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Ibrahim, Tomilayo

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THE DISTRIBUTIONAL IMPACT OF FOREGIN DIRECT INVESTMENT AT THE LOCAL MUNICIPAL LEVEL IN SOUTH AFRICA

Presented By:
TOMILAYO IBRAHIM
Student No:2009760

A thesis submitted to the School of Economics and Finance, Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the Degree of Doctor of Philosophy in Economics.

SUPERVISORS:

Primary Supervisor: Professor Umakrishnan Kollamparambil

Co-Supervisor: Professor Ronald Wall

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Dedication

This research is dedicated to my late father, Dr Samson Adebolu Adegbite who passed away before the completion of the study.

Declaration

I, Tomilayo Ibrahim declare that this thesis is my own original work, where someone else work was used, due acknowledgement has been given. It is submitted for the award of the degree Doctor of Philosophy in Economics, University of the Witwatersrand, Johannesburg. It has not been submitted either in part or in full to this or any other university, for another degree or examination.

ABSTRACT

In recent years, Foreign Direct Investment (FDI) has increased substantially and has spurred the interest of researchers to determine its impact on developing economies. Studies have examined its impact on a wide array of factors including growth, poverty, and inequality. A review of empirical literature on FDI in South Africa revealed that studies did not consider the importance of the spatial interaction effect across local municipalities on FDI inflow. Hence, the study examined the distributional impact of FDI on poverty, income inequality and domestic investment in municipalities at local level in South Africa for the period 2000-2016. It employed Fixed Effects (FE) as the diagnostic tool and the baseline for comparing spatial models. Furthermore, it contributes to empirical research by using spatial regression estimations to account for spatial interactions effect across local municipalities.

Several key findings were discovered from the study. First, it finds that FDI contributes significantly to reducing poverty in local municipalities in South Africa. The study also observed the presence of spatial interactions across local municipalities when examining the impact of FDI on poverty. This indicates that FDI inflow in local municipality 'i" contributes to poverty reduction in neighbouring municipalities. Second, there was no evidence of FDI impacting income inequality in municipalities at the local level. The study also finds that higher income level provinces such as Gauteng are associated with higher levels of income inequality. Lastly, the study suggests that FDI has no relationship with domestic investment at local municipal level in South Africa. This is because FDI is mainly natural-resource based and present in local regions while domestic investment is market-based and present in the urban regions of South Africa. As a result, the study also found no spatial correlation between FDI and domestic investment.

The findings of the study has significant policy implications. In order to further reduce poverty in local municipalities, policies to stimulate equal distribution of FDI across regions should be encouraged. Each municipality need to identify their local advantage to attract FDI, therefore, policy initiatives to discover and develop them would be beneficial in attracting more foreign investment. Likewise, backward, and forward linkage should be encouraged to ensure that foreign investors source their inputs locally and engage business owners in advertising and marketing their finished goods.

Keywords: FDI, poverty, income inequality, domestic investment, local municipalities, spatial analysis, regional study, South Africa.

Table of Contents

Acknowledgements 2
Dedication 3
Declaration 4
ABSTRACT 5
CHAPTER ONE 10
Introduction 10
1.1 Background 10
1.2 Overall Framework 13
1.3 Spatial Inequality in South Africa: An Overview 15
1.4 Objectives 16
1.5 Data 16
1.6 Research Significance 17
1.7 Structure of the Thesis 18
CHAPTER TWO 19
The Impact of Foreign Direct Investment on Poverty at Local Municipal Level in South Africa 19
2.1 Introduction 19
2.2 Theoretical and Empirical Literature Review 21
2.2.1 The Theoretical Links between FDI and Poverty 21
2.2.2 Empirical Review of FDI on Poverty 23
2.2.3 Spatial Approach to FDI and Poverty 24
2.3 Methodology 26
2.3.1 Model Specification ..... **Error! Bookmark not defined.**
2.3.2 Econometric Framework 27
2.3.3 Static Panel Data Estimation Techniques 27
2.3.4 Spatial Models 28
2.4 Data Sources and Variables Descriptions 31
2.4.1 Data Sources 31
2.4.2 Variable Descriptions 32
2.5 Empirical Analysis 35
2.5.1 Descriptive Statistics of key variables 35
2.5.2 Preliminary Analysis 39
2.6 Regression Results and Discussions 43
2.6.1 Results Estimations 43

2.7 Study Limitations 50
2.8 Conclusion and Recommendations 50
The Impact of FDI on Income Inequality at Local Municipal Level in South Africa. 52
3.1 Introduction 53
3.2 Theoretical and Empirical Literature Review 56
3.2.1 Income Inequality in South Africa: An Overview 56
3.2.2 Theoretical Perspective to the causation between FDI and Income Inequality 58
3.2.3 Empirical Review of FDI and Income Inequality 60
3.2.4 Empirical Evidence of FDI and Regional Income Inequality 62
3.3 Methodology 63
3.3.1 Model Specification 63
3.3.2 Econometric Framework 64
3.4 Data Sources and Variable Descriptions 67
3.4.1 Data Sources 67
3.4.2 Variable Descriptions 68
3.5 Empirical Analysis 71
3.5.1 Descriptive Statistics of Key Variables 71
3.5.2 Preliminary Analysis 75
3.6 Regression Results and Discussion 78
3.7 Study Limitations 85
3.8 Conclusions and Recommendations 85
CHAPTER FOUR 88
The Impact of Foreign Direct Investment on Domestic Investment at Local Municipal Level in South Africa. 88
4.1 Introduction 88
4.2 Theoretical and Empirical Literature Review 91
4.2.1 The Crowding-in Effect 91
4.2.2 The Crowding-out Effect 93
4.2.3 The Mixed Effect 95
4.3 Methodology 99
4.3.1 Theoretical Framework 99
4.3.2 Empirical Model Specification 101
4.4 Data Sources and Variables Descriptions 102
4.4.1 Data Sources 102
4.4.2 Variable Definitions and Expected Signs 103

4.5 Empirical Analysis 105
4.5.1 Descriptive Statistics 105
4.5.2 Preliminary Analysis 109
4.6 Regression Results and Discussions 111
4.7 Study Limitations 115
4.8 Conclusion and Policy Recommendations 115
CHAPTER FIVE 118
Summary, Conclusions and Suggestions for Further Research 118
5.1 Introduction 118
5.2 Summary, Key Findings and Conclusions 118
5.3 Policy Implications and Recommendations of the Study 120
5.4 Study Limitations and Suggestions for Further Research 122
REFERENCES 123

List of Tables

Table 2. 1 Summary Statistics of Variables 35
Table 2. 2 Average FDI Inflow 36
Table 2. 3 Average Poverty Rates 37
Table 2. 4 Average Employment Rates 37
Table 2. 5 Top 10 Local Municipalities receiving FDI 38
Table 2. 6 Fixed and Random Effect Results on poverty 44
Table 2. 7 Result for Spatial Models 45
Table 2. 8 Result for cumulative (direct, indirect, and total) spatial models on Poverty 46
Table 3. 1 Summary Statistics of Variable 71
Table 3. 2 Average FDI Inflow 72
Table 3. 3 Average Gini Coefficient 73
Table 3. 4 Average GDP per capita 74
Table 3. 5 Fixed and Random Effect Results on Income Inequality 78
Table 3. 6 Spatial results on income inequality 79
Table 3. 7 Result for Cumulative (direct, indirect, and total) Spatial Models on 80
Table 4. 1 Summary of selected empirical literatures 97
Table 4. 2 Summary Statistics of Variables 105
Table 4. 3 Average FDI Inflow 106
Table 4. 4 Average Domestic Investment 106

