IMPACT OF FOREIGN AND DOMESTIC INVESTMENT ON MANUFACTURING OUTPUT IN MALAWI

MASTER OF ARTS (DEVELOPMENT STUDIES) THESIS

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By

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DECLARATION

I, the undersigned, hereby declare that this thesis is my own work which has not been submitted to any other institution for an award of any kind. Where other people's work has been used, acknowledgements were made.

PENJANI MSULIRA BANDA

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Signature

12/5/2022

Date

CERTIFICATE OF APPROVAL

We, the undersigned, declare that this thesis is from the student's own work and effort. Where he has used others sources of information, it has been acknowledged. This thesis is submitted with our approval.

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DEDICATION

To my daughter Praise Msulira Banda and my wife Tionge Mkandawire. I also dedicate this to my mum and dad, Ireen and Grenenger.

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ABSTRACT

Over the past three decades, the manufacturing sector of Malawi has not been performing well despite contribution from both foreign and domestic investment. Hence, this study examined the impact of foreign direct investment (FDI) and domestic investment on manufacturing output in Malawi. Autoregressive distributed lag (ARDL) model cointegration test results indicated that FDI, domestic investment and manufacturing value added (MVA) are cointegrated, meaning that they have a long run relationship. The ARDL long run model estimations indicted that domestic investment had a greater impact on manufacturing output as it affected output in the current year with a coefficient of 0.18 while FDI had an impact on manufacturing output after a period of one year with a coefficient of 0.018. Domestic investment granger caused manufacturing output while FDI had no causal impact on manufacturing output. As such, as government promotes policies that attract foreign investment, there is need to place more emphasis on pro-domestic investment policies in the long run in order to stimulate growth in manufacturing.

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ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
BIC	Bayesian Information Criterion
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GMM	Generalized Method of Moments
GOM	Government of Malawi
IRF	Impulse Response Function
ISIC	Industrial Standard Industrial Classifications
MNC	Multi-national Cooperation
MVA	Manufacturing Value Added
NSO	National Statistics Office
OECD	Organization for Economic Co-operation and Development
OLI	Ownership Location and Internalization
OLS	Ordinary Least Squares
PP	Phillips-Perron

UNCTAD	United Nations Conference on Trade and Development
VAR	Vector Auto-regression

CHAPTER ONE

INTRODUCTION

1.1 Background

Industrialization has been identified as a sure strategy of economic growth, however, most developing countries face financial gaps that constrain industrial development (UNCTAD, 2013). Historically, domestic investment has been the key source of finance for industrial development in various countries through public spending, investment in state owned enterprises (SOEs) and the domestic private sector. However, over the recent decades, foreign direct investment (FDI) has increasingly become a key source of income for financing industrial development in both developed and developing countries. The increased importance of FDI has resulted into prominence of FDI theory in which FDI is known to benefit host countries by boosting investment, technology, productivity, industrial and economic growth (Dunning, 1994). However, despite this theoretical understanding, empirical studies indicate that FDI may not always have a positive impact on industrial and economic growth as it may crowd out domestic firms in the market (Jude, 2019). Thus, FDI with its advantages over advanced foreign technology, intensive capital and efficient managerial expertise, may out-compete and drive out domestic firms of the market. FDI may also have a neutral effect on domestic investment which is often attributed to the kind of FDI (Chen, Geiger and Fu, 2015). Mergers and acquisitions tend to have a neutral effect while greenfield investments which are new investments tend to boost domestic investment through spillover effects and business linkages.

FDI is the long-term investment in an enterprise that is resident in an economy other than that of the investor with a significant degree of influence and direct or indirect ownership of at least 10% of the voting power of the investment (OECD, 2008). Malawi is a developing country that is open to FDI and seeks to boost the manufacturing sector and the economy through FDI (GOM, 2017). The government of Malawi seeks to boost the manufacturing sector as it contributes the least to GDP of the country with a contribution of 17% in 2017 compared to the tertiary and primary sectors of the economy which contributed 51% and 32% respectively (GOM, 2017). Historically, the manufacturing sector of Malawi peaked in 1992 with a contribution of 22% to the gross domestic product (GDP) but has been decreasing ever since and remains steadily low (NSO, 2017). Studies have indicated that the manufacturing sector of Malawi experienced the decline due to trade liberation policies that were implemented under the structural adjustment programs. Increased tariffs and foreign exchange rate liberalization during the full trade liberalization episode that Malawi passed through in the 1990's resulted in a decrease in manufacturing production (Chirwa, 2002) and technical efficiency (Chavula, 2009) as it became costly to produce the same quantity of output.

This decline in part has characterized the economy with low growth rates which are highly dependent on exports of unmanufactured agricultural produce such as tobacco which earns about 80% of foreign exchange (NSO, 2017). Consequently, primary sectors of the economy dominated by agriculture, forestry and fishing employ a large proportion of the labor force of 64.1% while retail and wholesale employs 16.2% and manufacturing employs only 4.1% (NSO 2013). According to the Kuznets structural transformation theory, development translates into change in relative importance of the service, secondary and primary sectors of the economy such that the service sector should constitute the highest contribution to gross domestic product (GDP) followed by secondary sector then

the primary sector (Kuznets, 1973). In the case of Malawi, the service industry indeed dominates the economy with a contribution of 51% in the year 2017. However, the secondary sector in which manufacturing falls has persistently remained lower than the primary and tertiary sector with a contribution to GDP of 17% and 32% respectively in 2017 (NSO, 2017).

With proper management and distribution, FDI has the potential to boost both domestic investment and manufacturing output in the form of manufacturing value added (MVA) in Malawi. However, as reported by Jude (2019), the effects of FDI on domestic investment and productivity are country specific, hence, FDI may either crowd out, crowd in or have a neutral effect on domestic investment. MVA is the net output in the manufacturing sector after adding up all outputs and subtracting intermediate inputs (Orji, Orjio-Anthony, et al., 2015). Domestic investment is the investment made by local companies in the domestic market (Adams, 2009).

In order to attract foreign investment, the government of Malawi formulated legal instruments to protect foreign investors and ensure they receive national treatment. The constitution of the republic of Malawi (1995) protects foreign investment as it protects freedom to invest and own property irrespective of nationality. The Investment and Export Promotion Act (2012) also established the Malawi Investment and Trade Center (MITC), which facilitates business licensing, tax registration, tax incentives and provision of land permit.

The study used secondary time series data covering a 38-year period from 1980 to 2017. The data consisted of FDI inflows, domestic investment in the form of gross fixed capital formation and manufacturing output in the form of MVA. Control variables included in the study were trade openness, real effective exchange rate, inflation and gross domestic product (GDP). The data was collected from World Bank's world development index

database. The study employed an econometric approach to examine the relative impact of FDI and domestic investment on manufacturing output. Specifically, the study examined the short run and long run relationship between FDI, domestic investment and manufacturing output. The study also investigated the impact of FDI and domestic investment on manufacturing output and the causal linkages among the variables. The study makes a contribution to our understanding about the relative impact of FDI on domestic investment and manufacturing output. This information is important for scholars, development practitioners and policy makers to make informed decisions that would assist in boosting the investment and the manufacturing sector of Malawi.

1.2 Problem statement

Historically, manufacturing in Malawi have been driven by both domestic and foreign investment. After Malawi got independence in 1964, manufacturing was mainly dependent on domestic investment because government controlled and dominated economic activity though state owned enterprises (SOE) (Makuyana & Odhiambo, 2014). Domestic investment in the manufacturing sector increased from 14.9% to 27.9% of total domestic investment from 1974 to 1980 as government took deliberate investment efforts in the manufacturing sector (Munthali, 2004). However, after the global economic and oil crisis that occurred during the period from 1979 to 1983, government adopted public investment reforms of privatization of the SOEs and market liberalization because of reduced economic performance of the SOEs. These were conducted under the World Bank and IMF sponsored structural adjustment programmes from 1984 to 2000. FDI inflow started to increase such that in the last 2 decades, the manufacturing sector has been drawing a large share of FDI (Chimbalu, 2018).

However, despite these reforms that aimed at liberalizing the economy to draw in more FDI, UNCTAD (2020) indicates that Malawi has not been able to attract significant amount

of manufacturing FDI compared to the neighboring countries such as Zambia and Mozambique. Therefore, with these trends there is need to examine the relative importance of FDI and domestic investment in the manufacturing sector. However, there has not been a study to examine this question. Such knowledge would make a key contribution to the ongoing debate of the importance of FDI and domestic investment in the manufacturing sector of Malawi. This is information is important as most developing countries including Malawi undertook various reforms to liberalize the economy with the central aim of attracting FDI to boost manufacturing as part of structural adjustment. Sapuwa, 2008 studied the impact of FDI on manufacturing output in Malawi while Lunduka (2015) studied FDI and domestic investment in relation to economic growth in Malawi. While both studies found out that FDI has a positive impact on the economy and the manufacturing sector, there was no attempt to study the relative impact of FDI and domestic investment on manufacturing output. Understanding the relative significance of foreign and domestic investment in Malawi would assist in determining policies that would boost manufacturing. For instance, it would help in deciding whether there is need provide more emphasis on pro-domestic investment or pro-foreign investment policies depending on which of these has a greater impact on manufacturing output.

1.3 Objectives of the study

The overall aim of the study is to examine the impact of foreign direct investment and domestic investment and manufacturing output in Malawi. The specific objectives of the study are as follows:

a) To examine the long run and short run relationship between FDI, domestic investment and manufacturing output in Malawi;

b) To examine the relative impact of FDI and domestic investment on manufacturing output in Malawi

c) To examine the causal linkages between FDI, domestic investment and manufacturing output in Malawi

1.4 Study hypothesis

The study tests the following null hypotheses:

H_1: There is a short and long run relationship between FDI, domestic investment and manufacturing output in Malawi.

Ho: There is no short and long run relationship between FDI, domestic investment and manufacturing output in Malawi

H_2: FDI and domestic investment have an impact on manufacturing output in Malawi.

Ho: FDI and domestic investment do not have an impact on manufacturing output in Malawi.

H_3: FDI and domestic investment have a causal effect on manufacturing output in Malawi.

Ho: FDI and domestic investment do not have a causal effect on manufacturing output in Malawi.

1.5 Significance of the study

The findings of the this research will make a unique contribution to the understanding of the impact of FDI in Malawi as it examined the relative impact of FDI and domestic investment on manufacturing output in Malawi. This would enable understanding the relative importance of FDI and domestic investment in the manufacturing sector. The motivation of the study is that the impact of FDI and domestic investment on manufacturing output is country specific such that cross-country studies provide disputing results. The results of this study will show weather FDI or domestic investment has a greater and causal

impact on manufacturing output. This information is important for policy makers in Malawi to make informed decisions that would promote investment and the manufacturing sector of Malawi.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter has reviewed the theoretical and empirical literature of the impact of FDI and domestic investment on manufacturing output. The chapter starts by reviewing FDI theories that explain why FDI is chosen by multinational corporations in order to identify factors that attract FDI. Then literature on impact of FDI on manufacturing has been reviewed. Subsequently, the chapter reviewed literature on the relationship between FDI and domestic investment followed by a review of related studies that were conducted in Malawi and other countries.

