0.007	4.8e+21	61.1782	61.7018	62.891
3	-805.154	30.681	16	0.015	6.2e+21	61.2253	61.9817	63.6994
4	-773.312	63.684*	16	0.000	3.2e+21*	60.0937*	61.0828*	63.3291

Table 5: Lag Selection, Broad Industry Model

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-911.401				2.9e23	65.3858	65.444	65.5761
1	-845.766	131.27	16	0.000	8.6e+21	61.8404	62.1313	62.792*
2	-832.369	26.795	16	0.044	1.1e+22	62.0263	62.55	63.7392
3	-811.444	41.849	16	0.000	9.7e+21	61.6746	62.4309	64.1487
4	-786.701	49.487*	16	0.000	8.3e+21*	61.0501*	62.0391*	-64.2854

4.6 Cointegration Tests

As shown in section 4.4.4, cointegration highlights the existence of a long run relationship among the variables. Johansen's tests for cointegration estimated one cointegrating equation in each of the models. Results are shown in Tables 6 and 7 for the manufacturing and broad industry models respectively.

Table 6: Cointegration Tests, Manufacturing Model

Maximum	Parms	LL	Eigen Value	Trace Statistic	5%	Critical
0	52	-811.72816	.	76.8319	47.21	
1	59	-785.25064	0.84912	23.8769*	29.68	
2	64	-779.8585	0.31965	13.0926	15.41	
3	67	-775.82087	0.25054	5.0173	3.76	
4	68	-773.31221	0.16405			

Table 7: Cointegration Tests, Broad Industry Model

Maximum	Parms	LL	Eigen Value	Trace Statistic	5%	Critical
0	52	-811.83198	.	50.2622	47.21	
1	59	-801.47856	0.52266	29.5554*	29.68	
2	64	-793.60087	0.43033	13.8000	15.41	
3	67	-788.25723	0.31729	3.1127	3.76	
4	68	-786.70087	0.10521			

4.7 Vector Error Correction Models

Having satisfied the pre-requites for the Vector Error Correction Model, the study fit two respective VECMs, results are presented below.

4.7.1 Manufacturing Model

4.7.1.1 Short Run

With manufacturing as dependent variable, the short run model showed statistical significance at 1 percent level of significance. This implied that the model and its dynamics could be interpreted and applied in analysis. Further, the R^2 showed that trade openness, foreign direct investment and lending interest rate explained 93.2 percent of the variation in manufacturing share of GDP, offering confidence in the model's goodness of fit to the data. The short run results also showed that the error correction term was statistically significant and carried a negative sign with coefficient 0.09. This conforms to the literature as well as the earlier identified long run relationship in section 4.5 above. This finding implies that when in disequilibrium, the model adjusts to its long run equilibrium at the rate of 9 percent every year. This adjustment is fair given that industry may require some time to adjust to changes in trade and finance factors. Table 8 below summarizes the short run results.

The short-run model highlighted that manufacturing was influenced by its previous values at lags one and two at 5 percent levels of significance. Further, lags one and three of trade openness had negative effects on manufacturing at 5 and 1 percent levels of significance respectively. The negative signs on both coefficients imply that, in the short run an increase in trade at the respective lags reduces industrial growth. Furthermore, the first lag of foreign direct investment was observed to have a positive and significant effect on manufacturing at 10 percent level of significant, implying that a short run rise in FDI at lag one leads to industrial growth. Lastly, lags one and two of the lending interest rate was found to have respective negative and positive effects on manufacturing at 10 percent level of significance.

Table 8: Short Run Results, Manufacturing model

Equation	Manufacturing	Trade Openness	FDI	Lending Interest Rate
Error Correction	-0.0904247* (0.0294964)	0.2963169** (0.1415251)	-4080886 (7275257)	-0.1156297 (0.2896179)
Δ(Man (-1))	0.528811** (0.2060687)	1.025332 (0.9887255)	-19900000 (50800000)	3.35545 (2.023335)
Δ(Man (-2))	-0.4965812** (0.2214819)	-0.0551085 (1.062679)	8579473 (54600000)	-1.599154 (2.174673)
Δ(Man (-3))	-0.034696 (0.1601628)	1.637809** (0.7684673)	-22500000 (39500000)	0.0297959 (1.572597)
Δ(TO (-1))	-0.1161222** (0.0528124)	-0.495719*** (0.253396)	-2125024 (13000000)	0.1614059 (0.5185512)
Δ(TO (-2))	-0.0315826 (0.0488625)	-0.5692883** (0.2344442)	-5676410 (12100000)	-0.304484 (0.4797681)
Δ(TO (-3))	-0.1417517* (0.0494069)	-0.2670172 (0.2370561)	6333420 (12200000)	0.6476016 (0.4851132)
Δ(FDI (-1))	0.00000000294*** (0.00000000156)	-0.00000000154 (0.00000000746)	-0.397072 (0.3836997)	0.000000000242 (0.0000000153)
Δ(FDI (-2))	0.000000000945 (0.00000000146)	0.00000000295 (0.00000000701)	-0.1675743 (0.3605525)	-0.00000000108 (0.0000000144)
Δ(FDI (-3))	-0.000000000443 (0.00000000128)	0.00000000718 (0.00000000612)	0.2951621 (0.3144885)	-0.00000000547 (0.0000000125)
Δ(LIR (-1))	-0.0831578*** (0.0458947)	-0.6491989* (0.2202045)	3923427 (11300000)	0.2600964 (0.450628)
Δ(LIR (-2))	0.0903607** (0.0457754)	-0.393893*** (0.2196321)	2086258 (11300000)	0.5669636 (0.4494566)
Δ(LIR (-3))	-0.0611788 (0.0384148)	-0.330275*** (0.1843158)	549364.5 (9474961)	0.1469556 (0.3771851)
Constant	-1.766378* (0.5977983)	3.990849 (2.868259)	0.000000322 (147000000)	0.9206395 (5.869625)
R Squared	0.9321	0.6923	0.4939	0.6229
RMSE	1.40799	6.75558	350000000	13.8247
Chi-Square	192.2073	31.5001	13.66294	23.12463
P > Chi-Square	0	0.0047	0.4751	0.0583

*, ** and *** implies statistically significant at 1%, 5% and 10% respectively. Standard errors in parentheses.