Table 4. 5 Top 10 Local Municipalities receiving FDI 107
Table 4. 6 Top 10 Local Municipalities receiving domestic investment.....108
Table 4. 7 Fixed Effects and Random Effects Results on Domestic Investment 111
Table 4. 8 One and two-step system GMM results on domestic investment.....112

List of Figures

Figure 2.1 Nights Light in municipalities at local level in South Africa. 40
Figure 2.2 Pattern of FDI Inflow across Local Municipalities, 2010-2014…… 40
Figure 2.3 Poverty Rate……42
Figure 2.4 Employment Rate……42
Figure 3. 1 Night lights……... 76
Figure 3.2 Pattern of FDI Inflow ……76
Figure 3.3 Pattern of income inequality ..……77
Figure 4. 1 Night Light Imagery……...109
Figure 4.2 FDI Inflow……. 110
Figure 4.3 Domestic Investment……... 110

CHAPTER ONE

Introduction

1.1 Background

Substantial increase in FDI over the years particularly in emerging economies has spurred increasing research interest especially in international and development economics (Asafo-Adjei, 2007; Opoku et al., 2019). This is because FDI is viewed as the main determinant of economic growth in emerging economies. Before then, international commercial banks loaned money to developing countries, but after the folding up of banks due to debt crises, emerging economies were forced to adjust country policies to attract other forms of capital inflows (Bussiere et al., 2018). FDI appeared to be more beneficial because it does not involve any form of risk associated with loans (Demirhan and Masca, 2008). Also, it is said to be a more efficient alternative to augment limited domestic financial resources (Opoku et al., 2019; Lipsey, 1999; Okada and Samreth, 2014). It is an important tool for production level integration of many economies into global world because it contributes to managerial and technological skills of the host economy (UNCTAD, 1996). To add to this, it accounts for over 200 percent of financial development aid to emerging economies, making it a potent source of finance (Kosova, 2010).

Asides other benefits of FDI such as contributing to insufficient domestic financial resources, creating employment opportunities, increasing capital stock, technology spillovers, knowledge, and managerial skill transfers etc. (Borensztein, 1998; Kemeny, 2010; Tang and Tan, 2018; Jude, 2019), one major reason behind attracting FDI is the likelihood of new technology spillover which improves the efficiency of local firms in the host economy (Gorg and Stobl, 2005; Shah et al., 2020). This is viewed as an opportunity for emerging economies to meet up with the industrialized world (Jude, 2019). In other words, MNCs are believed to possess some firm-specific assets and by attracting FDI, the host economy expects that some if not all of these assets are transferred to local firms. This is expected to improve their productivity, develop skills, and increase their overall performance.

However, FDI has been observed to also have negative impacts on host economies. As highlighted in Carkovic and Levine, (2002), FDI's impact on developing economies is dependent on their desperation for foreign investment in a bid to address socioeconomic challenges such as poverty, unemployment etc. thereby giving MNCs the opportunity to exploit the host economies. These findings are grounded on the dependency theory which argues that

FDI is associated with social control and exploitation which contributes to widening inequality gap in host countries (Pan-long, 1995; Mihaylova, 2015). In addition, Herzer and Klasen (2008) argue that it can also negatively impact the host economy if: first, fierce competition between MNCs and domestic enterprises leads to the crowding out of the latter. Second, foreign firms decide to buy their production inputs from international suppliers instead of sourcing locally (Herzer and Klasen, 2008). In addition, the expatriation of profit by MNCs have a negative effect on the host country's balance of payment (Herzer and Klasen, 2008). Although various studies have asserted that FDI enhances economic growth, improves the citizen's welfare, and creates employment opportunities in the host economy (Ndikumana and Verick, 2008; De Mello, 1999; Chen and Chang, 1995; Aaron and Hadjimicheal, 2002; Gohou and Soumare, 2012). However, there are concerns that FDI also widens inequality gap in emerging economies (Cornia and Lipumba, 1999; Herzer and Nunnenkamp, 2012; Feenstra and Hanson, 1997). Despite the advances in research, literature is still unclear as to the significance of its impact on income inequality in host economy.

Over the years, socioeconomic challenges such as unemployment, poverty and inequality has posed a challenge to growth in South Africa (Woolard, 2002). In spite of efforts made to eradicate these issues, it remained a dominant challenge to South Africa's growth after apartheid regime ended in 1994 (Adams, 2009; Malindi, 2017). The inequality rate in South Africa led to its categorization as a country with higher rates of inequality in the world (StatSA, 2020).

As highlighted by Masipa, (2018), in an attempt to address these underlying issues, the government introduced various policies targeted at unemployment and inequality such as Growth, Employment and Redistribution (GEAR), this was formulated in 1996 to limit the restrictions on foreign direct investment inflows. Likewise, the National Development Plan (NDP) to eradicate poverty and inequality. The most recent launch is the Sustainable Development Goals (SDG 2030) which was adopted in 2015 by 193 countries, South Africa inclusive. Included in these policies is the main aim of attracting FDI inflows to increase employment opportunities, eradicate poverty, and enhance an inclusive and sustainable economic growth for all (Tshepo, 2014; Masipa, 2018).

FDI is indeed necessary to augment local investment in South Africa due to low level of savings and investment rates mostly associated with African economies (Ting and Kollamparambil, 2015). Therefore, to accelerate growth, foreign investment is required (Fedderke and Romm, 2004). Various studies examined the impact of FDI in South Africa and proven its effect to be beneficial to the economy (Tshepo, 2014; Malindini, 2018). This is because foreign investment

enhances domestic investment, creates employment opporunities, promotes technology transfer, and alleviates economic challenges such as poverty, unemployment, and income inequality (Xolani, 2011; Kinda, 2010). Furthermore, Tshepo (2014) analyzed effects of FDI on growth and employment which revealed that FDI positively impacts employment in South Africa. Malindini (2018) discovered that FDI might eventually eradicate income inequality if the government provides more incentives to enhance the inflow of Multinational Corporations (MNCs) who can provide more employment opportunities to semi-skilled workers. This implies that foreign investment can be beneficial to the host country if the right policies are implemented. In addition, Magombeyi and Odhiambo (2017) analyzed the effect of FDI on poverty in South Africa, the study showed that FDI has a negative correlation with poverty in the long run.

It is important to emphasize the mechanism through which FDI affects domestic investment, poverty, and inequality in developing economies. This is through the productivity effect of the backward and forward linkages. As argued by Suyanto and Sugiarti, (2018); FDI can increase productivity levels of domestic investment. This is achieved when the presence of MNCs in the same industry as domestic investment force the latter to increase productivity levels as a result of a strive for survival due to fierce competition from MNCs. Also, the inflow of FDI in a different industry can also increase productivity levels of local investment in another industry if MNCs agree to source the raw material input used in their production process locally (Aaron, 1999; Gorg and Greenway, 2014). This is known as the backward linkage effect. The forward linkage effect occurs when MNCs engage domestic firms in the marketing and distribution of their final products. By increasing productivity levels, more job opportunities are created thereby increasing employment rates and living standards and reducing poverty levels across the country. This indirectly results in the redistribution of income thereby tightening income inequality gaps in countries such as South Africa.

Regional development has been gaining more grounds in empirical research due to its ability to increase inclusive growth and development in emerging economies (Iammarino, 2018). Hence, the need for a regional study is crucial to the growth of an economy like South Africa due to high levels of inequality across provinces and local municipalities (Todes and Turok, 2017). South Africa is identified as an economy with high rates of inequality based on the impact of the apartheid regime where the black race was segregated and marginalized (Woolard, 2002). This led to the concentration of the black Africans in certain underdeveloped regions in the economy. Although a new era of democracy has occurred, however, the lasting effect of apartheid remains, hence noticeable high levels of spatial inequality in the economy

(Leibbrandt, 2012; Turok, 2017). Therefore, a sub-national study is needed for the development of the underdeveloped regions in South Africa. This type of study will assist policy makers in implementing policies that encourage forward and backward linkage effect of FDI which will facilitate inclusive growth and enhance overall economic growth, where every region in South Africa contributes and benefits.