2.2 FDI Theory

There has been a variety of theories that attempted to explain the drivers of FDI, behavior of multi-national corporations (MNCs) and their impacts on investor and host countries. The theories range from international trade theories and firm productivity theories. Hence, some scholars have classified FDI as market-seeking FDI, resource seeking FDI and efficiency seeking FDI (Kinyondo, 2012; Ilhan, 2007; Spatz, 2004). Despite similarities and differences in the theories, they all help in identifying many determining factors that influence FDI in host countries (Zekarias, 2016).

The theories include the Eclectic paradigm by Dunning (1994), Neoclassical theory by Findlay (1978), Location theory (Dunning 1994), internalization theory by Buckley and Casson (1976), Currency area theory by Aliber (1970), product cycle theory by Vernon (1979, 1966), industrial organization theory by Hymer (1960/1976) and Caves (1971), and risk diversification theory of Agmond and Lessard (1977) and Grubel (1968).

This study focused on the eclectic paradigm and the neoclassical growth theories to explain why FDI is chosen by MNCs. This is because the eclectic paradigm is extensive as it provides a variety of explanatory variables under a combination of ownership, location and internalization advantages. The other theories such as the location theory and internalization theory focus on just one of the advantages that are in the eclectic paradigm. Hence, the eclectic paradigm provides a general framework for explaining international production (Zekarias, 2016). The neoclassical theory explains how FDI boost investment and spurs output growth because it either increases volume of investment or efficiency (Orji, Orji-Anthony, Nchege, & Okafor, 2015) which is the core theory of this study. Hence, these two theories provide a theoretical framework of FDI effects on firm production.

2.2.1 The eclectic paradigm

The most prominent modern FDI theory is the eclectic paradigm which is also known as the OLI paradigm and was developed by Dunning (1994) to explain why FDI is chosen by MNCs. He proposed that an international enterprise is influenced by three types of advantages, namely; ownership (O), location (L), and internalization (I). The paradigm suggests that a firm will engage into FDI if all three advantages are satisfied. The first advantage of ownership (O) is critical because it acts as an asset that allows the MNC to compete successfully in the overseas economies due to advantages over technology and managerial knowledge. Shenkar (2007) also identified expertise, information technology,

marketing skills and organizations systems as ownership advantages that MNCs exploit with FDI and compete successfully in the overseas host countries. The location advantage (L) comprises all advantages related to geographic, politics, and economics of both home and host economies that facilitate the investing enterprises. These include: the quantity, quality, and price of inputs; transportation and communication costs; infrastructure; natural resources, government policies; legal and regulatory systems and stability of politics and economy. The third advantage is internalization (I) which is obtained when MNCs find it profitable to produce within their own organization in the host economy rather than exporting to the host economy. Therefore, the paradigm suggests that a firm will engage into FDI if all three advantages of ownership, location and internalization are satisfied.

The OLI framework has been criticized that the numbers of variables based on three OLI advantages are very large and tend to increase endlessly (Laoswatchaikul, 2011). Thus, it argued that it may have limited power to explain some specific international production (Dunning & Lundan, 2008). Nevertheless, the framework provides a broad theoretical framework of the key drivers of FDI that may be subjected to empirical study among various economies as this information is important to spearhead FDI-led economic growth among host countries (Dunninng, 1994). The framework also informed selection of variables employed in the stufy. Various studies have been conducted to examine the determinants of FDI. While the determinants vary from country to country, common determinants of FDI are infrastructure, market size, labor cost, exchange rate and economic stability (Laoswatchaikul, 2011). In the case of Malawi, Chimbalu (2018) found out that determinants of FDI are infrastructure, broad money and government consumption. Hence, market size, human capital, real exchange rate, population growth, and inflation were not found as determinants of FDI in Malawi.

2.2.2 Neoclassical growth theory

This section explains how FDI is a key driver of growth based on the Neoclassical growth theory. The Neoclassical growth theory is an economic theory that outlines how steady economic growth rate can be accomplished with proper amounts of labour, capital and technological progress (Akulava, 2011). In the 1980s, the neoclassical revolution challenged state regulation of markets and argued that deregulation of markets draws additional domestic and foreign investment, and thus increases the rate of capital accumulation (Todaro & Smith, 2010). This study is concerned with capital accumulation and linkages with manufacturing output, hence; the neoclassical growth theory provides a theoretical framework of how FDI can boost investment and output in host countries. The Solow's model is a neoclassical growth model that is based on the concept of diminishing returns to both capital and labour in the production process in the short term and constant-returns to both factors jointly. The model also includes technological progress which is determined exogenously to explain long term growth. The standard Solow's growth model is presented as:

$$Y = K^{\propto}(AL)^{1-\propto}$$

Where Y is output such as gross domestic product, K is the stock of capital (which may include human capital as well as physical capital), L is labor, and A represents technical progress such as productivity of labor, which grows at an exogenous rate (Todaro & Smith, 2010).

Based on the Solow's model, Findlay (1978) developed a model that demonstrates that FDI has a positive impact on both foreign and domestic capital accumulation as well as technological progress. He argued that the flow of FDI increases the rate of technological progress of an economy when FDI is channeled into new technologies and production

methods, and thereafter boosts domestic investment through spillovers. He further indicated that the rate of technological transfer in a developing country is a decreasing function of both the relative technology gap and the share of FDI in the total capital stock. Endogenous growth theorist criticized the Solow's model that growth cannot be explained by capital accumulation alone but rather through other endogenous factors such as research and development; human capital; technology and innovation (Blostrom & Kokko, 2003). Since, FDI is known to promote all of these exogenous factors (Usajile, 2014), FDI is a key driver of technological progress and domestic capital accumulation.

2.3 FDI and manufacturing

Having discussed that FDI has a positive impact on manufacturing basing on the Eclectic paradigm and neoclassical growth theory, this section reviews how different types of FDI impact on manufacturing. The impact of FDI on manufacturing can either be positive, negative or neutral and is dependent on the type of FDI (Jude, 2019). FDI is classified by investment type and investment motivation. In terms of investment type, there are generally three kinds of FDI, namely; greenfield FDI; brownfield FDI; and mergers and acquisitions (Chen, et al., 2015; Jude 2019; Kinyondo, 2012). Greenfield FDI is the type of FDI that builds new assets in host countries, brownfield FDI means foreign acquisition undertaken as part of establishment of a local operation while mergers and acquisitions aim at acquiring already existing assets of a local company by the foreign investors (Yigit, 2010). According to Jude, (2019) greenfield FDI develops stronger long run impacts on sectoral growth while mergers and acquisitions do not have significant effect unless they involve expansions. This is because new investments create new assets, employment, technology and business linkages with others sectors and spur economic growth. Brownfield FDI, mergers and acquisitions are often characterized with downscaling due to application of foreign technology in order to obtain efficiency, hence, often have negative

impact on employment, neutral impact on asset creation but a positive impact on efficiency and productivity of manufacturing (Chen, et al., 2015). Therefore, new investments have greater overall positive impacts on the FDI host economy.

In terms of investment motivation, FDI is classified as market-seeking, resource seeking and efficiency seeking (Ilhan, 2007; Spatz, 2004). Market seeking FDI aims at penetrating the local or regional markets; resource seeking FDI aims at accessing strategic assets or resources while efficiency seeking FDI aims at lowering production cost. Market seeking FDI is the most dominant kind of FDI in Sub-Saharan Africa (SSA) and it is driven by market size; market potential; political and economic stability (Lederman et al., 2010). Since market seeking FDI is the most dominant in SSA, UNCTAD (2013). recommends that SSA countries like Malawi need to take advantage of such FDI by putting in place policies that attract such FDI and strengthening linkages with other sectors and domestic investment. Developing countries can benefit from such FDI, however, this depends on the absorptive capacity of the economy in terms of the technological gap, human capital, access to finance, labour market regulations and intellectual property rights (Farole & Winkler, 2014). Hence, policy makers need to maximize these host country characteristics to improve the spillover effects of FDI into the economy of the host country.

Resource seeking FDI is attracted to countries that have a comparative advantage over availability of plenty and cheap raw materials or natural resources. However, resource seeking FDI is known to have a limited overall effect on economies because most resource seeking FDI is extractive FDI which seeks to extract the resources from the host country to the mother country (UNCTAD, 2007). Hence, resource seeking FDI creates less job opportunities and doesn't have positive spillover effects in the short term compared to other types of FDI (Chen, Geiger and Fu, 2015). Some empirical studies have even established that there has been an inverse relationship between the intensity of natural resource and

growth between 1970 and 1990 (Sachs & Warner, 1995). Hence it is argued that if resource seeking FDI dominates, host countries would not benefit from the capital potential (Selhausen, 2009).

Efficiency seeking FDI is perceived to have the greatest impact on an economy because it brings foreign technology, boosts productivity, boost exports and benefits domestic companies through adaptation, imitation and spillover effects (Nunnenkamp & Spatz, 2012). However, just as is the case with all types of FDI, the spillover effects depend on the absorptive capacity of host economy. Additionally, efficiency seeking FDI is attracted to countries with lower production cost, hence, it forms a smaller part of manufacturing FDI in Africa since only a handful of foreign companies are able to take advantage of lower production cost (Farole & Winkler, 2014). Dependence on imported production inputs, erratic electricity supply, high tax levels and poor trade logistics are the main barriers of efficiency seeking FDI in Africa (UNCTAD, 2013). However, despite the classifications of FDI by investor motivation, it has been noted that the boundaries between the classifications can at times not clear cut (Chen, et al., 2015). This is because the firms go through various development stages that make them exploit varying advantages. For instance, market seeking FDI can transform into efficiency seeking FDI when there has been establishment of strong local production networks that may need to become efficient and cost effective. Hence, host countries need to have a holistic package of policies and legal frameworks to attract the various forms of FDI by maximizing the determinants of FDI.

2.4 Relationship between foreign and domestic investment

The foregoing has mainly highlighted the positive effects of FDI on manufacturing and the host country economy. However, the relationship between foreign and domestic investment has been one of the most debatable topics in FDI studies. FDI is not always known to have

a positive effect on domestic firms and the economy but also a negative and sometimes neutral. Hence FDI may have a crowding out, crowding in or have a neutral effect on domestic investment. On one hand, scholars argue that foreign investment has a crowding in effect on domestic investment through complementarity and spillover effects (Ahmed, et al., 2015; Nunnenkamp & Spatz, 2012) as highlighted in the foregoing through its impact by investor motivation and investment type. On the other hand, other scholars that argue that FDI has a crowding out effect on domestic investment refer to competition in the real and financial market that favors foreign firms (Almounsor 2017; Al-sadig 2013; Jude 2019). This section emphasizes on the crowding out and neutral effect of FDI on domestic investment because previous section on FDI and manufacturing have highlighted the crowing-in effect and its impact channels.

Crowding out is when foreign firms outcompete domestic firms in the market. When domestic firms are outcompeted in the real market by the foreign firms, the domestic firms may suffer loses and close down thereby leading to deterioration of welfare in the economy (Ahmed, et al., 2015). Crowding-out domestic investment may also be in the form of political reasons such as the potential loss of national sovereignty (Buffie, 1993). As such, the crowding out effect is not good for the host economy. Lastly, FDI may have a neutral effect on domestic investment if it brings a one-for-one increase in total investment in the host economy (Titarenko, 2005). This occurs when the FDI is inadequate or when the host economy has poor absorptive capacity of the benefits of FDI. Therefore, FDI may either crowd in, crowd out or have a neutral impact on domestic investment.