4.7.1.2 Long Run

The long run manufacturing model was statistically significant at 1 percent level of significance with trade openness, foreign direct investment and lending interest rate being statistically significant at 1 percent. Specifically, trade openness had a positive relationship with manufacturing with coefficient 1.74 while foreign direct investment and lending interest rate had negative relationships with coefficients 0.05 and 1.39 respectively. In the case of trade openness, it implies that a one percentage point increase in trade openness results in a 1.37 percentage point increase in the share of manufacturing in GDP. Put differently, a percentage increase in the trade share of GDP results in a 1.37 percentage point increase in industrial growth. Further, a million-dollar inflow of foreign direct investment reduces manufacturing share of GDP by 0.05 percentage points. Lastly, a percentage point increase in the lending interest rate was found to reduce industrial growth by 1.39 percentage points. Table 9 below summarizes the results with the long run manufacturing model equation exposed below.

Table 9: Long Run Results, Manufacturing Model

Manufacturing Model	**Coefficient**
Manufacturing	1 (Restricted)
Trade Openness	-1.73742* (.3195445)
Foreign Direct Investment	0.051*^ (4.91e-09)
Lending Interest Rate	1.386956* (.2372945)
Constant	-3.727496
Chi-Square	130.5302
P > Chi-Square	0.0000

*, ** and *** implies statistically significant at 1%, 5% and 10% respectively. Standard errors in parentheses.

^ Multiplied by one million for ease of interpretation

$$man_t = 1.74to_t - 0.051fdi_t - 1.39lir_t + 3.73$$

4.7.2 Broad Industry Model

4.7.2.1 Short Run

The short run broad industry model showed statistical significance at 1 percent level of significance, this implied that the short run model dynamics could be interpreted and applied with a high level of confidence. Further, the R^2 showed that the trade openness, foreign direct investment and lending interest rate explained 70.2 percent of the variation in broad industry in the short run. This value is based on the variation in first differences and is thus not a perfect measure of goodness of fit, it nonetheless did give confidence in the model fit. Results for the short run model are shown in table 10 below.

Further, the short run model showed that there were some short run relationships running from the independent variables to broad industry. Specifically, broad industry was found to be dependent on its own previous values at lags one and two, both significant at 1 percent level of significance. The only other variable showing a significant relationship with broad industry in the short run was lending interest rate at lags one and three at 1 and 5 percent levels of significance respectively. Both lags were found to have positive effects on broad industry, implying that in the short run, an increase in lending interest rates caused industrial growth.

The results however also showed that the error correction term while carrying the expected negative sign was statistically insignificant with a p-value of 0.22. This implied that the model did not return to a long run equilibrium when in disequilibrium, suggesting that there was no clear long run relationship between broad industry and trade openness, foreign direct investment and lending interest rate. As such, while the short run model results could be interpreted and short run granger causality drawn out from them, the long run model could not be validated.

Table 10: Short Run Results, Broad Industry Model

Equation	Broad Industry	Trade Openness	FDI	Lending Interest Rate
Error Correction	-0.0389583 (0.0317973)	0.0229233 (0.1084338)	4035197 (5009832)	-0.2558266 (0.2221988)
Δ(BI (-1))	0.7874855* (0.2998546)	0.5498411 (1.02255)	48200000 (47200000)	-1.791219 (2.095374)
Δ(BI (-2))	-0.7246568* (0.256695)	0.1641149 (0.8753692)	-515271.6 (40400000)	2.403443 (1.793776)
Δ(BI (-3))	0.2132985 (0.1851807)	-1.105629*** (0.6314943)	18100000 (29200000)	0.3283454 (1.294036)
Δ(TO (-1))	0.0259043 (0.1000326)	-0.554913 (0.3411266)	9815888 (15800000)	-0.3705898 (0.6990248)
Δ(TO (-2))	0.0369916 (0.0922216)	-0.386094 (0.3144896)	2582391 (14500000)	-0.4492531 (0.6444412)
Δ(TO (-3))	-0.1017522 (0.082174)	-0.0223663 (0.2802257)	10400000 (12900000)	0.730558 (0.5742289)
Δ(FDI (-1))	0.0259043 (0.1000326)	0.0000000104 (0.00000000641)	-0.7010248** (0.2962186)	-0.0000000101 (0.0000000131)
Δ(FDI (-2))	0.0369916 (0.0922216)	0.00000000937 (0.00000000742)	-0.4246383 (0.3428353)	-0.0000000126 (0.0000000152)
Δ(FDI (-3))	-0.1017522 (0.082174)	0.0000000104 (0.00000000794)	0.272712 (0.366732)	-0.0000000243 (0.0000000163)
Δ(LIR (-1))	0.1040731** (0.0405593)	-0.1555312 (0.1383132)	58587.66 (6390316)	-0.0083421 (0.2834267)
Δ(LIR (-2))	-0.0525951 (0.0353506)	-0.0606031 (0.120551)	-3289603 (5569671)	0.079004 (0.247029)
Δ(LIR (-3))	0.0796841** (0.0357329)	-0.0961813 (0.1218547)	-862006.3 (5629904)	0.0719307 (0.2497005)
Constant	0.4923693 (0.9838708)	-2.301798 (3.355149)	0.0000000277 (155000000)	10.41374 (6.875256)
R Squared	0.7023	0.6518	0.5374	0.5721
RMSE	2.10732	7.18627	330000000	14.7259
Chi-Square	33.02231	26.20962	16.26415	18.71972
P > Chi-Square	0.0029	0.0243	0.2975	0.1759

*, ** and *** implies statistically significant at 1%, 5% and 10% respectively. Standard errors in parentheses.