Based on this backdrop, this study attempts to analyze the impact of FDI on poverty, income inequality and domestic investment at local municipal level in South Africa. Although several studies have explored the effect of FDI in South Africa, however, these studies were explored at national level (Fedderke and Romm, 2004; Mazenda, 2014; Tshepo, 2014; Magombeyi and Odhiambo, 2017; Nchoe, 2016). Understanding the effect of foreign investment inflow at a sub-national level is crucial to enhancing inclusive and sustainable economic growth in South Africa. Also, a sub-national study is needed given the high levels of spatial inequalities as well as accounting for the importance of spatial interactions across local municipalities in South Africa (Naude and Krugell, 2006; Todes and Turok, 2017).

Following the discussion above, this study attempts to answer the following research questions:

1. What is the effect of FDI on poverty at the local municipal level in South Africa?
2. Does FDI contribute to income inequality at the local municipal level in South Africa?
3. What is the impact of FDI on domestic investment at the local municipal level in South Africa?

1.2 Overall Framework

This study is grounded in the New Economic Geography (NEG) theory postulated by Krugman (1991). The theory is adopted to explain spatial disparities across local municipalities in South Africa. It stated that several economic activities are majorly concentrated in a geographical location. This theory provides a general equilibrium approach in which spatial disparities may or may not occur depending on various forces. It is the first theory that critically explains the reasons behind lagging economic development across regions, like the endogenous growth theory, it employed the use of increasing returns and spillovers (Krugman, 1991). Based on this theory, several factors give reasons to why economic activities concentrate in fewer areas. One major factor of spatial disparities in economic concentration is the increasing returns to scale. A large market concentration is said to establish two linkages namely the backward and forward linkage effects. The former explains the easy access to suppliers of production inputs while the latter explains the accessibility to distributors and consumers. Also, a large concentration also supports a thick local labour market where employers find it easier to locate

employees and vice versa. In addition to this, they also enjoy the benefit of external economies of scale which includes technology and knowledge spillover.

Another factor that contributes to spatial inequality is transport costs. This was explained using the "iceberg transport costs" postulated by Samuelson (1952) where only a fraction of the goods shipped from one region to another arrives the destination and the 'lost in transit' fraction is the cost paid for shipment. As a result, the value of the shipment cost determines firm's decision to either concentrate in one region and sell to other regions by transport or set up a duplicate firm in other regions. According to the NEG theory therefore, increasing returns and transport costs are determinants of agglomeration and dominance of economic activities in a region.

Spatial disparities in the South African context are characterized by concentration of economic activities in some locations. In 2011, only three provinces (Kwazulu-Natal, Gauteng, and Western Cape) contributed 65% to the growth of the economy while only three local municipalities (City of Johannesburg, Ethekwini, and City of Cape Town) contributed 35% to the growth of the economy. In addition, population is more concentrated in these areas. As of 2011, Gauteng and Western Cape provinces comprised of 35% of the economy's population (David et al., 2018). Concentration of economic activities in fewer areas is determined by several factors. History and initial conditions are major determinants of spatial disparity in population and economic activities in the country (Wilson, 2011). The development of urban centers like Cape Town and Durban is attributed to their trading port activities, while Johannesburg and Pretoria's initial development is attributed to the mineral discovery such as gold and diamonds in past years (Krugell and Naude, 2005; Wilson, 2011).

During the apartheid regime, black people were cut off urban land and had no access to land or properties outside homelands in a bid to marginalize the black Africans socio-economically. Their housing was situated on the periphery areas and their access to cities was restricted. In a bid to limit their movement in developed areas, a transport system was designed which brought them back and forth their workplaces in the urban areas daily (State of African Cities Report, 2016). Even though in recent times, their living conditions has improved due to the public sector investment in low-income housing, public transport facilities etc. This investment has not revealed a more equitable and integrated cities. This is because the location of the low-income housing further segregates the urban poor (State of the African Cities Report, 2016).

Taking the NEG approach into consideration, FDI location decision is determined by location-unique characteristics such as local markets, labor cost, infrastructural facilities, accessibility to neighboring markets. MNCs are attracted to locations with higher productivity levels, and

this is because such locations imply a smooth running of production activities and greater demand for output (Blanc-Brude et al., 2014). Foreign investment entry is anticipated to positively impact domestic investment through backward and forward linkage effect, which in turn increases employment level, reduces poverty, and tightens the income gap.

1.3 Spatial Inequality in South Africa: An Overview

The spatial structure of an economy plays a vital role in determining its equal distribution of income (Turok, 2018). Dense settlements enhance inclusive growth and social integration while dispersed settlements lead to exclusion from opportunities, developments and creates a social segregation amongst the indigenes of a country (Naude and Krugell, 2003; Turok, 2018). As highlighted by Kaulihowa and Adjasi, (2017), spatial inequalities destabilize inclusive economic growth and development in emerging economies. It leads to inefficient allocation of resources, and high dependency ratios. Therefore, addressing the issue of spatial inequality is crucial to efficient distribution of wealth in South Africa.

South Africa is considered as one of the highest unequal economies with uneven development (Turok, 2018; Malindini, 2018). This is observed in the spatial structure of the economy as well as the rural-urban divides that occur as a result of consistent migration of its people from the smaller regions to the urban metropolitan regions (Naude et al., 2002; Naude and Krugell, 2003). As highlighted by Turok, (2018), the urban areas are characterized by exclusive large cities and towns with business precincts and social amenities and contrasted by overcrowded townships and shack settlements. In the rural areas, poverty is evident in the remote villages with the lack of access to social amenities such as good roads, piped water, standardized houses, and superior school structures. This clearly explains the high level of inequality in the country. Poor communities are segregated and have no stake in the development of the economy. This type of spatial divides results in inefficiencies, barriers to trade interactions, and wasted productive potential (David et al., 2018; Wilson, 2011; Turok, 2018).

The historical and initial conditions in South Africa are determinants of spatial divisions among population and economic activities (Todes and Turok, 2017). The colonial and apartheid segregation policies such as the Native Land Act of 1913 which deprived black Africans of the right to own a land resulting in their confinement to only 13% of the land (Woolard, 2002). The Group Area Act of 1950 led to forceful suburban segregation. The population was classified by race, as a result, the blacks were forcefully removed and situated in rural areas such as homelands as well as townships in large cities and towns (Todes and Turok, 2017; David et al., 2018).

As argued by Wilson, (2011), although these policies were revoked in 1987, however, the long-term effect is evident in the dense settlement in rural areas, the homelands, and townships. The black Africans are still residing in such living standard conditions due to the restrictions on migrations and forceful removals during the colonialism and apartheid regime (Wilson, 2011). The urban areas are characterized with superior economic amenities such as access to better education, better living standards, access to reliable electricity and piped water, standardized infrastructural facilities (Turok, 2018; Wilson, 2011). All these have a positive impact on the living conditions and chances to succeed in life. Woolard (2002) also highlighted that the rural areas on the other hand, are characterized with inferior infrastructural facilities such as lesser livelihood opportunities, lack of access to good health care, poor living standards, lack of access to superior education standard. The highlighted challenges place a limitation on the potentials of the rural population and hinders them from contributing to the growth of the economy. Also, it results in social insecurity, crime, untimely death, and avoidable health hazards (Woolard, 2002; Todes and Turok, 2017; Naude and Krugell, 2006; Wilson, 2011).
The issue of spatial division in South Africa therefore needs to be addressed. Eliminating spatial inequality across regions in the economy can enhance inclusive growth and development enjoyable by all. This study therefore examines the importance of spatial interactions across local municipalities in South Africa using spatial models.