The relationship between FDI and domestic investment has also been noted to be bi-direction such that domestic investment also affects FDI. Empirical studies indicate that domestic investment may have positive impact on foreign investment (Harrison & Revenga, 1995; MacMillan, 1999). Firstly, public infrastructure is known to have a positive

impact on FDI because an increase in public capital stock reduces transaction costs and increases productivity which consequently attracts foreign investment (Ndikumana & Verick, 2008). Secondly, domestic investment may attract FDI as domestic firms have the information advantage over domestic markets, hence, once the information is complete in sectors that are profitable, foreign firms get a signal to invest in the foreign country (Moreau & Lauthier 2012). Therefore, the relationship between FDI and domestic investment is bi-directional whereby FDI and domestic investment may both affect each other.

2.5 Related empirical studies

This section will review the methodologies and key findings of a variety of studies that had similar objectives to this study.

Adams (2009) studied the impact of FDI and domestic investment on economic growth in Sub-Saharan Africa over the period 1990 to 2003. The study used panel data of 42 sub Saharan countries. Using OLS and fixed effects estimations, the study found out that Domestic investment was positively and significantly correlated with economic growth while FDI did not have a significant correlation with economic growth. Therefore this shows that the domestic investment was a key driver of economic growth as compared to FDI in Sub-Saharan Africa. These results are similar to that of Samantha and Haiyun (2018) who found out that the industrial sector in Sri Lanka was more sensitive to local shocks of domestic investment than foreign shocks of FDI.

In Malawi, separate studies have been conducted on the impact of FDI and domestic investment on the economy without comparison of significance. Sapuwa, 2008 studied the impact of FDI on manufacturing output in Malawi using vector autoregression (VAR) framework. The study found out that FDI had a positive impact on manufacturing output. Lunduka (2015) studied the impact of FDI and domestic investment on economic growth

using time series data for the period 1973-2010. The impulse response function results show that shocks on FDI and domestic investment have a positive impact on economic growth. The results also reveal that FDI crowds-in domestic investment, and that domestic investment has a crowding out effect on FDI in Malawi. These two related studies had different objectives and used different methodologies; hence, it is not clear as to whether FDI or domestic investment has greater impact on manufacturing. Additionally, the studies did not include control variables to avoid estimation errors and assist in explaining the results.

Jude (2009) studied the impact of FDI on domestic investment in transition economies covering the period 1995-2015. Using generalized method of moments (GMM) estimation, they found out that FDI lead to a creative destruction phenomenon with a short term crowding out effect followed by a crowding in effect on domestic investment.

Kamaly (2014) argued that the effects of FDI are country specific depending on the nature of FDI and that the general rule is that FDI has a neutral effect on domestic investment. He added that crowding in or crowding out effect of FDI on domestic investment is only found in few countries.

Country specific studies indeed provide diverse results. Ndunge (2009) studied the impact of FDI on domestic capital formation in Kenya with data covering the period between 1970 and 2009. Using OLS and granger causality, the results found out that FDI had a crowding in effect on domestic investment. Ahmed, Ghani, Mohamad and Derus (2015) studied the impact of FDI on domestic investment in Uganda. Using OLS, they found out that FDI had a neutral effect on the aggregate economy and the manufacturing sector. Yahia, Haiyun, Khan, Shah and Islam (2018) studied the impact of FDI in Sudan. Using time series data from 1976 to 2016 and employing ARDL and granger causality tests, the results showed a crowding out effect on domestic investment.

The diversity of the results is not only attributed to the type of FDI in the various countries but also methodological issues (Almfraji and Almsafir, 2014). Hence, there is a need to undertake the appropriate methodological approach in order to come up with reliable results. For instance, two studies on the impact of FDI on the manufacturing sector in Nigeria provide disputing results. On one hand, Orji, Orji-Anthony, Nchege, and Okafor (2015) examined the impact of FDI on the Nigerian manufacturing sector over a 40-year period from 1970 to 2010. The study employed the classical linear regression model and OLS, and discovered that within the period under review, FDI impacted negatively on the manufacturing sector. On the other hand, Ekienabor, Aguwamba and Liman (2016) examined the impact of FDI on the Nigerian manufacturing sector over a 31-year period from 1981 to 2012. Using OLS, FDI was found to have a positive impact on domestic investment. According to Almfraji and Almsafir, (2014), such a difference could be attributed to the sample size where by studies with larger sample sizes provide more reliable results.

Jude (2019) also adds that most studies conclude in favor of a crowding in effect of FDI on domestic investment based on a positive coefficient on FDI in explaining total gross fixed capital formation. However, a positive contribution of FDI to gross fixed capital formation is not a sufficient evidence of crowding in, as domestic disinvestment could be partially offset by higher FDI inflows. Crowding in should correspond to an increase in gross fixed capital formation higher than the increase in FDI. Hence, selection of the appropriate estimation procedure is important.

2.6 Conclusion

The chapter has reviewed the eclectic paradigm (OLI framework) and the neoclassical growth theory that provide the theoretical framework for the study. The chapter has also reviewed the theoretical and empirical literature on the impact of FDI and domestic

investment on manufacturing output. Related studies that were conducted have also been reviewed. The review shows that studies provide disputing results over the impact of FDI on domestic investment and manufacturing output. The variations are attributed to differences in the nature of FDI and methodological issues.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the theoretical and analytical framework; data sources and description; stationarity tests, model specification and model validation tests used in the study. Basing on the time series properties of the variables and theoretical framework, the autoregressive distributed lag (ARDL) model was used to examine the long run relationship between FDI, domestic investment and manufacturing value added. The ARDL vector error correction model (VECM) was used to examine the short run relationship between the variables. Impulse response functions were employed to examine the impact of FDI and domestic investment shocks on manufacturing output. Pair wise granger causality test was used to examine the causal impact of FDI and domestic investment on manufacturing output.

3.2 Theoretical and analytical framework

Given the hypotheses that FDI and domestic investment boosts manufacturing output, the key variables of concern in this study are FDI, domestic investment and manufacturing output. Control variables used in the study are GDP, trade openness (TO), real exchange rate (RER) and inflation (INF).

In functional forms, the analytical framework is given as:

$MVA=f\ (MVA_t, FDI_t, DI_t, GDP_t, TO_t, RER_t, INF_t)$…….. (1)

Whereby, equation (1) indicates that manufacturing value added (MVA can be estimated by its own previous values as well as current and previous values of FDI and domestic investment (DI) and the control variables.

Selection of the appropriate analytical framework is key to obtain reliable results. Since this study used time series data and not panel data as was the case with other studies described in the empirical literature section, the study will employ the standard methodological framework of analysis of time series data. A step wise approach generally involves four steps of; investigating the time-series properties of the variables; the short and long-run relationships among the variables; model estimation and finally drawing conclusions and recommendations (Wakyereza, 2017). Shrestha and Bhatta (2018) provides a general methodological framework through which this step wise econometric analysis is conducted. It starts by investigating the time-series properties of the variables through unit root testing to determine if a time series is stationary. Gujarati (2011) indicates that a time series is said to be stationary when it has a stable mean value and standard deviation, while non stationary time series do not have stable means. He further adds that regression of non-stationary time series using inappropriate models may provide spurious results. The methodological framework indicates that when all the variables of interest are stationary, ordinary least square (OLS) or vector autoregressive (VAR) models can provide unbiased estimates. However, OLS or VAR models may not be appropriate to analyze the relationship among variables when the variables are not stationary. In such cases there is need to test for cointegration to determine if the variables have a long run relationship. Non

stationary variables that are not cointegrated do not affect each other hence have no relationship, while non stationary variables that are cointegrated may have a relationship which can be examined using error correction models and causality tests (Shrestha & Bhatta, 2018). Lastly, when the variables of study are of mixed type (stationary and non-stationary variables), then ARDL models are appropriate.

This study employed an ARDL model and impulse response functions to estimate the impact of FDI and domestic investment on manufacturing output due to the time series properties of the variables. The ARDL model approach to cointegration analysis was appropriate because the variables were of mixed order of integration. The alternative cointegration test approach was the Johansen's cointegration test, however this approach was deemed inappropriate for the study because it is appropriate for studies with variables of the same order of integration. Since the variables were found to be cointegrated; thus have a long run relationship, a system of VAR models was developed to estimate impact of FDI and DI shocks on manufacturing output using impulse response functions.

3.3 Data sources and description of variables

The data was collected from World Bank-world development indicators database. The data comprises time series data covering a 38-year period from 1980 to 2017 as presented in appendix 1. Preference was to use a larger sample size but a complete set of each of the variables used in the study was available for the 42-year period. The variables used in the study are FDI inflow as a proxy for FDI, gross fixed capital formation (GFCF) as a proxy for domestic investment and manufacturing value added (MVA) as a proxy for manufacturing output. All variables are measured in US$ and were 2015 constant real values. The control variables used in the study are real effective exchange rate, inflation, GDP and trade openness.

The choice of the variables is based on the following reasons:

Foreign direct investment (FDI): FDI was used to estimate FDI inflows. FDI is different from other forms of cross boarder investments such as portfolio investment and financial aid as FDI is the long-term investment in an enterprise that is resident in an economy other than that of the investor with a significant degree of influence and direct or indirect ownership of at least 10% of the voting power of the investment (OECD, 2008). FDI comprises both mergers and acquisitions. FDI is expected to have a positive impact on manufacturing output.

Domestic investment (DI). This represents the investment made by local companies in the domestic market. DI was estimated using Gross fixed capital formation (GFCF). GFCF is also known as investment as it measures the value of acquisitions of new or existing assets by the business sector, government and households in economy. Hence, the domestic investment variable is not limited to the manufacturing sector rather the aggregate economy. Domestic investment is expected to have a positive impact on manufacturing output.

Manufacturing value added (MVA): MVA is used to reflect manufacturing output. MVA is the net output in the manufacturing sector after adding up all outputs and subtracting intermediate inputs. MVA is used instead of total output because it is less affected by variations in production mix.

Gross domestic product (GDP): It is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period. GDP also represents market size and is expected to have a positive impact on manufacturing output.

Inflation: The rate of inflation acts as a proxy for the level of economic stability. High and unpredictable inflation cripples businesses as it represents an increase in prices for raw

materials and business operations. Considering that investors prefer to invest in more stable economies that reflect a lesser degree of uncertainty, it is expected that inflation would have a negative effect on investment.

Real exchange rate: It is the weighted average of a country's currency in relation to other major currencies. Currency devaluation leads to cheap exports and expensive imports making a country's exports more competitive in the world market, leading to increased export volumes. A strong and volatile exchange rate reduces domestic investment rate.

Trade openness: Trade openness is one measure of the extent to which a country is engaged in the global trading system. Openness of the economy is calculated as the ratio of the sum of exports and imports to real GDP. The higher the ratio, the higher the rate of domestic investment meaning investment is primarily driven by trade. Open economies encourage more investment as it encourages confidence among investors. Trade openness is expected to have a positive impact on manufacturing output.