4.8 Short Run Granger Causality

4.8.1 Manufacturing Model

In the manufacturing model, the short run granger causality tests showed that individually trade openness granger caused industrial growth at 1 percent level of significance, implying that the level of trade in the economy causes industrial growth. FDI was on the other hand not found to individually cause industrial growth, meaning FDI could not be used to enhance industrial growth. Lending interest rate was however found to individually granger cause industrial growth, implying that interest rate could be used to promote industrial growth. Lastly, trade openness, FDI and lending interest rate were found to jointly granger cause industrial growth at 1 percent level of

significance. This implies that trade and finance cause industrial growth in the short run and can when used jointly be used to influence industrial growth. Results are summarized in Table 11 below.

Table 11: Short Run Granger Causality, Manufacturing Model

Independent Variable	Dependent Variable	P-Value
Trade Openness	Manufacturing	0.0038
Foreign Direct Investment	Manufacturing	0.1384
Lending Interest Rate	Manufacturing	0.0002
Trade Openness, FDI and LIR	Manufacturing	0.0000

4.8.2 Broad industry Model

In the broad industry model, trade openness was not found to individually granger cause broad industry at 5 percent level of significance, implying that it could not be used to promote broad industry growth. On the contrary, foreign direct investment was found to individually granger cause broad industry at 5 percent level of significance, implying that it could be used as an instrument to promote broad industry. Similarly, lending interest rate was found to individually granger cause broad industry at 5 percent level of significance showing that interest rates could be used to influence broad industry. Lastly, trade openness, FDI and lending interest rate were found to jointly granger cause broad industry at 1 percent meaning trade and finance instruments when used together can influence broad industry. Results are shown in table 12 below.

Table 12: Short Run Granger Causality, Broad Industry Model

Independent Variable	Dependent Variable	P-Value
Trade Openness	Broad Industry	0.1058
Foreign Direct Investment	Broad Industry	0.0289
Lending Interest Rate	Broad Industry	0.0103
Trade Openness, FDI and LIR	Broad Industry	0.0039

4.9 Impulse Response Analysis

4.9.1 Manufacturing Model

It can be seen in figure 7 below that orthogonalized shocks to manufacturing by the independent variables, including itself have permanent effects. Specifically, the impulse response of manufacturing on itself remains positive over the 20-year period with initial cyclical movements until gradual stabilization around year 15. This follows naturally, a sudden rise in manufacturing share of GDP would imply further expansion in the manufacturing sector. Similarly,

manufacturing has a positive response to an orthogonalized shock to trade openness over the 20-year period with initial cyclical movements towards gradual stabilization after year 12. This can be seen to mean openness leads to manufacturers importing raw materials, intermediate goods and capital goods necessary for increased production. Manufacturing also responds positively to a one time orthogonalized shock to FDI, composed of an initial upward movement up to year 4 followed by a short-lived stability up to year 7 then a downward movement up to year 9 then a gradual mild stabilization after year 15. Lastly, findings showed that manufacturing responds negatively to an orthogonalized shock to lending interest rate which remains negative over the 20-year period. Manufacturing in this instance has a steep decline up to year 4 and then a rise up to year 6 and then a mildly stable but negative response from year 12 onwards. This outcome follows naturally from how a lack of financing would lead to a decline in manufacturing output.