1.4 Objectives

This study aims at ascertaining the distributional impacts of FDI in municipalities at local level in South Africa. Specific objectives are:

1. To determine the impact of FDI on poverty in municipalities at local level in South Africa.
2. To analyze the impact of FDI on income inequality in municipalities at local level in South Africa.
3. To examine the impact of FDI on domestic investment in municipalities at local level in South Africa.

1.5 Data

This thesis used data from Quantec Survey (Easydata), fDi Markets database and the HIS Markit Regional explorer. Since the thesis is conducted on a sub-national level, it employed local municipality data for the period 2000-2016. Although the dataset is based on the 2011

local municipal boundaries, however, all datasets were geocoded. This was done to ensure that they were joined with the most recent municipal shapefile that was adjusted in 2016. The details of the datasets employed in each study are explicitly explained in the chapters following.

1.6 Research Significance

The persistent inequality in regional economic development has been a long-time challenge particularly in developing economies which led to the emergence of regional economic development (Iammarino, 2018). In other words, global economies are decentralizing power and functions and giving more important roles to local governments (Jansen et al., 2007). In South Africa, high regional inequalities remain a challenge even after the post-apartheid regime (Wilson, 2011). As pointed out by David et al., (2018), although the government made significant efforts to reduce poverty and inequalities by adopting various approaches such as the provision of social grants and basic amenities to the vulnerable in the rural areas, the development of Spatial Development Initiatives (SDIs) with the aim of addressing spatial disparities across regions, and the development of the Local Government Transition Act (LGTA) which was launched in 1993 and completed in 2000 with the major aim of rectifying the errors of apartheid by closing the wide inequality gap and promoting inclusive growth in South Africa (Jansen et al., 2007; David et al., 2018).

Decentralization is said to be a powerful determinant in the achievement of development goals (World Bank, 2000). This is because it enhances overall development by placing importance on the role of local communities ensuring that they have a say in the decision-making process of their development (World Bank, 2000). It is therefore important to examine effects of FDI at sub-national level because it gives a critical insight into regions that are lacking and enables national and regional policy makers to investigate ways and measures to attract foreign investment into these regions to achieve inclusive economic growth that is beneficial to all. To the best of our understanding, little or no studies have analyzed this at a sub-national level. Hence, it adds to empirical literature by providing an insight on the impact of FDI at regional level.

Studies on the importance of spatial interactions across regions are limited in South Africa (David et al., 2018). Spatial analysis has proven to be the best tool in regional studies since it captures spatial interaction effects across regions (Anselin, 2003). In carrying out a regional study effectively, the spatial analysis tools are more effective in highlighting spatial correlation across regions which will enable policy makers to implement policies to further encourage spatial interactions across regions based on the benefits. For instance, foreign investment

inflow in region "i" is not only advantageous to region 'i" but also surrounding regions. FDI in one region can increase employment opportunities and eradicate poverty in another. Hence the need for spatial tools. This study therefore contributes to existing literature by analyzing the impact of FDI on socio-economic challenges in South Africa at the local municipal level using spatial analysis.

1.7 Structure of the Thesis

This PhD thesis is a compilation of three essays that focuses on distributional impact of FDI on municipalities at local level using spatial analysis. The thesis comprises of five chapters with chapter one focusing on the general background and introduction, overall framework, research questions, study objectives and justification of the study.

The first essay of the thesis is presented in chapter two. It examines the impact of FDI on poverty at the local municipal level in South Africa using random effects, and spatial models such as Spatial Autoregressive (SAR), the Spatial Lagged X model (SLX), and Spatial Durbin Model (SDM). The chapter attempts to answer the question of whether FDI contributes to poverty reduction in South African local municipalities. In addition, it seeks to answer whether spatial interaction exists across local municipalities.

Chapter three evaluates the impact of FDI on income inequality at the local municipalities using fixed effects, and spatial models. It answers the question as to whether FDI contributes to income inequality. The third paper in chapter four explores the impact of FDI on domestic investment at local municipal level in South Africa. It employs the use of fixed effects, one and two-step system GMM. This chapter fulfills the objective of examining the impact of FDI on domestic investment at local municipality level. Chapter five being the last and final chapter concludes the thesis by providing a summary of the results and synthesizes all conclusions.

CHAPTER TWO

The Impact of Foreign Direct Investment on Poverty at Local Municipal Level in South Africa

2.1 Introduction

As the struggle to break the cycle of poverty in African economies continues, the United Nations developed a post-MDG agenda. The Sustainable Developmental Goals (SDGs) was developed in 2015 with the main aim of improving human capital development and eradicating poverty in emerging economies by 2030 (United Nations, 2015). As highlighted in their SDG report of 2015, achieving the SDGs requires a substantial amount of capital which is a great challenge to many African economies as a result of the wide gap between local savings and investment requirement. African leaders are consistently seeking solutions both nationally and internationally to achieve the SDGs. As a result, FDI is seen as a crucial determinant in achieving this goal (Magombeyi and Odhiambo, 2017). This is because it is said to enhance economic development in several ways such as creating job opportunities, reducing poverty, transferring knowledge and technology from home country to the host country (Fedderke and Romm, 2006; Li and Tanna, 2019).

The South African government has also attempted to find solutions to the persistent poverty challenge which came about because of its history of deprivation and exclusion of the majority of its people (Stats SA, 2019). The government has made efforts to eradicate poverty by being actively involved in programs such as Millennium Development Goals (MDGs 2015), Sustainable Development Goals (SDGs 2030), National Development Plan (NDP 2030). These programs are aimed at opening the economy to foreign investors in other to stimulate economic growth and development (World Bank, 2018; Makhoba, 2018; United Nations, 2017).

There is mixed evidence in literature that FDI increases productivity, introduces new processes, transfers technology, increases employment opportunities, while eradicating socio-economic challenges such as poverty and income inequality (Huang and Ren, 2013; Chinyelu, 2014; Tshepo, 2014). In addition, it is said to impact the economy in two ways: direct effects through employment as well as income generation and indirect effect through the forward and backward linkage effect as well as technology transfer and spillover effects resulting in the development of both skilled and unskilled workers (Aaron, 1999).

However, FDI can also be detrimental to emerging economies (Jenkins, 2006; Onimisi, 2014). Therefore, the type of FDI inflow as well as its mode of entry, determines its impact on the economy. Brownfield FDI is said to possibly reduce employment since it involves the

acquisition of local investment (Onimisi, 2014). In other words, it involves either merging or acquiring of local investment which does not necessarily impact employment or reduce poverty in the host economy. In addition, Jenkins (2006) pointed out that capital intensive investment also reduces employment through the substitution of labour. The study argued that the use of capital- instead of labour-intensive technologies by Multi-National Corporations (henceforth referred to as MNCs) results in reduced employment opportunities thereby leading to increased poverty. Furthermore, FDI inflow does not create employment opportunities when the resources used in the production process by MNCs are sourced outside the host economy. This is because outsourcing outside of the country within larger global supply chains reduces opportunities for local firms specialized in that production area. This thereby reduces employment opportunities that might have arisen through indirect effect of FDI which leads to higher poverty rate. Likewise, the introduction of capital technologies as a result of the presence of MNCs results in an increased demand for skilled labour thereby resulting in increased inequality gap between skilled and unskilled labour (Figini and Gorg, 1998; Jenkins, 2006). Due to data availability, this study therefore restricted its analysis to employing only greenfield FDI to evaluate the impact of FDI on poverty in South Africa.