All the series were transformed into logarithm form to ensure that the data was normally distributed. This helps to linearize data and reduce the influence of outliers on the time series properties of the transformed data. Furthermore, log transformation makes elasticity calculation easier as the estimated coefficients are approximate to percentage changes in the variables (Gujarati, 2011). The FDI series had some negative values, hence, the series was proportionally rescaled in order to have a minimum of one in order to transform the series into logarithmic form.

3.4 Stationarity test

It is important to ensure that the variables are stationary before conducting regression to avoid spurious results where by the R^2 and the coefficients may appear statistically

significant whilst they are not. Hence, it is important to conduct stationarity test before any regression analysis. A time series is said to be stationary when it has a stable mean and standard deviation (Gujarati, 2011). In performing stationarity test, a combination of test such as the Phillips-Perron (P-P) and the augmented dickey fuller (ADF)) tests are recommended to provide robust results (Wakyereza, 2017). Hence these tests were employed. These results from the tests complemented each other to test the null hypothesis that the variable has unit root at 5% confidence level. Non stationary data was made stationary by obtaining differences until stationarity is detected. Variables that are made stationary by differentiating once are known as integrated variables of order one and are denoted as I (1) while variables made stationary by differentiating twice are known as integrated variables of order two denoted as I (2). Stationary variables imply that variables are stationary in levels and are denoted as I (0).

3.5 Model specification

To examine the short run and long run relationship of FDI, domestic investment and manufacturing value added; the ARDL model was estimated and bounds test was used to test for cointegration. The ARDL model also estimated the relative impact on FDI and domestic investment on manufacturing output. Pair wise granger causality test was used to test for causality among the variables.

3.5.1 Long run relationship between FDI, domestic investment and MVA

The ARDL cointegration technique developed by Pesaran and Shin (Pesaran & Shin 1999;) and the Johansen cointegration technique by Jonsen and Juselius, (1990) have become the solution to determining the long run relationship between series (Nkoro & Uko, 2016). However, the ARDL cointegration approach also known as the bounds test has some advantages over the Johansen cointegration technique. First, the ARDL model is more

appropriate in small samples (Ghatak & Siddiki, 2001) and the data set used in this study comprised a sample of 38 years which is relatively small due to data limitations. Second, the ARDL approach can be applied regardless of whether the regressors are I (1) and/or I (0) as the determination of a long run relationship between variables does not require the variables to be of the same order of cointegration.

The ARDL model estimates the dependent variable based on changes in its own lags and lagged values of the other explanatory variables.

The following generalized ARDL models were estimated to describe the long run relationship between FDI, domestic investment and MVA.

$$LNMVA_t = C + \sum_{j=1}^{j=q} \beta_1 LNMVA_{t-j} + \sum_{j=0}^{j=q} \beta_2 LNFDI_{t-j} + \sum_{j=0}^{j=q} \beta_3 LNDI_{t-j} +$$

$$\sum_{j=0}^{j=q} \beta_4 LNGDP_{t-j} + \sum_{j=0}^{j=q} \beta_5 LNTO_{t-j} + \sum_{j=0}^{j=q} \beta_6 LNRER_{t-j} +$$

$$\sum_{j=0}^{j=q} \beta_7 LNINF_{t-j} + U_i \ldots\ldots\ldots (2)$$

Where:

MVA is manufacturing value added

FDI is foreign direct investment

DI is domestic investment

C is constant

q is number of lags

j=1,2, … q;

t is time subscript

β_{1-7} are long run coefficients for the ARDL model

U are the residuals from the ARDL model

To execute the ARDL "Bounds" testing approach, each of the variable was treated as a dependent, and equations were formulated for each variable as per equation (2):

The Akaike information criteria was used to determine the appropriate lag length. The AIC is an objective measure of model suitability as it balances features of model fit and complexity. An alternative information criterion is the Bayesian information criterion (BIC) which is also an objective measure of model suitability. They differ in the terms of penalty attached to increasing number of parameters in the model as the BIC induces higher penalization as compared to AIC. Nevertheless, suitable models have the lowest AIC/BIC values.

Having estimated the ARDL models above, cointegration test using bounds test was employed in each of the equation to determine if there is a long run relationship among the variables. The null hypothesis that was tested was that there was no cointegration at 5% confidence level. The null hypothesis is rejected if the calculated F-statistic is bigger than the upper bound critical value, in which case it is concluded that the variables are actually cointegrated. The null hypothesis cannot be rejected when the F-statistic calculated appears to be less than the lower bond critical value and it is concluded that the variables are not co-integrated. However, if the F-statistic falls between the lower and the upper bound, then the results is inconclusive. In such a case, cointegration can be further examined by estimating the ECM version of the ARDL (Kremers, et al., 1992).

3.5.2. Short run relationship between FDI, domestic investment and MVA

After examining the long run relationship between the variables, it is important to examine the short run relationship of the variables. This is because non stationary variables that are cointegrated may have a short run relationship which can be examined using error correction models (Shrestha & Bhatta, 2018). The ARDL long run model was then

reformulated into an ECM, which integrates short and long- run dynamics of the models. The ECM was estimated as follows:

$$D(LNMVA_t) = C + \sum_{j=1}^{j=q} \beta_1 D(LNMVA_{t-j}) + \sum_{j=0}^{j=q} \beta_2\, D(LNFDI_{t-j}) +$$

$$\sum_{j=0}^{j=q} \beta_3 D(LNDI_{t-j}) + \sum_{j=0}^{j=q} \beta_4 D\left(LNGDP_{t-j}\right) + \sum_{j=0}^{j=q} \beta_5 D\left(LNTO_{t-j}\right) +$$

$$\sum_{j=0}^{j=q} \beta_6 D\left(LNRER_{t-j}\right) + \sum_{j=0}^{j=q} \beta_7 D\left(LNINF_{t-j}\right) + ECT + E \ldots\ldots\ldots \quad (3)$$

Where:

Manufacturing value added (MVA), foreign direct investment (FDI), domestic investment (DI), gross domestic product (GDP), trade openness (TO), real exchange rate (RER) and inflation (INF) are stationary variables

D if the difference parameter of the variables

C is the intercept

β_{1-7} are the short run coefficients for the model

q is number of lags

j=1,2, … q;

t is time subscript

ECT is the error coefficient term

E is white nose error

The ECT is supposed to be negative. When the ECT is significant and has a negative sign, it validates that there exists a long run relationship among the variables. ECT coefficient is used to indicate the speed of adjustment from the short run equilibrium to the long run steady state.

3.5.3 Relative Impact of FDI and domestic investment on manufacturing value added

To estimate the relative impact of FDI and domestic investment on manufacturing output in Malawi, the ARDL model in equation (2) was estimated. In order to further investigate the impact of FDI and domestic investment on manufacturing output, the study also employed impulse response functions (IRF) to examine the impact of FDI and domestic investment shocks on MVA. The IRF is a tool through which the reaction of one variable to an impulse or shock on another variable in the system can be explained (Wakyereza, 2017). The IRF was employed in vector auto regression (VAR) system that was developed by Sims (1980). According to Sim (1980), VAR can be used with variables of mixed order of integration as long as the interest is in the relationships and not the parameters because differentiating the nonstationary variables could throw information about the long run relationship away. The impulse response functions were used to further examine the impact of FDI and domestic investment on manufacturing value added. VAR models are commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbance on the systems of variables. The study employed unrestricted VARs and not Structural VAR model because in Structural VAR models only lagged values of the endogenous variable are employed in the right hand side of the equation, hence there is no issue of simultaneity. As such, the strength of the VAR model is its ability to incorporate residuals from past observations into the regression model for the current observation. Another advantage of VAR is that of being easy to understand. In a VAR model the exogenous variable is forecasted by using lagged values of the exogenous variables.

$LNMVA_t = \propto + \sum_{j=1}^{j=k} aLNFDI_{t-1} + \sum_{j=1}^{j=k} \gamma_j LNDI_{t-1} +$

E_i……………………………………… (4)

$LNFDI_t = \propto + \sum_{j=1}^{j=k} bLNMVA_{t-1} + \sum_{j=1}^{j=k} w_j LNDI_{t-1} +$

ε_i……………………………………... (5)

$LNDI_t = \propto + \sum_{j=1}^{j=k} cLNFDI_{t-1} + \sum_{j=1}^{j=k} z_j LNMVA_{t-1} +$

U_i……………………………………… (6)

The simulation of IRF involves tracing the reaction of the variables to a one standard deviation shock on the errors on all the variables in the VAR system. The results of the impulse response simulation are displayed in a line graphs comprising 5 years' ex-ante forecast for each of the dependent variable.

3.5.4 Causal linkages between FDI, domestic investment and manufacturing output in Malawi

The existence of a relationship in a regression between the variables implies existence of a causal relationship between the variables, but does not tell the direction of the causal relationship. Thus, the Granger causality test was employed to determine the direction of the causality that exists between the variables. Granger causality employs the F – statistic in time series forecasting is to test whether the lags of one of the included regressors has useful predictive content, above and beyond the other regressors in the model. The Granger causality tests the null hypothesis that there is no granger causality between the variables. The null hypothesis is rejected when the significance of the probability of the f statistic is less than 5%. Based on Granger 1969, the Granger causality model is specified based on a simple VAR:

$$X_t = \sum_{i=1}^{n} \propto_i Y_{t-1} + \sum_{j=1}^{n} \beta_j X_{t-j} +$$

U_{1t} …… (7)

$$Y_t = \sum_{i=1}^{n} \propto_i X_{t-1} + \sum_{j=1}^{n} \beta_j Y_{t-j} + U_{2t}$$

…… (8)

Where $X_t$and Y_t are exogenous variables, j is number of lags, U_t stands for the error terms of the VAR. The β coefficients indicates the influence of Y_{t-j} on X_t and influence of X_{t-j} on Y_t.

3.6 Model validation tests

3.6.1 Model stability tests

The study used the CUSUM test for model stability. This involved testing the null hypothesis that; if the estimated line graph does not lie between the 5% significance boundaries, then the model is not stable.

3.6.2 Serial Correlation

Serial correlation is a common problem in regression analysis involving time series. Serial correlation means that the error terms are correlated such that the error term at time t is correlated with the error term at time (t – 1). Consequently, the errors are under estimated thereby leading to spurious results. The Dublin-Watson and Breusch-Godfrey tests were used to test for autocorrelation.

3.6.3 Test for heteroscedasticity

One of the key critical assumptions of classical linear regression is that the errors are homoscedastic; meaning that they have a stable variance. Heteroscedasticity means that the

errors have an unstable variance which results into spurious regression (Gujarati, 2011). Hence, testing for heteroscedasticity is important to avoid deriving spurious results. Heteroscedasticity was tested using the Breusch–Pagan and White tests at 5% confidence level. If the errors are found to be heteroscedastic, model specification, choice of variable and lag length will be reevaluated to derive the appropriate model and reliable results.

3.7 Conclusion

The chapter presented the data sources, justification of choice of the variables, model specification, analytical techniques and diagnostic tests used in the study. The ARDL model approach to cointegration technique was employed because of its ability to model a mixture of I (0) and I (1) variables unlike the Johansen cointegration test. The ARDL model estimates also explain the impact of FDI and domestic investment on manufacturing value added. The VAR (IRF) further examined the impact of FDI and domestic investment shocks on manufacturing value added. Pair wise granger causality tests was used to test for causality.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings and the interpretation of the results of the study as per the research objectives and estimation procedures that were presented in the previous chapter. The chapter starts by presenting the descriptive statistics, patterns and variations of the variables. This is followed by unit root test results, examination of the long run and short run relationship, impact of FDI and domestic investment on manufacturing output, causality and model validation tests.