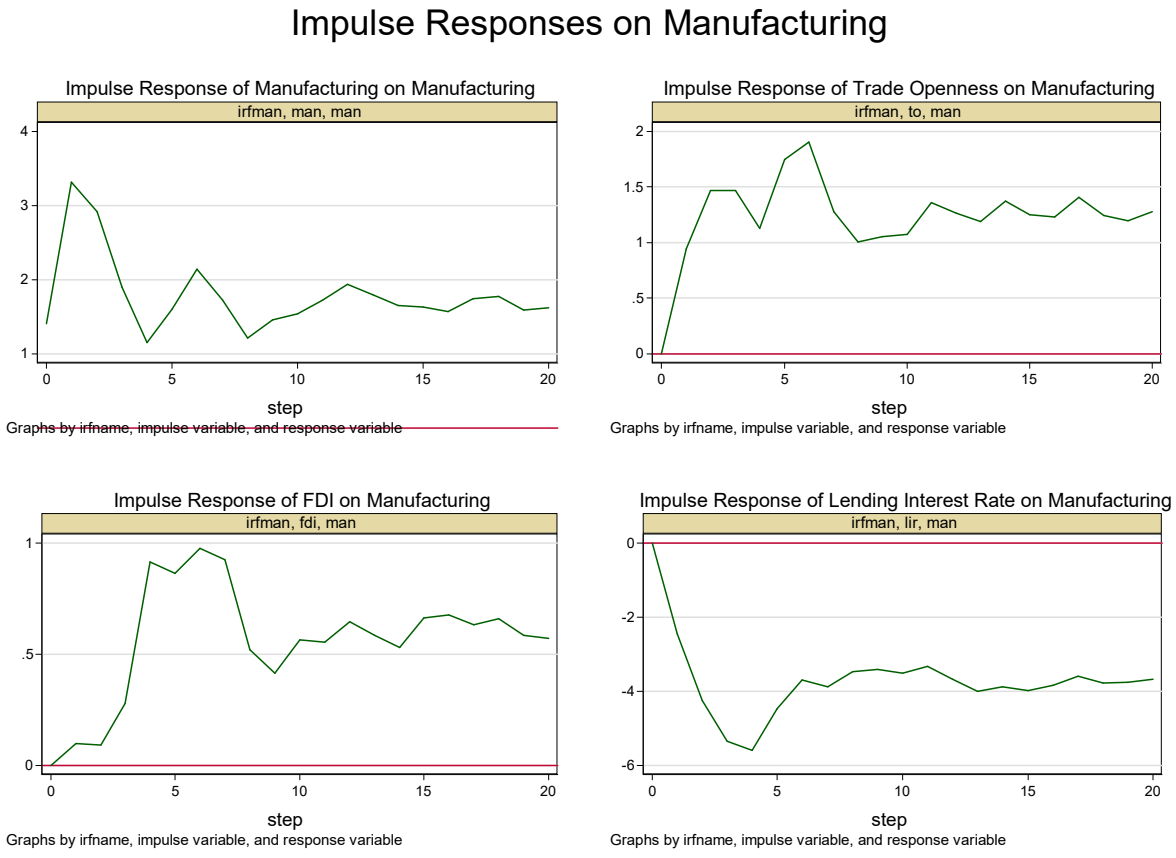


Figure 7: Orthogonalized Impulse Responses on Manufacturing

4.9.2 Broad industry Model

It can be seen in figure 8 below that orthogonalized shocks to broad industry by the independent variables, including itself have permanent effects on broad industry. Specifically, the response of broad industry to a one time orthogonalized shock on itself is positive over a 20-year period. As regards trade openness, a onetime orthogonalized shock to trade openness enlists a positive response in broad industry that begins with an upward trajectory up to year 7 and then a fairly stable but positive response from year 12 up to year 20. Further, a shock to FDI leads to an initial positive response to broad industry followed by a decline into a negative response from year 1 to year 2 and then a positive response from year 2 to year 3, remaining positive and then fairly stabilizing from year 11 up to year 20. Lastly, a shock to lending interest rate leads to an initial increase in broad industry up to year 1 followed by a decline from year 2 onwards into a negative response, staying negative up to year 20.

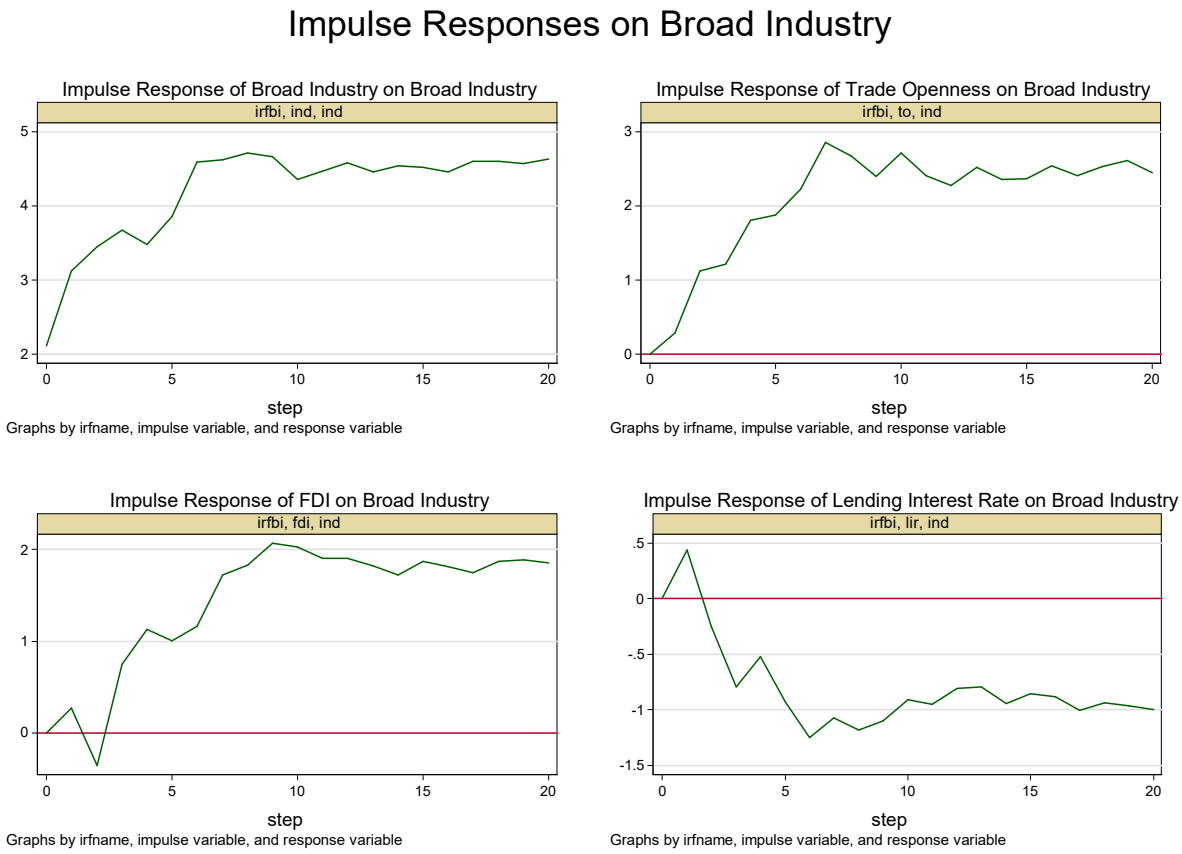


Figure 8: Orthogonalized Impulse Responses on Broad Industry

4.10 Post Estimation Tests

This section highlights four post estimation tests of the two models, particularly, specification, autocorrelation, normality and stability tests.