The uniqueness of this research is to examine the impact of FDI on poverty at local municipality level. This study takes into consideration the spatial interactions across local municipalities in South Africa. Although extant studies have analyzed the effect of FDI at the regional level in other countries, however, majority focused on the location-decision and the determinants of FDI (Ledyaeva, 2009; Blanc-Brude et al., 2014). In addition, this study contributes to existing literature by using spatial regression techniques to analyze the importance of spatial interactions when examining the impact of FDI on poverty. This is because econometric techniques ignoring spatial effects in empirical studies may lead to biased results (Chua, 1993; David et al., 2018).

In the South African context, various studies have examined impact of foreign investment on various socioeconomic indicators (Fedderke and Romm, 2004; Tshepo, 2014; Makhoba, 2018; Magombeyi and Odhiambo, 2017). However, they are limited by the fact that they do not consider effects of spatial interactions across regions. Evaluating the importance of spatial correlation in FDI studies to fully understand its impact on emerging economies is important.

Regional economic development has gained increasing attention in recent years because of increasing spatial inequality across regions (Iammarino, 2018). The regional characteristics are expected to drive FDI behaviour, and therefore aggregating information at a macro level leads to loss of information (Chua, 1993). In other words, each region is imbibed with a unique

natural advantage and its growth is dependent on its location-specific characteristics. The pattern of regional distribution of FDI has a significant impact on spatial dimensions of national poverty. Hence, understanding FDI at a regional level is crucial in South African context.

In addition, several studies have shown that FDI is not equally distributed across regions of host economy (Fedderke and Romm, 2004; Dunstan et al., 2018). Therefore, any attempt to conduct a macroeconomic study may lead to biased results because of high level of household poverty located majorly in rural municipalities in South Africa. This study employed spatial analysis regression model because "everything is related to everything else but near things are more related than distant things" (Tobler, 1970; Dunstan et al., 2018; David et al., 2018). Since spatial dependency exists between municipalities then spatial spillover is expected to occur. For instance, the presence of FDI in local municipality "i" will lead to workers migrating from neighbouring municipalities in search of better-paying jobs. This will increase employment rate and reduce poverty in local municipality 'i' and neighbouring municipalities as well. This study intends to guide policymakers to implement policies that will significantly reduce poverty at local municipal level.

The rest of the paper is structured as follows: the next section (2) reviews some of the important literature reviewing FDI and poverty followed by a review of empirical literature. This is followed by the methodology in section 3 which investigates capturing of the data and the estimation strategy. The results are presented and discussed in Section 4. Finally, section 5 concludes the study.

2.2 Theoretical and Empirical Literature Review

2.2.1 The Theoretical Links between FDI and Poverty

Various ways through which FDI inflow can reduce poverty in emerging economies has been observed. This includes creating employment opportunities, enhancing growth, technology and knowledge transfer, development of human capital, contributing to international trade integration, increasing tax revenue through payment of corporate taxes, developing domestic investment through forward and backward linkages etc. (Adams, 2009). These advantages contribute to increased employment opportunities thereby improving living standards and reducing poverty in emerging economies (Fauzel et al., 2016). However, they are only achievable through a suitable and conducive investment environment such as friendly host country policies, flexible labour market, good infrastructural facilities etc. (Meyer, 2004; Fauzel et al.,2016).

It is therefore worth highlighting that the most effective way through which FDI reduces poverty is employment creation (Fedderke and Romm, 2006). This is achievable because MNCs tend to employ and train locals who possess the skills and potentials required to achieve their goals and objectives resulting in growth and poverty reduction. Previous studies (Aaron, 1999; Tshepo, 2014) have shown that there are 2 main means by which employment is created by foreign investment: direct employment through MNCs as well as indirect employment through backward and forward linkages. These studies argued that forward linkages are said to occur when local firms source their inputs from MNCs while backward linkages occur when MNCs source their inputs from local firms. FDI therefore creates various spillovers across the country through job creation in the supplier and distributor firms resulting in significant poverty reduction. Interestingly, the indirect effect has proven to create more job opportunities when compared with the direct effects. This is substantiated by a study carried out by Aaron (1999) which revealed that for every 1 direct employment created, there are 1.6 additional employment created indirectly through the forward and backward linkage effect between FDI and domestic firms. The forward and backward linkages to employment enhance creation of more job opportunities which results in poverty reduction most especially in emerging economies (Gorg and Greenway, 2014; Meyer, 2004; Liu et al., 2009).

Gorg and Greenway, (2014) concludes that technology and knowledge transfer improves efficiency, productivity and reduce poverty. The study argues that this is achieved by enhancing human capital investment through training and developing the technical and managerial skills of citizens. This is because it improves the productivity and efficiency of locally owned establishments which in turn increases their level of income and reduces poverty (Gorg and Greenway, 2014).

According to Fauzel et al., (2016), FDI is said to also reduce poverty through proper allocation of tax revenue. Foreign investment inflow increases revenue generated through tax in the host economy. The study highlights that the increased tax, therefore, provides the government with additional funds to finance social development programs such as social security benefits, grants for local enterprises, interest-free loans to entrepreneurs, tax-free incentives to emerging local businesses etc. These programs encourage and develops locally owned firms by increasing the economy's output level, personal income, and reducing poverty. In addition, Kinda, (2010) and Xolani, (2011), concludes that although FDI supplements local investment, it further creates employment opportunities, encourages technology transfer, and other beneficial advantages to emerging economies. As a result, developing economies such as South Africa should attract more FDI to help alleviate socioeconomic challenges which are not limited to poverty.

Against this backdrop, findings on the impact of foreign investment on poverty is inconclusive due to varying evidence from different studies (Xolani, 2011; Gorg and Greenway, 2014; Fauzel et al., 2016). The motivation behind this study is based on the need to evaluate the impact of FDI on poverty as it pertains to the local municipal level in South Africa using spatial models.

2.2.2 Empirical Review of FDI on Poverty

Various studies have evaluated the FDI-poverty nexus especially in emerging economies (Hung, 2005; Gohou and Soumare, 2012; Zaman, 2012; Ucal, 2014). This study therefore critically examines various views and perspectives on the effect of foreign investment on poverty in emerging countries.

Hung (2005) examined the impact of FDI on poverty reduction using data of 12 provinces from 1992 to 2002. The findings showed that FDI has a negative impact on poverty. In other words, FDI inflow contributes to poverty reduction in Vietnam. Gohou and Soumare (2012) evaluated the impact of FDI on poverty reduction in African countries. Data was collated from 52 economies for the period 1990 to 2007. The study showed that FDI has a significant positive impact on Human Development Index (HDI) and per capita GDP. In addition, the study also revealed a bi-directional relationship between FDI and poverty in the selected countries. That is, a reverse causality is observed between FDI and poverty. Similarly, Soumare (2015) evaluated the effect of FDI on poverty in Algeria. The study found a bi-directional linkage between the FDI and poverty. Zaman et al (2012) evaluated the causation between FDI and poverty employing data from 1985 to 2011. The study revealed a significant inverse relationship between FDI and poverty suggesting that as foreign investment inflows increased, poverty reduced in Pakistan.

In a bid to examine the effect of FDI on poverty in some African countries, Fowowe and Shuaibu (2014) found that FDI when associated with financial development reduces poverty significantly. The study revealed that financial system enhances the effectiveness of FDI in poverty reduction in African economies. Fauzel et al., (2016) evaluated the impact of foreign investment inflows on poverty using time series data for the period 1980-2013. The study revealed that FDI reduced poverty in Mauritius. Similarly, Shamim et al., 2014 analyzed the impact of FDI using both the ARDL and co-integration technique for the period 1973-2011. The findings showed that FDI reduces poverty when controlling for variables like Gross domestic Product, and public investment in Pakistan.