4.2 Descriptive statistics, patterns and variations of the times series data

Table 1 shows the descriptive statistics of the variables as whole numbers except for trade openness which is expressed as a percentage.

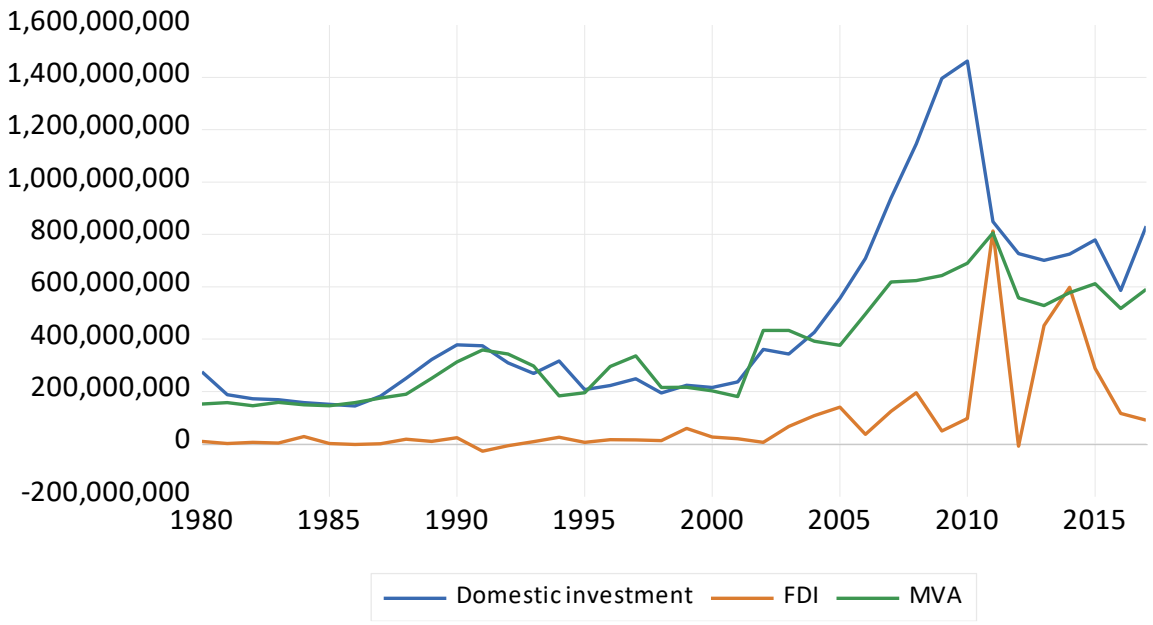
Table 1: Descriptive statistics of the data

	FDI	GDP	Inflation	Exchange rate	Domestic Investment	Trade openness	MVA
Mean	89,772,709	3,140,000,000	20	140	467,000,000	60	361,000,000
Median	21,299,996	2,140,000,000	14	133	319,000,000	57	324,000,000
Maximum	813,000,000	8,000,000,000	83	215	1,460,000,000	91	806,000,000
Minimum	(28,700,000)	1,130,000,000	7	65	145,000,000	42	145,000,000
Std. Dev.	175,000,000	2,080,000,000	14	48	348,000,000	11	192,000,000
Skewness	2.83	0.77	2.56	-0.01	1.35	0.95	0.53
Kurtosis	10.69	2.18	11.61	1.54	4.06	3.59	2.04
Observations	38	38	38	38	38	38	38

As illustrated in Table 1, all variables have a total number of 38 observations, implying that the study used a balanced sample. The mean, median, maximum and minimum values are all within range and do not provide a significant alarm to detect except for FDI which has a minimum negative value. In terms of skewness, the descriptive statistics show that all variables are positively skewed, meaning that they have a cumulative distribution function with a long right tail, except for real exchange rate which is negatively skewed. The kurtosis measure of the variables shows that GDP, exchange rate and MVA are platykurtic while FDI, inflation, domestic investment and inflation are leptokurtic or peaked and normally distributed.

Figure 2 shows the trends of FDI, domestic investment and MVA form the year 1980 to 2017. Graphical presentations of all the variables indicate that all variables (FDI, domestic investment and MVA) have random variations, however; all variables have an upward trend.

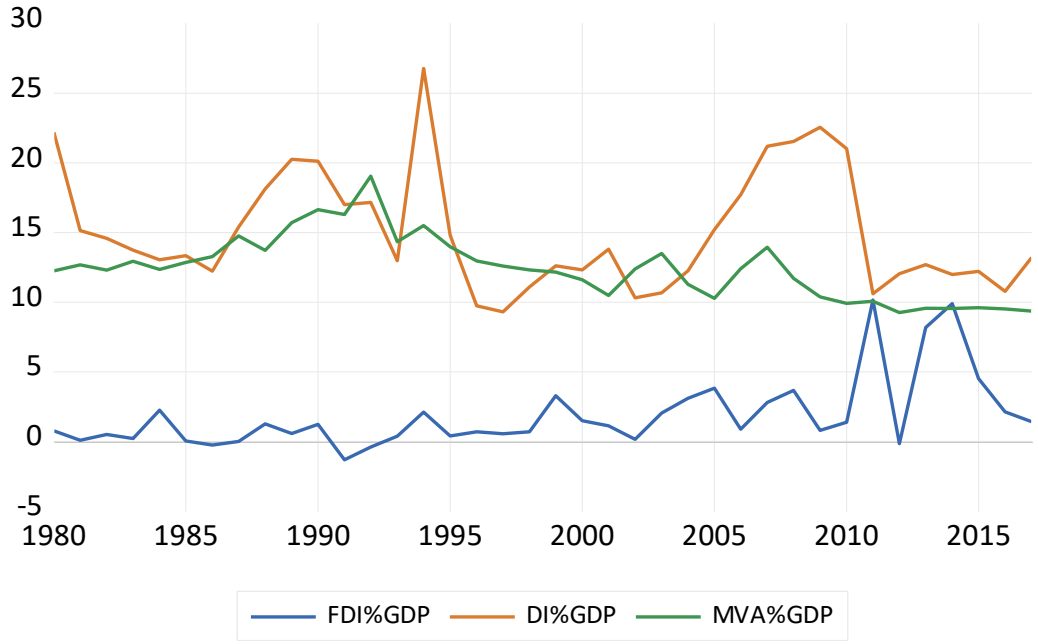
Figure 1: Trends of FDI, domestic investment and MVA, 1980-2017



Understanding the pattern and variations of time series is important as it provides an idea about stationarity properties of a variable and also helps decide whether to include both an intercept and trend in a stationarity test equation. Hence, intercept and trend was included in stationarity test because the variables have intercept and trend as depicted in figure 1. An eyeball inspection indicates that there is no stationarity among all variables at levels, however; stationarity tests were conducted to confirm the stationarity properties of the variables.

FDI and domestic investment was also compared on their relative economic importance expressed as a percentage of GDP from the year 1980 to 2017.

Figure 2: Trends of domestic investment, MVA and FDI inflow as a percentage of GDP, 1980-2017



As illustrated in Figure 2, from the year 1980 to 2017, as a percentage of GDP, FDI inflow has experienced an upward trend while domestic investment and MVA has experienced a downward trend. FDI inflows during the 1980s averaged 1% of GDP per annum (p.a.). The trend continued in the 1990s but slightly improved in the 2000s, averaging 2% of GDP p.a.

Until year 2001, economic activity in the country was controlled by state through state owned enterprises (SOE) hence there was very little FDI inflow as government was not open to FDI. While FDI inflow was low, domestic investment and MVA averaged 13% and 13% respectively from the year 1980 to 2000. Due to poor performance of SOEs, in the year 1984, the government started to undertake various policies such as privatization of the SOEs and market liberalization to open up the economy for foreign investment. Hence, the low levels of FDI inflows during the period from 1970 to 2000 is attributed to several economic challenges that Malawi faced, which comprised low performing state-owned enterprises, low human capital development, and macroeconomic instability which led to high inflation and exchange rate and interest rate misalignments (Chirwa and Odhiambo, 2015, 2016). FDI inflow in Malawi has been low even compared with neighboring countries such as Mozambique, Zambia and Tanzania (UNCTAD, 2015). According to Whiteside (1989), the government of Malawi offered very few incentives for FDI inflow and had no coherent policy towards industrialization. It is only from 2010 to 2016 when FDI inflows in Malawi started to increase averaging 6% of GDP. (Chirwa and Odhiambo, 2015, 2016). A change in policy in 2013 increased FDI inflows when the Reserve Bank devalued the Kwacha in 2012 and had a floating currency. The change resulted in the availability of foreign currency on the market and eased investors' hustle to remit foreign investment funds (Chimbalu, 2018). The 2017 investment climate analysis shows that Malawi has adequate legal instruments for investors' protection and treatment. The 1994 constitution of Malawi protects investment regardless of nationality and the introduction of Malawi Investment Trade Centre as a One Stop Centre has improved information flow to both prospective and existing investors regarding regulations and procedures on investment in Malawi. However, despite the increase in FDI inflow in the past decade, figure 2 indicates that FDI inflow has not been stable as there has been drops in the years 2003,

2006, 2009, 2010 and a deficit in 2012. As such, despite an upward trend in FDI, there has been fluctuations in FDI inflow. The World Bank (2013) attributes the economic slumps to the high-risk environment characterized by high inflation, a volatile exchange rate, some market failures, weak and unreliable public services; thus leading to a shift into the production of low-value subsistence crops by farm households, scaling down manufacturing activities, and increased investments in low-risk assets, such as Treasury Bills

4.3 Results for unit root test

The main stationarity tests used in the study were ADF and PP tests. The KPSS test was employed when ADF and PP test provided different results.

Table 2: Stationarity results with ADF and -PP tests

Variable in natural logarithmic form	ADF statistic		PP statistic	
	Level	1st difference	level	1st difference
FDI	-5.98 (-4.27)***	-5.5 (-4.25)***	-5.98 (-4.22)***	-34.42 (-4.23)***
Domestic investment	-2.47 (-4.24)	-4.95 (-4.23)***	-2.56 (-4.22)	-5 (-4.23)***
Manufacturing value added	-3.05 (-4.22)	-6.38 (-4.23)***	-3.02 (-4.22)	-8.27 (-4.23)***
GDP	-3.05 (-4.22)	-6.38 (-4.23)***	-2.79 (-4.22)	-8.44 (-4.23)***
Real exchange rate	-4.81 (-4.23)***	-6.9 (-4.24)***	-3.58 (-4.22)	-10.61 (-4.23)***
Inflation	-2.41 (-4.24)	-6.71 (-4.24)***	-3.06 (-4.22)	-11.8 (-4.23)***
Trade openness	-4.62 (-4.22)***	-5.49 (-4.25)***	-4.75 (-4.22)***	-25.58 (-4.23)***

Note: *** indicates significance level at 1% level of significance

Table 1 results indicate that the null hypothesis for FDI, real exchange rate and trade openness cannot be accepted at 1% level of significance meaning that FDI is I (0), thus stationary at level. However, test results of domestic investment, MVA, GDP and inflation

indicate that the null hypothesis cannot be rejected at 1% level of significance implying that the variables are not stationary at levels. Hence, these variables (domestic investment, MVA, GDP and inflation) were found I (1) which is stationary at first difference.