4.10.1 Specification Test

Figure 9 below shows that the predicted cointegrating equation of the manufacturing model has a very similar configuration as the first difference of manufacturing, this highlights that the manufacturing model was correctly specified. Table 13 below further shows that the stronger Augmented Dickey-Fuller unit root test found the cointegrating equation stationary at 1 percent level of significance, further echoing that the model was correctly specified. Similarly, figure 10 below shows that the predicted cointegrating equation of the broad industry model was very similar to the first difference broad industry, highlighting that the broad industry model was correctly specified. Further, table 14 shows that the Augmented Dickey-Fuller test found that the cointegrating equation of the broad industry model was stationary at 1 percent level of significance, emphasizing further that the broad industry model was correctly specified.

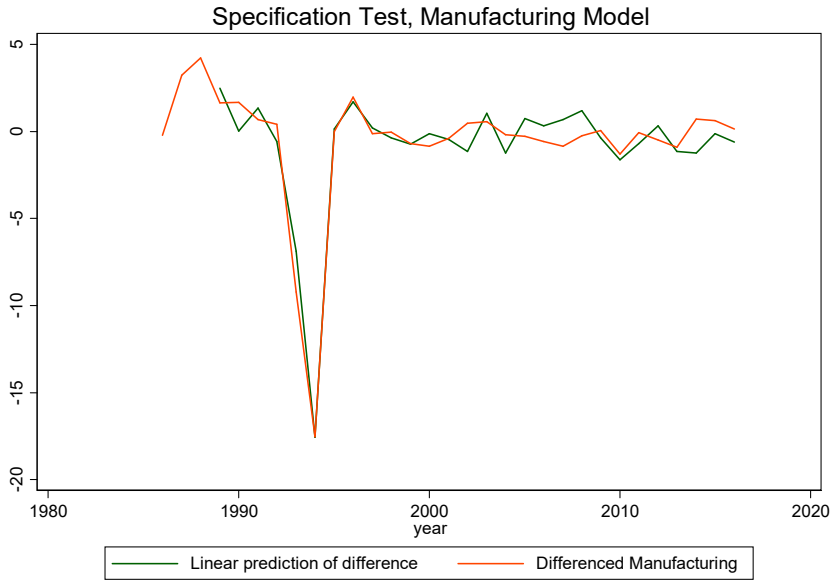


Figure 9: Cointegrating Equation Plot, Manufacturing Model

Table 13: Stationarity Test of the Cointegrating Equation, Manufacturing Model

Variable	P – Value (ADF)	Status
Cointegrating equation	0.0025	Stationary

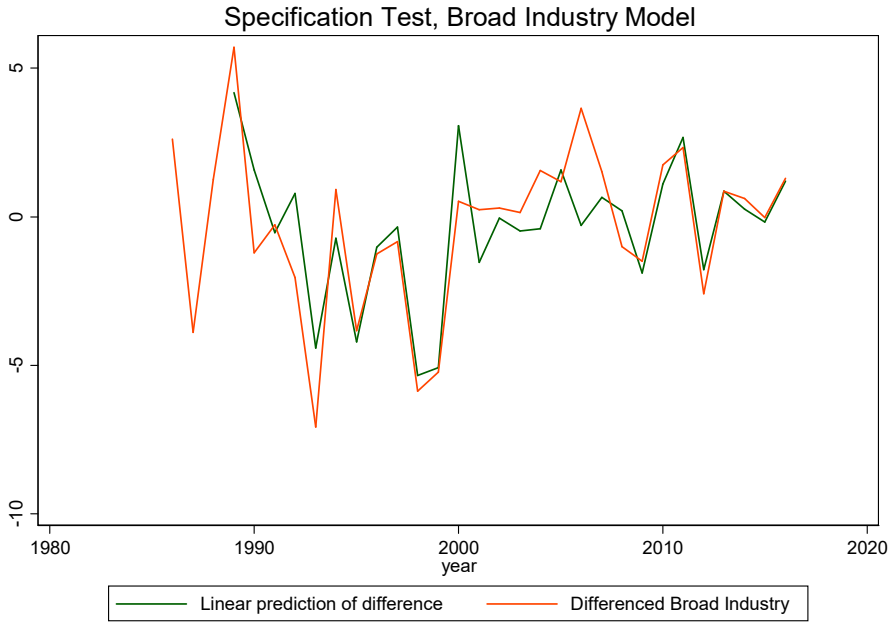


Figure 10: Cointegrating Equation Plot, Broad Industry Model

Table 14: Stationarity Test of the Cointegrating Equation, Broad industry Model

Variable	**P – Value (ADF)**	**Status**
Cointegrating equation	0.0000	Stationary

4.10.2 Autocorrelation Test

The Lagrange-Multiplier autocorrelation tests failed to reject the null hypotheses that neither of the models had autocorrelation in their residuals at one percent level of significance, as shown in table 15 below.

Table 15: L – M Autocorrelation Test, Manufacturing and Broad Industry Models

Manufacturing model				**Broad Industry Model**			
Lag	Chi Square	df	Probability > Chi Square	Lag	Chi Square	df	Probability > Chi Square
1	13.7935	16	0.61409	1	17.1810	16	0.37398
2	20.5374	16	0.19698	2	8.6658	16	0.92654

4.10.3 Normality Tests

The Jarque – Bera normality tests also failed to reject the null hypotheses that the residuals of the variables in the respective models were jointly normally distributed at 1 percent level of significance. This is shown in Table 16.