Isreal (2014) undertakes a study to investigate the impact of FDI on poverty in Nigeria from 1980-2009 using a standard unit root test and standard co-integration technique. The study contributed to empirical literature by finding a positive relationship between FDI and poverty. It further suggested that Nigeria should attract foreign investment that increases job opportunities which will be benefited by the citizens. In other words, since FDI is said to increase employment opportunities and reduce poverty, Nigeria should attract more foreign investment in order to achieve that.

In another study to examine the impact of FDI on poverty reduction, Calvo and Hernandez (2006) used data from 20 Latin American economies revealed that FDI significantly reduces poverty. In addition, Ogunniyi and Igberi (2014) evaluated the impact of FDI on poverty reduction in Nigeria using Ordinary Least Square. Although the study showed a positive but insignificant effect on poverty, it clearly implies that FDI has a potential of reducing poverty if policies are implemented to develop the infrastructural facilities as well as investing in human capital development to attract growth enhancing FDI in Nigeria. Ucal (2014), examined the effect of foreign investment on poverty from 26 emerging economies within the period 1990-2009. The study revealed that foreign investment reduces poverty in the selected developing countries.

None of the above cited studies examined the impact of FDI at the sub-national level. Although some research studies explored FDI at the regional level, however, these studies focused on the determinants, location choice and major metropolitan (urban) cities (Na and Lightfoot, 2006; Ng and Tuan, 2006). This study is therefore an improvement to regional studies on FDI by focusing on local municipalities in South Africa. In addition, it contributes to empirical studies in the following ways: first, it focused on the impacts of FDI at the sub-national level. Second, it employed the use of spatial regression to analyze the spatial interaction effects at the regional level.

2.2.3 Spatial Approach to FDI and Poverty

Understanding the effects of spatial interdependencies at the sub-national level is very important in analyzing the effect of FDI on poverty in emerging economies. Beugelsdijk and Mudambi (2013) stressed that the major FDI studies focused on the national rather than the sub-national level, hence, limiting them. This is because a national approach is not very informative and does not take into consideration the importance of spatial interactions across regions. In addition, a national study disregards spatial spillovers which results in the loss of information on regional economic growth (Chua, 1993; David et al., 2018). In other words,

ignoring the impact of spatial spillover has an adverse implication on the overall growth of an economy. This is because economic activities in region "i" impacts the growth and development of neighbouring regions. For instance, trade influences such as FDI inflows in region "i" has an impact on neighbouring regions (Capello, 2009). Therefore, the role of spatial interdependency is very crucial to the growth of development of emerging economies and must be examined. Majority of the studies on spatial spillovers (Driffield, 2006; Madariaga and Poncet, 2007; Wen, 2014; Capello, 2009) have concluded that FDI inflow in region "i" influences the development of region "i" and neighbouring regions.

To understand the impact of spatial interdependencies, we look at the New Economic Geography (NEG) postulated by Krugman in 1991. The theory states that the convergence of manufacturing companies in specific urban regions will lead to the overpopulation of the urban regions at the expense of the growth and development of the rural regions. Applying this to the South African context, the concentration of FDI in urban areas negatively impacts the development of local municipalities. In other words, a more even distribution of FDI is essential to increasing employment opportunities, reducing poverty and spatial inequalities as well as enhancing overall growth of the economy (Portilla et al., 2019).

Although South Africa is classified as an upper-middle-income economy based upon its GDP, it is also associated with a significant poverty rate about 40-50%. This contradiction is a result of the magnitude of spatial inequalities in economic activities (Wilson, 2011; David et al., 2018). As stressed by Wilson (2011), the dominance of economic activities is limited to urban areas like Gauteng and Western Cape. In 2011, out of nine provinces these three provinces contributed more than 50% to GDP. Likewise, population is more concentrated in Gauteng and the Western Cape due to migration after 1996 while other regions experience sparse population (David et al., 2018). Such patterns of population concentration and economic activities are expected to increase spatial inequalities in any developing economy. This is because fewer regions are developing at the expense of other regions (Wilson, 2011; David et al., 2018; Naude and Krugell, 2005).

David et al., (2018) stressed that in South Africa, historical conditions are major determinants of spatial distribution of population and concentration of economic activities in few regions. The preliminary development of big cities like Cape Town, Durban, Johannesburg, and Pretoria is associated with their functions long before the apartheid regime. For instance, the port of Cape Town is one of the largest and busiest port with roots traced back to the 1650s. Similarly, the port of Durban is the greatest port in Sub-Saharan Africa and the fourth largest container terminal generating more than 30% in revenue (Todes and Turok, 2017). The establishment of

these ports accelerated the growth of the regions. Likewise, the discovery of gold and diamonds in Johannesburg and Pretoria led to their rapid development (Wilson, 2011; Todes and Turok, 2017; David et al., 2018).

State of South African Cities Report pointed out that different apartheid segregation policies contributed to the initial spatial disparities in economic activities. For instance, the Native Land Act (1913) that confined the blacks to a limited portion of the land and the Group Area Act (1950) that segregated the population based on their race. This led to the forceful movement of the blacks to the rural regions in South Africa. Even though the restrictions have been removed, however, economic activities are still limited in rural areas (State of South African Cities Report, 2016; Krugell and Naude, 2005).

Taking this into consideration, a spatial approach is essential to evaluate the direct and indirect impact of FDI on regional poverty in South Africa. Also, understanding spatial interactions across regions is essential in formulating employment generation and poverty reduction policies that accelerate regional and inclusive growth in South Africa as well as other emerging economies facing the same challenge.

2.3 Methodology

This section considers the theoretical and econometric framework as well as model specification in examining the impact of FDI on poverty at the local municipal level in South Africa.

2.3.1. Model Specification

This chapter is based on the dual gap theoretical framework postulated by Chenery and Strout in 1956. The model purports that a gap exist between investment and savings as well as import and export. Hence, to reduce poverty and achieve economic growth, foreign investment inflows should be encouraged since it plays a vital role in filling these gaps (Kolawole, 2013).

A simplistic model is specified following the works of Ogunniyi and Igberi (2014) and Kedir (2012) who examined the impact of FDI on poverty in Nigeria and Ethiopia. Poverty is a function of FDI, age dependency ratio, GDP per capita, average household size, GDP growth rate, education, social grant, rural ratio, and African population.

The econometric form is expressed as:

$$POV = f\,(FDI_{i,t}, AGE_{i,t}, EMP_{i,t}, GDPC_{i,t}, H_{i,t}, GDPGR_{i,t}, EDU_{i,t}, SOCGR_{i,t}, RR_{i.t}, AFR_{i,t}) \quad (2.1)$$

where:

POV is measured using the poverty gap-measure for the ith local municipality for (i = 1,…,213) at time t for (t = 2000,…, 2016), FDI represents greenfield FDI at local municipal level, *AGE* is the age dependency ratio of the ith local municipality at time t, *EMP* represents employment rate which is measured as a percentage of the population that is working in local municipality i at time t. *GDPC* is GDP per capita measured as gross domestic product divided by population for ith local municipality at time t, H represents average household size measured as the total number of people living in a household in the ith local municipality at time t. *GDPGR* is GDP growth rate measured as the annal year on year growth in local municipality "i", EDU represents education which is the percentage of total population with matriculation and university qualification in ith local municipality. SOCGR represents social grant measured as expenditure on social welfare in local municipality "i" at time "t", RR represents rural ratio measured as the ratio of people living in rural local municipalities and AFR is African population measured as the percentage of black Africans in ith local municipality.