4.4 Long run relationship between FDI, domestic investment and MVA

Having noted that MVA, GDP, inflation and domestic investment are non-stationary at level, in order to avoid deriving spurious regression results, cointegration tests was conducted among the non-stationary variables. According to table 3, the cointegration test results indicate the variables have are cointegrated. The null hypothesis that there is no cointegration equation(s) is rejected as the trace statistic is greater than the critical value at 5% confidence level. When the variable are not cointegrated, including them in regression would provide reliable results.

Table 3: Johansen's cointegration results of non-stationary variables (MVA, GDP, Inflation and domestic invest)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.589519	50.36637	47.85613	0.0285
At most 1	0.228740	18.31104	29.79707	0.5432
At most 2	0.214985	8.960760	15.49471	0.3690
At most 3	0.006834	0.246877	3.841465	0.6193

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Bounds test was conducted among all the I(0) and I(1) variables to determine if the variables are cointegrated, thus has a long run relationship. The test was conducted for each

variable as an exogenous variable and the variables were cointegrated in all scenarios. The table 4 below summarizes the bounds test results.

Table 3: ARDL bounds test results

Dependent variable	F-statistic	Critical values bounds				Outcome
		0.95		0.99		
		I(0)	I(1)	I(0)	I(1)	
D(LNMVA)	6.08	2.27	3.28	2.88	3.99	Cointegration
LNFDI	5.07	2.27	3.28	2.55	3.61	Cointegration
D(LNDI)	4.13	2.27	3.28	2.88	3.99	Cointegration
D(LNGDP)	6.01	2.27	3.28	2.88	3.99	Cointegration
LNER	4.98	2.27	3.28	2.88	3.99	Cointegration
LNTO	10.44	2.27	3.28	2.88	3.61	Cointegration
D(LNINF)	7.34	2.27	3.28	2.88	3.99	Cointegration

In table 4 above, the second column indicates the calculated F statistics which are compared with the I (0) or I (1) critical values at first 95 percent and 99 percent. The case of an intercept and trend was considered during the bounds test because this were the time series properties of the data. For all the dependent variables, the F-statistic is higher than all critical values, hence, the null hypothesis of no cointegration is rejected implying that there is cointegration among all the variables when each is a dependent variable.

Having noted that the variables are cointegrated, thus have a long run relationship, it is suggested that the variables should not be treated in isolation rather all variables should be considered because they affect each other. Hence, in order to boost the manufacturing sector of Malawi; efforts should be put in place to attract FDI, boost domestic investment as well as increase manufacturing productivity as explained by MVA. Nsiku (2012) in a study in a study on assessing investment incentives in Malawi argued that this could be achieved by maintaining political and macroeconomic stability, and putting in place incentives for private investment. This is also consistent with the Ownership, Location and Internalization (OLI) framework that explains that firms engage in foreign investment by being attracted to ownership, location and internalization advantages (Wakyereza, 2017). While factors that promote investment are diverse, policy could provide special focus on investor motivation factors as was reported by NSO (2012) under the Malawi Foreign Private Capital and Investors' Perceptions Survey. These are; political stability, domestic economic situation, market size, region market size and trade openness.

4.5 Short run relationship between FDI, domestic investment and MVA

The ECM was estimated to determine the short run effects of FDI and domestic investment on MVA. The ECM coefficient represents the speed of adjustment to equilibrium

aftershocks. The ECM coefficient is supposed to be a negative coefficient. From the table 5 we see that the model has the correct negative sign of -0.99 as expected. This implies that the model returns to equilibrium at a high speed of 99% within a year.

Table 4: ECM estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMVA(-1))	0.479138	0.181171	2.644671**	0.0148
LNFDI	-0.007507	0.003582	-2.095799**	0.0478
LNFDI(-1)	-0.018985	0.003535	-5.371037***	0.0000
D(LNDI)	0.194490	0.071185	2.732170**	0.0122
D(LNGDP)	0.937727	0.124422	7.536690***	0.0000
D(LNGDP(-1))	-0.601519	0.207029	-2.905478*	0.0082
D(LNGDP(-2))	-0.181240	0.068055	-2.663145**	0.0142
LNER	-0.470809	0.142335	-3.307751***	0.0032
LNER(-1)	0.422584	0.140387	3.010146***	0.0064
LNTO	-0.143973	0.145888	-0.986877	0.3344
D(LNINF)	0.005704	0.033390	0.170818	0.8659
D(LNINF(-1))	0.040060	0.031521	1.270905	0.2170
ECT	-0.999797	0.334040	-2.993048***	0.0067

R-squared	0.948258	Mean dependent var	0.040089
Adjusted R-squared	0.920036	S.D. dependent var	0.237628
S.E. of regression	0.067196	Akaike info criterion	-2.283842
Sum squared resid	0.099338	Schwarz criterion	-1.706142
Log likelihood	52.96724	Hannan-Quinn criter.	-2.084420
Durbin-Watson stat	1.777984		

Note: *** indicates significance level at 1% level of significance

** indicates significance level at 5% level of significance

* indicates significance level at 10% level of significance

4.6 Impact of FDI and domestic investment on MVA

The Akaike information criteria was used to determine the lag length of 1, 1, 0, 2, 1, 0, 1 as presented in appendix 10 for the variables MVA, FDI and domestic investment, GDP, real exchange rate, trade openness and inflation respectively, for the ARDL model. The table 3 below indicates the estimation results of the ARDL model showing the estimated impact of FDI, domestic investment and control variables on MVA.

Table 5: Results of the ARDL (1, 1, 0, 2, 1, 0, 1) model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNMVA(-1)	0.350359	0.116386	3.010329*	0.0062
LNFDI	0.007203	0.004422	-1.628764	0.1170
LNFDI(-1)	0.017531	0.004541	-3.860844*	0.0008
LNDI	0.180680	0.060247	2.999000*	0.0064
LNGDP	0.980476	0.138758	7.066084*	0.0000
LNGDP(-1)	0.462821	0.158472	-2.920516**	0.0077
LNGDP(-2)	0.144997	0.083445	-1.737643***	0.0956
LNRER	-0.435628	0.148455	-2.934415*	0.0075
LNRER(-1)	0.430115	0.158143	2.719790*	0.0122
LNTO	-0.087265	0.180450	-0.483597	0.6332
LNINF	0.009008	0.042576	0.211577	0.8343
LNINF(-1)	0.052087	0.038578	1.350159	0.1901
C	1.687245	2.460438	0.685750	0.4997

R-squared	0.989157	Mean dependent var	19.59934
Adjusted R-squared	0.983499	S.D. dependent var	0.538420
S.E. of regression	0.069163	Akaike info criterion	-2.230510
Sum squared resid	0.110020	Schwarz criterion	-1.658683
Log likelihood	53.14917	Hannan-Quinn criter.	-2.030927
F-statistic	174.8431	Durbin-Watson stat	1.731936
Prob(F-statistic)	0.000000		

Note: * indicates significance level at 1% level of significance

** indicates significance level at 5% level of significance

** indicates significance level at 10% level of significance

The coefficient of determination (R^2) has a value of 0.989 implying that 98.9% of the variability in MVA is explained by the estimated model applied in the study. The Dublin Watson statistic is 1.73 implying that there is no first order serial autocorrelation in the model.

The estimated coefficients of the long run relationship show that current domestic investment (DI) is found to have a positive and significant impact on MVA at 1% confidence level with a long run coefficient of 0.18. This implies that a 1% increase in current domestic investment may result into a 0.18% increase in current MVA. Current FDI however did not have an impact on manufacturing output. Rather lagged FDI, FDI (-1) has a positive impact on manufacturing output with a coefficient of 0.018. This implies that a 1% increase in FDI (-1) may result into a 0.018% increase in current MVA. Hence, in comparison, domestic investment, other than FDI had a greater and more direct impact on manufacturing output as domestic investment has a positive impact on MVA in the same year while FDI impact lagged for one year. Additionally, the impact coefficient of domestic investment (0.18) is greater than the coefficient impact on FDI (0.018). It could be argued that domestic investment had a positive impact on MVA in Malawi because domestic investment forms a greater percentage of GDP as compared to FDI signifying that domestic investment dominates the economy. For instance, in 2017 domestic investment percentage of GDP was 13% while FDI percentage of GDP was 4% (NSO, 2018). Additionally, the government of Malawi took deliberate efforts to invest into manufacturing through state owned companies up unto the year 2001 after which various SOEs were privatized. Hence, manufacturing output was closely associated with domestic investment. However, FDI does not have an immediate impact on manufacturing output in same year supported by the findings of Jude (2019) that FDI does not immediately turn into capital formation and firms take time to start earning profits especial greenfield investment as they have long run

impact. According to UNCTAD (2020), since 2003 after which FDI inflow started to increase in Malawi, most FDI in the manufacturing sector has been in the form of mergers and acquisitions with a total value of 113 million USD as compared to Greenfield investments, which had a total value of 33 million USDs. Greenfield investments, which are new investments, tend to boost domestic investment and output more than mergers and acquisitions. Since most of the FDI has been in the form of mergers and acquisitions, this also explains the lagged and lower impact of FDI on manufacturing output in Malawi.

Table 3 also indicates that manufacturing output explained by its own lag. It was found out that past value of MVA, specifically MVA (-1) had positive and significant impact on current MVA at 1% confidence levels. From a mathematical perspective, the long run coefficient for MVA (-1) was 0.35 implying that 1% increases in MVA (-1) result into 0.35% increase in current MVA. By implications, higher past values of MVA influences current MVA to be higher.

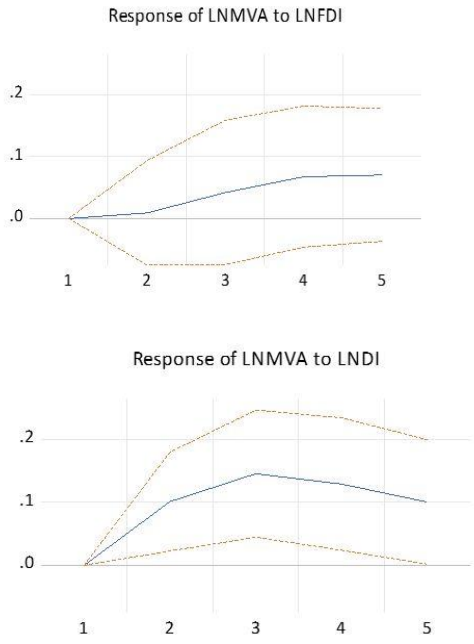
Of the control variables, current GDP had a positive impact on manufacturing output while RER had a negative relationship with manufacturing output. However, trade openness and inflation had no impact on manufacturing output. Hence, as per figure 1, despite that MVA has an upward trend from the year 1980 to 2017, the MVA trends are negatively affected RER at 1% confidence levels. From a mathematical perspective, the long run coefficient for RER was 0.43 implying that 1% increases in RER result into 0.43% decrease in current MVA. Hence, exchange rate management influenced in manufacturing performance while trade openness and inflation had no impact on manufacturing. In order to improve the business climate of manufacturing firms, there is need to promote effective macroeconomic policies that contribute to increase in manufacturing productivity by promoting trade openness, ensuring macroeconomic stability and effective monetary policy to reduce

inflation as these improve productivity and competitiveness of manufacturing firms (Orji, Orjio-Anthony, Chege, Okafor, 2015)

4.6.1 Response of MVA to FDI and domestic investment shocks

Impulse response functions were to further examine the impact of FDI and domestic investment on manufacturing output under the second objective. It was necessary to do this further examination because FDI inflow formed a low percentage of GDP, such that FDI did not have an impact on MVA in the current year rather after a period of 3 years. Hence, with use of IRF the study examined and compared the impact of one standard deviation positive shock of FDI and domestic investment on manufacturing output to examine the difference. The study sought to compare the response of MVA to FDI and domestic investment positive shocks. .