Table 16: Jarque-Bera, Tests, Manufacturing and Broad Industry Models

Manufacturing Model				Broad Industry Model			
Equation	**Chi Square**	**df**	**Probability**	**Equation**	**Chi**	**df**	**Probability**
D_Manufacturing	0.133	2	0.93562	**D_Broad Industry**	0.467	2	0.79171
D_Trade Openness	6.002	2	0.04973	**D_Trade Openness**	1.170	2	0.55701
D_FDI	0.392	2	0.82195	**D_FDI**	0.904	2	0.63626
D_LIR	1.230	2	0.54069	**D_LIR**	0.433	2	0.80535
All	7.757	8	0.45753	**All**	2.975	8	0.93593

4.10.4 Stability Tests

The eigenvalue stability condition tests results showed that all eigen values in both the manufacturing and broad industry models were strictly less than one, with the exception of the 3-unit moduli from the VECM specifications. This implied that the models had the correct number of cointegrating equations which were also stationary. This is shown in tables 18 and 19, and Figures 11 and 12 for the manufacturing and broad industry models respectively.

Table 17: Eigenvalue Stability Condition, Manufacturing Model

Eigen Value	Modulus
1	1
1	1
1	1
-.5608816+.7491113i	.935818
-.5608816-.7491113i	.935818
.3578671+.7905985i	.867822
.3578671-.7905985i	.867822
-.4765093+.6789286i	.829461
-.4765093-.6789286i	.829461
-.01536477+.8259599i	.826103
-.01536477-.8259599i	.826103
.6641715+.461426i	.808726
.6641715-.461426i	.808726
-.8053245	.805325
.5221069	.522107
.2656123	.265612

The VECM specification imposes 3-unit moduli

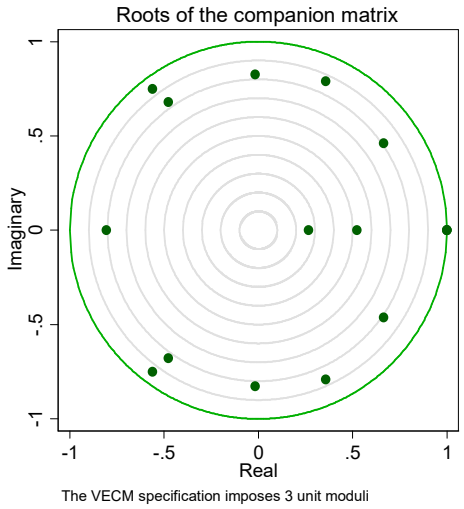


Figure 11: Stability Test Graph, Manufacturing Model

Table 18: Eigenvalue Stability Condition, Broad Industry Model

Eigen Value	Modulus
1	1
1	1
1	1
-.5524751+.7465187i	.928719
-.5524751-.7465187i	.928719
-.4751973+.7016852i	.847452
-.4751973-.7016852i	.847452
.7297413+.4227046i	.843328
.7297413-.4227046i	.843328
-.1112517+.8355794i	.842953
-.1112517-.8355794i	.842953
.3611179+.7218691i	.807156
.3611179-.7218691i	.807156
-.780762	.780762
.7197276	.719728
.3974227	.397423

The VECM specification imposes 3-unit moduli

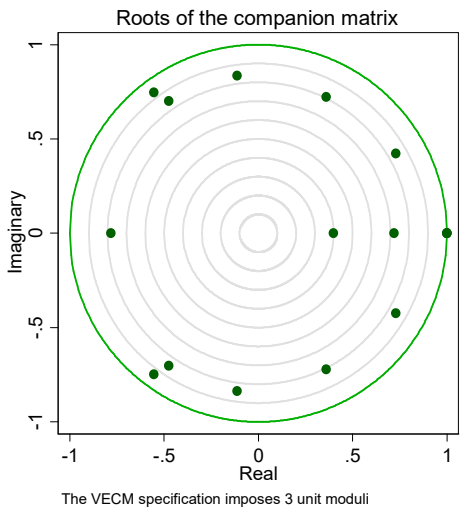


Figure 12: Stability Test Graph, Broad Industry Model

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This study sought to assess the effects of trade and finance on industrial growth. Trade was indicated by trade openness while finance had two indicators; FDI and lending interest rate, representing foreign and domestic finance respectively. It focused on four hypotheses: trade openness has positive effects on industrial growth, FDI inflows have negative effects on industrial growth, lending interest rates have negative effects on industrial growth and trade and finance jointly cause industrial growth. To facilitate for insight within industrial growth, two industrial growth indicators where used; manufacturing share of GDP and broad industry share of GDP. The foregoing culminated into two models with the manufacturing model being the primary analysis model, while the broad industry model provided for a comparative analysis of the trade and finance causalities when the influence of mining and mining related industrial sectors are included in industry. As highlighted in chapter four, manufacturing provides a better analysis of industrial depth relative to broad industry and further provides for insight into the economic diversification agenda. This rationale is based on the observation that while mining has previously dominated Zambia's foreign exchange earnings and remained among the biggest contributors of GDP, it has not yielded the structural transformation necessary for industrialization. In this view, determination of the effects was done based on the manufacturing model's short run granger causality, long run model and orthogonalized impulse responses.