2.3.2 Econometric Framework

This study conducted five different econometric models for robustness checks. These are: the fixed, random effect models, Spatial Autoregressive Model (SAR), Spatial Lagged X model (SLX), and Spatial Durbin Model (SDM). Fixed and random models are categorized under the static panel data estimation techniques which is the Standard Linear Model (SLM) for spatial analysis. The SAR, SLX, and SDM models on the other hand are categorized under spatial models which accounts for spatial interactions across local municipalities in South Africa.

2.3.3 Static Panel Data Estimation Techniques

A panel data estimation combines time series and cross-section regression (Baltagi, 2006). There are 2 main panel data estimations: the fixed and random model. The former assumes that the individual effects are related to the independent variables while the latter assumes that the individual specific effects are not (Baltagi, 2006; Greene, 2008). The decision to choose between the two is based upon Hausman post estimation statistics. This study therefore uses the static panel data regression as the diagnostic tool and the baseline for comparing spatial models (Golgher and Voss, 2016). The regression model is expressed as:

$$y_{i,t} = a_i + \beta x_{i,t} + \varepsilon_{i,t}, \qquad \varepsilon_(i,t) \sim N(0, \sigma^2) \qquad (2.2)$$

Where, $y_{i,t}$ is the poverty rate in local municipality 'i' at year 't', α represents the intercept coefficient, β comprises of all the coefficients of the explanatory variables in matrix form. x_t represents a row vector that comprises of all the explanatory variables which includes FDI, domestic investment, education, household size, age dependency ratio and $\varepsilon_{i,t}$ is the white noise error term.

However, static panel estimation assumes that observations are independent making it a major limitation of the model. To address this limitation therefore, this study employed spatial analysis model.

2.3.4 Spatial Models

The assumption of independent variables is contrary to the spatial model's assumption that spatial interaction exists between dependent variables, explanatory variables, or the residuals (Elhorst, 2014). This, therefore, renders the static panel data estimation techniques inadequate. It is important to note that in other to analyze the impact of FDI in local municipalities, a model that accounts for spatial interactions across municipalities is essential.

According to Elhorst (2014), most spatial analysis studies are conducted by starting from a standard linear regression, afterwards a Moran's I statistics is conducted to determine spatial correlation between regions. A positive Moran's I value implies that a positive spatial dependency exists and vice versa (Moran, 1950). A spatial analysis is dependent on the result of the Moran's I. This study therefore conducts the SAR, the SLX and finally the SDM to critically examine the spatial interaction effect of FDI on poverty. This is because each spatial model has a unique interpretation to it which will be explained in detail in subsequent sections. First, we test for significant spatial autocorrelation across local municipalities in South Africa using Moran's I statistics. As previously explained, a positive result depicts a positive spatial autocorrelation and vice versa. It is expressed as:

$$I = \frac{N}{W} \frac{\sum_i^N \sum_j^N w_{i,j}(x_i - \overline{x})(x_j - \overline{x})}{\sum_i^N (x_i - \overline{x})^2} \tag{2.3}$$

Where, x_i represents the municipality "i" intercept, x_j is the municipality j intercept, $\overline{x}$ represents the mean, $w_{i,j}$ is spatial weights for municipality i and j, and W represents the sum of all $w_{i,j}$. Based on Moran's I statistics result, this study then proceeds to estimating the selected spatial models.

Spatial econometrics was originally established in Europe in 1970 because of the need to evaluate sub-national data in regional economics (Paelinck and Klaassen, 1979). Long before now, models that incorporate 'space' were mostly used in specific fields like urban and real estate economics, economic geography, and regional science (Anselin and Florax, 1995; Anselin and Ray, 1997; Pace et al.,1998). However, spatial econometrics has progressively been embraced by a wider range of empirical studies in other areas of economics like international economics, public finance etc. (Anselin, 2003).

A spatial weights matrix is a vital aspect of spatial analysis model because it shows the quantification of spatial correlations present in attributes of a dataset. That is, it reveals the spatial structure of a dataset (Anselin, 2003). The spatial weights matrix employed in this study assumes the Tobler's first law of geography which says, "everything is related to everything else, but near things are more related than distance things" (Tobler, 1970) and the distance decay factor. The distance decay matrix is expressed as:

$$w_{ij} = \frac{1}{d_{ij}}$$

Where d_{ij} is the distance between local municipality "i" and "j". The distance is calculated using the maximum eigen value instead of the row-standardized matrix. This is because a row-standardized inverse distance weight matrix that is formulated based on distance decay will lead to loss of information and invalid economic interpretation (Anselin, 1988; Vega and Elhorst, 2013). An inverse distance matrix is selected over a contiguity-based matrix because the latter is restricted to only the effects from adjacent local municipalities (i.e., local municipalities that share a common border) while the former takes into account all close municipalities (Vega and Elhorst, 2013).

This study initially estimated the SAR which shows spatial correlation in dependent variable (poverty). It determines the impact of the dependent variable (poverty) on neighbouring municipality 'j' on the dependent variable (poverty) of municipality 'i'. It is worth noting that an SAR model generates global spillover because any change in an explanatory variable included in the study will result to a change in the dependent variable anywhere in South Africa keeping in mind that "near things are more related than distant things" (Tobler, 1970; Lesage and Pace, 2011; Golgher and Voss, 2016).

It can be written as:

$$y_{i,t}=a_{in} + \rho W y_{j,t} + \beta' x_{i,t} + \varepsilon_i, \qquad \varepsilon \sim \mathrm{N}(0, \sigma^2 \mathrm{In}) \qquad (2.4)$$

Where, $y_{i,t}$ represents poverty in local municipality 'i' at year 't', a is measured as the intercept coefficient, i_n is the n-dimensional column vector containing 1. ρ represents the spatially lagged 'y' parameter measuring the degree of spatial dependence of dependent variables between neighbouring municipalities. This parameter shows how poverty in municipality 'j' affects poverty in municipality 'i'.

W measures the inverse distance spatial weight matrix which encapsulates effect from nearby municipalities, $Wy_{j,t}$ is the spatially lagged dependent regressor. This variable is known as the neighbouring (j) values of the dependent variable at year 't'.β' is the coefficient of explanatory variables, $x_{i,t}$ is a row vector that comprises of all explanatory variables such as FDI, domestic investment, education, average household size, age dependency ratio for local municipality 'i' at year 't'. ε_i measures the error term.

We then proceed to estimate the SLX model which reveals spatial interactions between explanatory variables of municipality "i" on the dependent variable of closest neighbouring municipalities "j". Contrary to the SAR model, spillovers from the SLX estimation are specifically local because a variation in the explanatory variable in municipality "i" affect only the nearest neighbour since both are strictly contiguous (Leasage and Pace, 2011; Golgher and Voss, 2016).

It is expressed as:

$$y_{i,t} = a_{in} + \beta' x_{i,t} + W x_{j,t}\lambda + \varepsilon_i, \qquad \varepsilon \sim N(0, \sigma^2 In) \qquad (2.5)$$

$Where,$ $y_{i,t}$ represents poverty in local municipality 'i' at year 't', a is the intercept coefficient, i_n is measured as the n-dimensional column vector containing 1, β' represents the coefficient of the explanatory variables, $x_{i,t}$ is a row vector that comprises of all the explanatory variables for local municipality 'i' at year 't'.

λ is the spatially lagged 'x' parameter. It measures the spatial interactions between independent variables in local municipality 'i' and neigbouring local municipalities "j".

W represents the inverse distance spatial weight matrix which encapsulates the effect from nearby regions, $Wx_{j,t}$ is the spatially lagged 'x' variable. This variable is known as the neighbouring (j) value of independent variables at year 't'.