Figure 3: Impulse response function of MVA to FDI and DI (Response to Cholesky One S.D. Innovations ±2 S.E)



The first graph in figure 3 shows the time path of MVA in response to 1 standard deviation positive shock in FDI. MVA responds positively to the shock in FDI as shown by the graph which starts by from zero in the first two years but thereafter increases until the end of year 5. However, the confidence intervals specified by the red line graph crosses zero implying that the results are insignificant. This implies that a positive shock in FDI does not have a significant observable impact MVA over the whole period from year 1 to year 5. This suggests that FDI inflow is not significant enough to affect MVA. Hence there is need to attract more FDI in the manufacturing sector.

The second graph in figure 3 shows the time path of MVA in response to a positive 1 standard deviation shock in domestic investment. MVA responds positively to a shock in domestic investment from the first year up to the third year after which it starts to decline up five. The confidence intervals specified by the red line graph are above zero amongst throughout the five-year period implying that domestic investment contributes to growth in MVA during this period. This result is also consistent with the ARDL model results that domestic investment is a key driver of MVA hence there is need to put in pro-domestic investment in order to boost manufacturing output.

4.7 Causal linkages between FDI, domestic investment and manufacturing output in Malawi

The pairwise granger causality test results in table 6 show that domestic investment granger causes manufacturing output in Malawi at 90% confidence level, as the probability is 0.097. However, FDI does not granger causes manufacturing output in Malawi. As such, there is no causal relationship between FDI and manufacturing output. This suggests that FDI

inflow is not significant enough to affect MVA. Hence there is need to attract more FDI in the manufacturing sector.

The results in table 6 also show that there is no causal relationship between FDI and domestic investment. As such, FDI does not granger cause domestic investment. The results are consistent with those of Kamaly (2014) who studied the impact of FDI on domestic investment in emerging economies. He found out that FDI generally has a neutral impact on domestic investment except in a few countries. Therefore, domestic investment plays a key role in the manufacturing sector as it has a causal impact on manufacturing output. As such, as government promotes policies that promote foreign investment, there is need to place more emphasis on pro-domestic investment policies in the long run in order to stimulate growth in manufacturing.

Table 3: Pair wise granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
D(LNMVA) does not Granger Cause D(LNDI)	35	0.06936	0.9331
D(LNDI) does not Granger Cause D(LNMVA)		2.52017	0.0973
LNFDI does not Granger Cause D(LNDI)	35	0.58014	0.5660
D(LNDI) does not Granger Cause LNFDI		0.41849	0.6618
LNFDI does not Granger Cause D(LNMVA)	35	0.18835	0.8293
D(LNMVA) does not Granger Cause LNFDI		0.66748	0.5205

4.9 Validation of estimated equations

4.9.1 ARDL model and ECM stability test

The study used the CUSUM test for model stability. This involved testing the null hypothesis that; if the estimated line graph does not lie between the 5% significance boundaries, then the model is not stable. The estimated line graphs lie between the 5%

significance boundary meaning that the models are stable. Appendix 2 and 3 presents the ARDL model and ECM stability test results.

4.9.2 Serial correlation test for ARDL model and ECM

Serial correlation test was conducted to test if the error terms were correlated in the estimated ARDL and ECM equations. When there is correlation among the error terms then the estimated standard errors will tend to underestimate the true standards errors (Gujarati, 2011), hence, providing spurious results. The Breusch-Godfrey serial correlation LM test was used to test for serial correlation. This involved testing the null hypothesis that there is no serial correlation. The results indicated that there was no serial correlation in both the ARDL and ECM equations. Appendix 4, 5 and 6 presents the ARDL model and ECM stability test results.

4.9.3. Heteroscedasticity test

Heteroscedasticity was tested using the Breusch–Pagan and White tests at 5% confidence level. All the models (ARDL, ECM and VAR) were found to be homoscedastic as per Appendix 7,8 and 9.

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATIONS

5.1 Conclusion

The study was conducted with the overall objective of examining the impact of FDI and domestic investment and manufacturing output in Malawi. Specifically, the study examined the long run and short run relationship between FDI, domestic investment and manufacturing output in Malawi. The study also examined the relative impact of FDI and domestic investment on manufacturing output and causal linkages among the variables. Real exchange rate, inflation, domestic product (GDP) and trade openness were included as control variables to avoid estimation errors and to assist explaining the results. The study covered a period of 38 years, from 1980 to 2017. Annual time series data was collected from the World Bank-World Development Indicators database.

Firstly, before looking into the research questions, log transformation was conducted on the data to normalize the data. Then stationarity tests were conducted mainly using the ADF and PP tests to determine if the data had unit root and the order integration i.e. the number of times the data would be differentiated to make it stationary. Unit root tests indicated that FDI, real exchange rate and trade openness were stationary at levels while domestic investment, GDP, inflation and manufacturing value added were stationary at first difference at 1% confidence level. Since the variables were found to be of different orders of integration, the ARDL model was chosen over the Johansen's co-integration test approach to examine the long run relationship between the variables.

The ARDL model cointegration test results indicated that FDI, domestic investment and MVA are cointegrated meaning that they have a long run relationship. This means that the variables interact with each other such that one variable has an impact on the other. The short run model estimated by the ARDL ECM indicated ECM coefficient was found to be 0.99 meaning that the model returns to equilibrium at a high speed of 99%. The ARDL long run model estimation results also indicated that both FDI and domestic investment have a positive long run impact on MVA. Domestic investment positively affected manufacturing output in the current year with a coefficient of 0.18 while FDI positively affected manufacturing output after a period of 1 year with a coefficient.

Due to the possible endogeneity between among FDI, domestic investment and MVA, VAR models and impulse response functions were employed to examine the nature of the relationship between the variables. The results indicated that positive shocks in FDI did not have an impact of MVA while positive shocks in DI had a positive impact on MVA throughout a five year period. Pair wise granger causality test results indicate that domestic investment granger causes manufacturing output while FDI does not cause manufacturing output. Model diagnostic tests were conducted to examine the robustness of the models used in the study. The ARDL, ECM and VAR models were found homoscedastic, stable and with no serial correlation. Hence, the results indicated that the models were robust such that results of the model were reliable.

5.2 Policy implications

Having established that FDI, domestic investment and MVA have a long run relationship, it was noted that the variables interact with each other. Hence, it is suggested that the National Industrial Policy (NIP) should not treat the variables in isolation rather policy

should consider all variables in order to boost domestic investment and manufacturing output in Malawi. Particularly, there is need to discuss in the policy how to boost FDI in manufacturing sector in Malawi as this component is not included in the NIP. The ARDL long run model estimations results found out that domestic investment, other than FDI has positive direct impact on manufacturing output. It is suggested that this is so because FDI formed a low percentage of GDP, hence, not significant enough to have a greater impact on manufacturing output. Therefore, government needs to put in effort to boost FDI inflow, however should put more emphasis on pro-domestic investment policies as this has a greater impact on manufacturing output. Despite that FDI does not immediately turn in to capital formation and increase productivity, most FDI in the manufacturing sector has been in the form of mergers and acquisitions (UNCTAD, 2020). Mergers and acquisitions tend to have a neutral effect on manufacturing output as compared to greenfield investments which are new investments. This is because new investments develop stronger long run impacts on sectoral growth while mergers and acquisitions do not have significant effect unless they involve expansions (Jude, 2019). Hence, there is need to promote policies that promote new foreign investment in the manufacturing sector to boost output.

GDP had a positive impact on manufacturing output while inflation had a negative impact. However, trade openness and inflation had no impact on manufacturing output. Therefore, while factors that promote investment are diverse, policy could provide special focus on investor motivation factors as was reported by NSO (2012) under the Malawi Foreign Private Capital and Investors' Perceptions Survey which are political stability, domestic economic situation, domestic market size, regional market size and trade openness.

Since FDI inflow formed a low percentage of GDP, the study also examined the impact of one standard deviation positive shocks of FDI and domestic investment on manufacturing output. It was found out that FDI positive shocks did not have an impact on manufacturing

output while domestic investment had a positive impact on manufacturing output throughout a five-year period. Granger causality test results also indicate that FDI does not granger causes manufacturing output while domestic investment granger causes manufacturing output. This signifies that there is need to attract more FDI inflow. There were also large fluctuations in FDI inflow hence there need to ensure continuous FDI inflow as this would have a cumulative greater impact on manufacturing output.

5.3 Limitations of the study

Initially, the study also sought to employ panel data collected from the Annual Economic Survey results. This would present an opportunity to examine the impact on FDI on the various manufacturing industries based on industrial standard industrial classifications (ISICs). However, due to data limitations, the sample size of the time series data for the ISIC's panel data was not adequate. Hence, the study was unable to examine the interaction of these variables at ISIC level. This would be necessary to understand which industries attract the most foreign and domestic firms. This information is critical for policy makers to make informed decisions that would boost sectors that are not performing well as per their disaggregation. FDI and domestic investment data in respect to manufacturing for the period under study is also not available. Hence, the study employed to the variables relating to the whole economy as proxies to measure the effect of FDI and domestic investment on manufacturing.

5.4 Direction of future research

Future studies related to this study should examine the impact of FDI on the manufacturing sector disaggregated by the industrial standard industrial classifications. This study also examined the interaction of the FDI, domestic investment and manufacturing output in the real market. Future studies should also examine the interactions of the variables in the

financial market as well as export market. This would assist understand the impact of FDI on local liquidity, finance of local firms and international trade. The results derived from such studies would complement the results derived from this study that has been conducted in the real domestic market.