5.2 Trade Openness

From table 11 above, the short run granger causality tests revealed that trade openness granger caused industrial growth. Adamu and Dogan (2016) in the Nigerian case, found the same result using the Yoda Yamamoto analysis and went on to recommend that the Nigerian economy promotes international trade with the caveat that it diversifies from its dependence on crude-oil, a recommendation that can be easily adapted to the Zambian economy. Further, the long run model shown in table 9 showed that trade openness had a positive long run effect on industrial growth. Specifically, a percentage point increase in the share of merchandise international trade results in a 1.7 percentage point increase in industry. These results are consistent with the findings by Umoh and Effiong (2013), Chandran and Munusamy (2009), Adofu and Okwanya (2017), Ajmair and Hussain (2017), Guadagno (2012), Ogu, Aniebo and Elekwa (2016), and Ejaz et al. (2017). In the case of Umoh and Effiong (2013) for instance, in their Nigeria study found that a percentage

increase in trade openness raised the manufacturing index of production by 0.759. Similarly, Ejaz et al. (2017), in their study of South Asia industrial growth found that a percentage point increase in trade openness led to a 142 million dollar increase in industrial value added. They rationalized that trade openness leads to industrial growth as it promotes specialization of production in which countries have comparative advantage, a view held by (Kniivila, 2007) much earlier. Guadagno (2012), found a similar result and pointed out that trade openness also promotes access to technology and capital, both of which are critical in industrial growth.

From the domestic perspective, Weeks and Mungule (2013) contend that the manufacturing sector in Zambia is import dependent on both capital and intermediate goods, it thus implies that the more open the economy becomes the higher the growth in industry. Further, data on imports by category shows that the sum of inputs (raw materials, intermediate goods and capital goods) outweighs consumption goods (CSO, 2017). Economic theory follows naturally from the above arguments, that the relationship between trade and industrial growth is dependent on the structure of the economy. If for instance the bulk of trade are imports of final consumption industrial goods, trade would be expected to negatively affect industrial growth, in which case protectionist strategies need to be implemented (Otalu and Anderu, 2015). In the current case however, results suggest that the industrial sector benefits from an increase in the merchandise trade.

Further, impulse responses shown in the second quadrant of figure 7 highlight that industrial growth has a positive response to shocks in trade openness, a similar impulse response was found by Adofu and Okwanya (2017). This implies that a positive shock to trade openness causes an increase in industrial growth, similar results were obtained by Ebong et al (2014). Comparatively, trade was not found to granger cause broad industry. This result may be attributed to the general notion that that mining output is mostly influenced by international metal prices. Based on the above analysis, this study contends that not only does trade cause industrial growth, there is also a positive long relationship between the two variables.

5.3 Foreign Direct Investment

The results show in table 11 above that FDI did not granger cause industrial growth in the short run. FDI was on the other hand found to granger cause broad industry in the short run. The long run model depicted in table 9 further highlighted that FDI had a negative effect on industrial growth, specifically, a million-dollar inflow reduced industry by 0.51 percentage points. Results

in the literature are varied on the effect of FDI on industrial growth. Samouel and Aram (2016) for instance found that the effect of FDI varied across both time periods and region. They found that while FDI was a significant determinant of industrial growth in Southern African countries it was insignificant for other African regions. The study concluded that countries needed to target good quality FDI for it to be effective in industrial growth. Aiyedogbon and Anyanwu (2015) similarly found inconclusive results, showing that while FDI was positively related to industrial development it was not statistically significant. Based on this result, Aiyedogbon and Anyanwu (2015) went on to make a general conclusion that efforts towards FDI should be intensified in Nigeria to boost industrial development. Other results have found more definite results, Fongang et al (2017), for instance, in their study of manufacturing growth in the Economic and Monetary Community of Central Africa (EMCCA) found that FDI was positively related to manufacturing growth. The study found that a percentage point in the FDI share of GDP raised manufacturing growth by 0.86 percent, proposing that FDI played other non-finance roles such as technology transfer, domestic investment stimulation and human capital development.

The effect of FDI inflows as shown above is dependent on the structure of the economy and the composition of the inflows. In this context of the current study findings, an increase in FDI inflows can be argued to cause a reduction in manufacturing because the bulk of FDI inflows are directed towards the mining sector. An increase in FDI inflows towards the mining sector thus results in other domestic resources shifting towards this FDI enriched sector. A shift of domestic resources such as human capital and government structural support away from manufacturing thus results in a shrinkage of the sector. In support of this analysis, COMESA (2018) data shows that FDI inflows towards mining and quarrying were 2.7 times higher than the FDI inflows towards Manufacturing in between 2012 and 2013 and have followed similar patterns over the review period. The foregoing can thus be said to justify the contrasting causal relationships of FDI with manufacturing and broad industry. Based on the results and the foregoing arguments, this study contends that FDI does not granger cause industrial growth in the short run but has a negative effect on industrial growth in the long run.

5.4 Lending Interest Rate

Lending interest rate was on the other hand found to granger cause industrial growth as shown in table 11. In the long run, lending interest rate had the expected negative effect on industrial growth, a percentage point increase in the lending interest rate resulted in a 1.4 percentage point decrease

in industry share of GDP, as shown in table 9. These results are in line multiple findings by other studies, among others, of Nwandu (2016), Ezeaku, et al. (2018) and Bosiu, et al. (2017). Nwandu (2016), for instance investigated the impact of rising interest rates on Nigerian manufacturing and found that a rise in interest rate not only reduced manufacturing share to GDP but in a parallel analysis found that it negatively affected the average capacity utilization in the sector. This finding follows naturally, the industrial sector is usually dependent on short term loan financing for working capital. Similarly, Bosiu, et al. (2017) argued that Zambian industrial firms mainly cited access to finance as the major hinderance to their growth. Further support for the results can be drawn from Ezeaku, et al. (2018) in their analysis of the monetary policy transmission into industrial sector growth. They found that a unit increase in the real lending rate reduced industry share in GDP by 37 percent in the long run.

The results in table 11 further show that lending interest rate was also found to granger cause broad industry. This result is justified because lending interest rates is expected to affect the entire domestic industrial sector in the same way. Further, the impulse response of industrial growth to shocks in lending interest rate as shown in figure 7 conforms to the above discussion. An orthogonalized shock to lending interest rate leads to a shrinkage in industrial growth over the 20-year period and has a permanent effect on industrial growth. The study thus contends that lending interest rate granger causes industrial growth in the short run and maintains a negative relationship with industrial growth in the long run.