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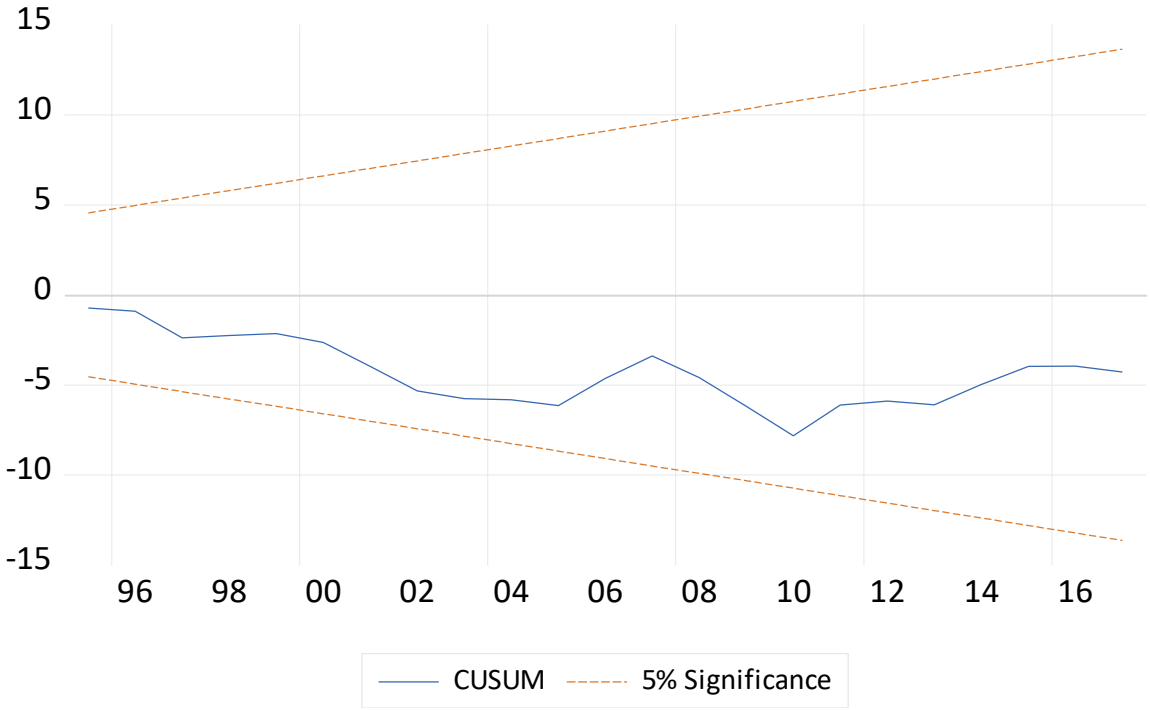
APPENDICES

Appendix 1: Data set used in the study

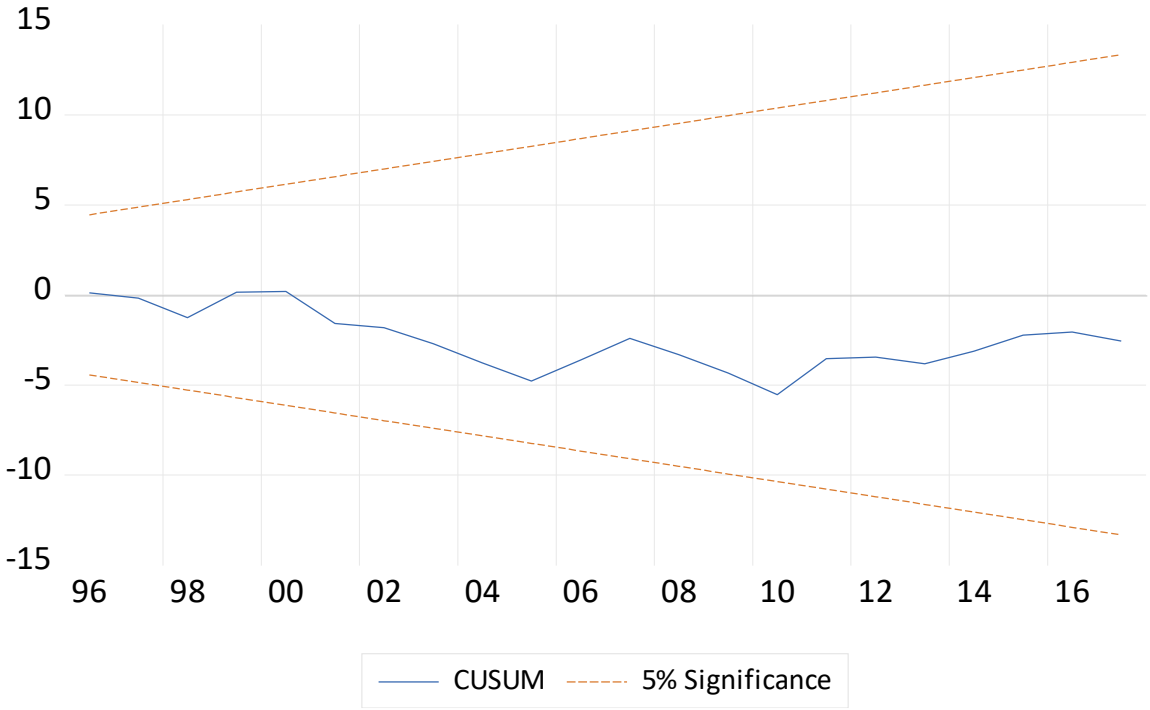
Year	FDI inflow	Rescaled FDI	DI	MVA	lnfdi	lndi	lnmva
1975	22110000	50810001	152581616.1	75133132.67	17.74360376	18.8432102	18.1347722
1976	9700000	38400001	148192771.1	75355969.33	17.46356804	18.81402449	18.1377337
1977	5537539.587	34237540.59	178978845.9	88935651.79	17.34883328	19.00277818	18.30342365
1978	9125979.115	37825980.12	292876614.9	100509659.8	17.44850673	19.49526197	18.4257644
1979	-1224173.136	27475827.86	283878075.7	151196474.5	17.12881719	19.46405539	18.8340907
1980	9481641.542	38181642.54	274719862.1	151706809.5	17.4578654	19.43126245	18.83746033
1981	1116945.186	29816946.19	187423210.1	156903719.4	17.21058745	19.04887977	18.87114292
1982	6000000	34700001	172145902.4	145129038.4	17.36225027	18.96385295	18.79313382
1983	2553705.855	31253706.85	167943479.7	158229571	17.25764855	18.93913805	18.87955752
1984	27290000	55990001	157563322.5	149310103.3	17.84068368	18.87533798	18.82153593
1985	523530.7692	29223531.77	150951079.1	145397708.1	17.19048483	18.83246636	18.79498336
1986	-2930000	25770001	144753103	157156842.7	17.06472162	18.79054011	18.87275486
1987	90549.2605	28790550.26	182052791.2	174629284.2	17.17555778	19.01980726	18.97817591
1988	17440000	46140001	250068324.7	189297310	17.64719083	19.33724474	19.05882941
1989	9290000	37990001	322014857.8	249887878.2	17.45283355	19.59010824	19.33652289
1990	23300000	52000001	378371321.8	313137161.5	17.7667543	19.7513866	19.56215187
1991	-28700000	1	374558556	359050975.6	0	19.74125871	19.69897493
1992	-7100000	21600001	308772541.8	342788638.2	16.88820392	19.54811545	19.6526246
1993	8000000	36700001	268715363	296974016.5	17.41828734	19.40916325	19.50915521
1994	24992617.89	53692618.89	316411794.3	183136864.2	17.7987861	19.57255507	19.02574432
1995	5643045.579	34343046.58	207061771.7	195401080.9	17.35191013	19.14852772	19.09056483

1996	15797661.13	44497662.13	222394160.1	295427024.2	17.61094721	19.21996186	19.50393241
1997	14868714.36	43568715.36	248091916.9	335533391.7	17.58984991	19.32930987	19.63123204
1998	12104230.4	40804231.4	194246071.3	215548034.1	17.52429634	19.08463632	19.18869434
1999	58528206.28	87228207.28	223881689.2	216079372.9	18.28403831	19.2266283	19.19115637
2000	25999996.36	54699997.36	214836674.9	202550868.4	17.81737422	19.18538865	19.12650162
2001	19299991.09	47999992.09	236862071	180129697.4	17.6867114	19.28298855	19.00918769
2002	5899999.359	34600000.36	360403112.5	433073474.9	17.35936425	19.70273372	19.88641796
2003	65885630.02	94585631.02	342791902.9	433252570.5	18.36501613	19.65263412	19.88683142
2004	107811374	136511375	425835361.1	391984475.5	18.7319185	19.86956335	19.78673279
2005	139696707.4	168396708.4	555989231.5	375905673.2	18.94183311	20.13625948	19.7448488
2006	35561531.63	64261532.63	708419384.8	495913160.8	17.97847176	20.37854683	20.02191139
2007	124388838.7	153088839.7	939564598.6	618359313.9	18.84652896	20.66092713	20.24258026
2008	195424461.1	224124462.1	1145828196	623531998.7	19.22771209	20.85939353	20.25091064
2009	49130854.84	77830855.84	1396655606	642557851.7	18.17004852	21.05734636	20.28096741
2010	97010028.45	125710029.4	1462593383	689691514.3	18.64948846	21.10347699	20.35175497
2011	812753754.6	841453755.6	849379220.6	805963907.7	20.55064162	20.56001631	20.50754952
2012	-8886001.78	19813999.22	726396952.7	557880357.4	16.80189928	20.40360719	20.13965508
2013	451360605.7	480060606.7	701033513.9	527825596.5	19.98942292	20.36806625	20.08427648
2014	598087746.6	626787747.6	724864314.3	577551224.8	20.25611852	20.40149504	20.1743077
2015	516092796.5	544792797.5	778910112.3	611908131.6	20.11591609	20.47340621	20.23209272
2016	325632351	354332352	585696930.5	517164939.7	19.68574588	20.18831303	20.06387241
2017	277112167.4	305812168.4	846672085.7	590359611	19.53848164	20.55682403	20.19624242

Appendix 2: ARDL model stability test results



Appendix 3: ECM model stability test results



Appendix 4: ARDL equation serial correlation test results

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	2.549436	Prob. F(2,21)	0.1020
Obs*R-squared	7.033232	Prob. Chi-Square(2)	0.0297

Appendix 5: ECM equation serial correlation test results

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.873048	Prob. F(2,20)	0.1796
Obs*R-squared	5.521470	Prob. Chi-Square(2)	0.0632

Appendix 6: VAR Model Serial correlation test results

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	12.66188	9	0.1785	1.475407	(9, 56.1)	0.1797
2	9.921106	9	0.3569	1.128958	(9, 56.1)	0.3583

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	12.66188	9	0.1785	1.475407	(9, 56.1)	0.1797
2	25.11511	18	0.1218	1.493488	(18, 57.1)	0.1267

Appendix 7: ARDL equation heteroscedasticity test results

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.262214	Prob. F(12,23)	0.3037
Obs*R-squared	14.29425	Prob. Chi-Square(12)	0.2823
Scaled explained SS	5.254022	Prob. Chi-Square(12)	0.9490

Appendix 8 : ECM equation heteroscedasticity test results

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.581466	Prob. F(13,21)	0.8421
Obs*R-squared	9.263860	Prob. Chi-Square(13)	0.7527
Scaled explained SS	2.532759	Prob. Chi-Square(13)	0.9992

Appendix 9: VAR Model heteroscedasticity test results

Joint test:

Chi-sq	df	Prob.
48.49437	72	0.9849

Individual components:

Dependent	R-squared	F(12,22)	Prob.	Chi-sq(12)	Prob.
res1*res1	0.116121	0.240857	0.9930	4.064229	0.9822
res2*res2	0.123994	0.259498	0.9904	4.339775	0.9765
res3*res3	0.157774	0.343438	0.9704	5.522094	0.9382
res2*res1	0.126339	0.265116	0.9895	4.421872	0.9746
res3*res1	0.137759	0.292909	0.9841	4.821569	0.9637
res3*res2	0.115785	0.240070	0.9931	4.052488	0.9825

Appendix 60: Akaike information criteria for the top 20 ARDL models