5.5 Trade and Finance

The study further found that jointly, FDI and lending interest rate granger caused industrial growth. This implies that the cumulative effect of FDI and lending interest rate results in a causal relationship with industrial growth. Lastly, trade and finance were found to jointly granger cause industrial growth. This causality considered trade openness, FDI and lending interest rate. It implies that when trade and finance policies are used together, they can be used to influence industrial growth. This study thus argues that trade and finance jointly cause industrial growth in Zambia.

CHAPTER SIX: CONCLUSION, POLICY RECOMMENDATIONS AND LIMITATIONS

6.1 Conclusion

This study has presented a case for the effects of trade and finance on industrial growth in Zambia. It began by defining industrialization and industrial growth from the context of the study. It further detailed Zambia's industrialization process by showing the evolution of its industrial strategy from the initial colonial model through state led import substitution industrialization, market liberalization, to the current arguably export led industrialization strategy. The study went on to demonstrate the varying paths to industrialization between the early industrializers such as Britain and the newly industrialized countries such as South Korea. It further highlighted some underlying patterns between trade and finance, and industrial growth as well as the role of the state in the industrialization process. The study proceeded to highlight the theoretical literature in the trade, finance and industrialization debate as well as the empirical literature from four perspectives: cross-country, developing country, developed country and Zambian. A literature review synthesis was then provided showing that the current literature had gaps that the study attempted to fill.

The analysis principally sought to test the hypotheses that; trade openness has positive effects on industrial growth, FDI inflows have negative effects on industrial growth, lending interest rate has negative effects on industrial growth and trade and finance jointly granger cause industrial growth. This was borne out of the realization that trade and finance policy in Zambia had not accelerated industrial growth as it did in the case of the NICs. Short run granger causality was examined on the basis of short run granger causality while long run effects considered the long run model. Impulse response analysis was used to examine the behavior of industrial growth as a result of shocks to the trade and finance variables. On the basis of the study aim and literature review, trade was indicated by trade openness while foreign direct investment and lending interest rate represented international and domestic finance respectively. Manufacturing share of GDP and broad industry share of GDP were utilized as indicators for industrial growth, culminating into two models. The manufacturing model served as the primary analysis model as it contained the more policy relevant indicator, the broad industry model was used to gain insight on the varying effects of trade and finance on the two industrial growth indicators.

Applying the methodology to the data revealed that all the variables under study were integrated at order one with their graphical behavior exhibiting varying trends at level and no trends when differenced. Optimal lag tests were then carried out, revealing four as the optimal lag length for both models. Cointegration tests were further executed, structured based on information from the graphical analysis, the optimal lag tests result as well as economic intuition. The tests revealed the presence of one cointegrating equation in each model. On this result, two respective Vector Error Correction Models were fitted, both of which passed the relevant post estimation tests of specification, normality, autocorrelation as well as stability.

Results showed that trade openness and lending interest rate individually granger caused industrial growth in the short run while FDI was found not to granger cause industrial growth. Further, trade openness, FDI and lending interest rate, cumulatively trade and finance, were found to jointly granger cause industrial growth in the short run. FDI and lending interest rate were found to exert negative effects on industrial growth in the long run while trade openness was found to have a positive effect. The obtained results conformed to mainstream empirical studies as well as economic theory but gave new light on the Zambian industrial growth case, especially with regard to the effect of FDI on industrial growth. It showed that not only does FDI granger not granger cause industrial growth, it also has a negative effect in the long run. FDI was however found to granger broad industry, a result attributed to the composition of FDI, particularly, the bulk of FDI is directed to the mining sector. This highlighted the importance of conscious distribution of FDI across the industrial sectors to pursue balanced growth as well as the diversification agenda. The impulse response function analysis supported the short run granger causality analysis and long run model results on trade openness and lending interest rate, showing that industrial growth responded positively to shocks in trade openness but negatively to shocks in lending interest rate.

Based on the foregoing analysis, it can be concluded that trade is positive for the growth of the industrial sector in Zambia as it serves as a good source of inputs in the production process. It can further be highlighted that the current FDI inflows in Zambia do not promote diversification and industrial growth but rather reinforce the economy's dependence on the extractive sector. Lastly, this study concludes that lending interest rate serves to inhibit industrial growth if not well managed.

6.2 Policy Recommendations

Three key policy issues are worth exploring on industrial policy in Zambia based on the findings of this study. The pursuit of FDI should be balanced across sectors to facilitate balanced growth. The findings of this paper propose that FDI has a negative relationship with industrial growth because FDI inflows are concentrated to the mining sector. As such resources such as labor and government structural support are further shifted from industry to sectors aligned with FDI inflows.

Secondly, barriers to trade and protectionism need to be explicitly addressed in industrial policy. It is the recommendation of this study that policy makers consider the promotion of international trade to enhance industrial growth. Care however needs to be taken to protect the local industry from foreign final consumption goods. Research in this regard needs to be undertaken to establish which specific areas of production the domestic economy has comparative advantage against trading partners. This would then inform a targeted protectionist policy.

Lastly, based on the established relationship between lending interest rate and industrial growth, policy makers may wish to keep lending interest rate low to ensure that sufficient domestic financial resources are available for investment in order to grow the industrial sector.

6.3 Limitations of the Study

Due to unavailability of data, this study was unable to unbundle the trade variable between consumer goods and input goods. Similarly, lack of data prevented analysis of FDI net inflows by industrial sector and as such overall FDI net inflows were used.

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