Finally, this study estimated the SDM which encapsulates spatial interactions between dependent variable (poverty) and the explanatory variables (FDI, domestic investment, education etc.) across neighbouring municipalities (Lesage and Pace, 2009). More specifically,

it determines the impact of both dependent and explanatory variables of the neighbouring municipality 'j' on the dependent variable (poverty) of municipality 'i'. SDM encompasses both global and local indirect effect because of interactions between exogenous and endogenous variables, hence the results are observed to be larger when compared to the SAR and SLX models (Elhorst, 2010; Golgher and Voss, 2016)

It is therefore expressed as:

$$y_{i,t} = ai_n + \rho W y_{j,t} + \beta' x_{i,t} + \lambda W x_{j,t} + \varepsilon_i, \qquad \varepsilon \sim N(0, \sigma^2 In) \tag{2.6}$$

$Where,\ y_{i,t}$ represents poverty in local municipality 'i' at year 't', a is the intercept coefficient, i_n is measured as the n-dimensional column vector containing 1, ρ is the spatially lagged 'y' parameter measuring the degree of spatial dependence of dependent variables between neighbouring municipalities. $Wy_{j,t}$ is the spatially lagged 'y' variable at year 't'.

β' on the other hand, is the coefficient of the explanatory variables that are not spatially lagged, $x_{i,t}$ is a row vector that encapsulates all explanatory variables for local municipality 'i' at year 't'. λ represents the spatially lagged 'x' parameter measuring the degree of spatial dependence of the municipality "i's explanatory variables and the dependent variable of neighbouring municipality 'j'. $Wx_{j,t}$ represents the spatially lagged 'x' variable. ε_i is measured as the error term.

2.4 Data Sources and Variables Descriptions

2.4.1 Data Sources

This study made use of foreign investment data from Financial Times Markets database (Financial Times, 2017). This is different from other types of investment data because it is entirely made up of greenfield 'cross-border' ventures as well as expansions of 1 million USD at the minimum. Unlike Mergers and Acquisitions (M&As), greenfield investments are majorly made by high profiled MNCs. These investments have been observed to enhance capital formation, domestic productive levels and create job opportunities in host economies (Agosin and Machado, 2005). In addition, greenfield FDI enhances the transfer of technology in a bid to speed up production process in host countries (Dunstan et al., 2018).

International organizations such as the Economist Intelligence Unit (EIU), United Nations (UN) etc. and academics like Burger et al., (2012); Ascani et al., (2016); Wall and Stavropoulos (2016); Shi et al., (2018) use greenfield investment because of its ability to enhance growth and

development of regions. Also, transactions on the database are checked across various sources to ensure validity and reliability, yearly updates are also implemented to ensure that no completed transaction is left out. Based on this, this study refers to greenfield FDI as FDI.

The poverty data is obtained from the IHS Markit Regional explorer. IHS provides economic, risk, industry and demography data used in making key informed decisions at regional, state and national levels. Quantec Survey (Easy Data) on the other hand, serves as the source for other South African variables due to its local municipal data availability since this study is conducted in municipalities at local level in South Africa. Quantec Survey is mainly involved in the distribution of economic and financial data in South Africa. It distributes ranges of data relating to macro, regional and industry levels and provides users the ability to make key policy and investment decisions.

Following Dunstan et al., (2018), on the 3rd of August 2016, there was an amalgamation of some local municipalities in South Africa. Based on the 2016 boundary reform, South Africa now has 205 local municipalities, but the dataset obtained is based on the 2011 local municipal boundaries. As a result, the amalgamated municipalities were separated into their former constituents and assigned the unique ID value of the newly amalgamated municipalities (Yes Media, 2018). This study therefore examines 213 local municipalities. All datasets were also geocoded to ensure that they are joined with the 2016 municipal shapefile.

Empirical studies have shown that FDI and domestic investment data are annually sparse (Dunstan et al., 2018). Hence, this study investigates the impact of FDI on poverty at 5-year intervals. The sum of the interval for FDI and domestic investment is used while the 5th year value for all other variables is employed. This results in 4 panel observations i.e., 2000-2004, 2005-2009, 2010-2014 and 2015-2016. In addition, all relevant data are related to the 2016 local municipal shapefile since the study is conducted at a local municipal level.

2.4.2 Variable Descriptions

2.4.2.1 Dependent Variable

Poverty: The poverty data is obtained from IHS Markit regional explorer. The poverty rate is measured using the poverty gap-measure. The poverty line used for the measure is defined as level at which food and non-food items is purchased without having to give up one for the other. Based on Fowowe and Shuaibu (2014) and Gohou and Somare (2015), poverty is expected to have an inverse relationship with FDI.

2.4.2.2 Independent Variables

FDI: Is defined as a form of investment owned and controlled by a resident of another country in the country of interest (UNCTAD, 2007). According to Wall et al., (2016), the advancement of local productivity and employment generation can be linked to the development of operational facilities that are associated with greenfield investments. Therefore, greenfield investment will be used as an appropriate proxy for total FDI for the period 2000-2016.The FDI data used in this study is obtained from the Financial Times FDI database and is measured as FDI inflow at the municipal level as a percentage of local municipal GDP in million USD. Generally, FDI inflows is not annually constant, as a result the data is aggregated into 5-year intervals. Following previous empirical studies, FDI is therefore expected to have a negative impact on poverty (Fowowe and Shuaibu, 2014; Zaman et al., 2012).

Employment Rate: Is the total annual employment rate in South Africa. It is measured as a percentage of the total population that are ready and willing to work in municipalities at local level in South Africa. Several research studies have shown that increased employment opportunities result in significant poverty reduction in emerging economies (Klasen, 2005; Ijaiya et al., 2011). Therefore, this study anticipates a negative relationship between employment and poverty in municipalities at local level in South Africa.

Education: This study defines education as the percentage of total population with matriculation and university qualification in municipalities at local level in South Africa. For the purpose of this study, education has been categorized into two levels (matriculation and university) to show the impact of various levels of education on poverty at the local municipal level in South Africa. The data on education is obtained from the Quantec Survey. As seen in the findings of Isreal (2014), education had a negative relationship with poverty. This implies that increased education reduces poverty level in emerging economies. Hence, a negative relationship with poverty is anticipated.

Average Household Size: This study defines average household size as the total number of people living in a household divided by the number of households in a local municipality. Previous research studies have shown that households below the poverty line have a larger number of people in the household in comparison with the households above the poverty line (Meyer, 2016). As a result, this study employs average household size to determine the poverty level of households in South Africa. Following Meyer and Niyimbura, (2016), it is expected to be positively correlated with poverty.

Age Dependency Ratio: This is the ratio of the population (dependent population 0 to 14 years of age and 65 years and above) over the working population (15 to 64 years). It is a measure of

pressure placed on the working population of an economy. A higher age dependency ratio of an economy implies that financial pressure is being placed on the working population, which can be an indication of poverty in a household. The findings of Sinnathurai, (2013) reveals a positive relationship between age dependency ratio and poverty. Therefore, this study anticipates a positive relationship with poverty.

GDP Growth Rate: Measures the annual year-on-year growth rate of an economy. This is done by comparing the current year gross domestic product of an economy with the previous year. Based on Ebunoluwa and Yusuf, (2018) GDP growth rate is expected to have a negative correlation with poverty. *GDP Per Capita:* This is the total value of goods and services produced in an economy in a particular year divided by the total population in that local municipality. It is used to determine the personal income of individuals in an economy. For the purpose of this study, it is measured as ratio of GDP to population in the local municipalities. Previous research studies have shown that GDP per capita can be used as a real determinant of poverty rate in an economy. It is expected to have a negative correlation with poverty. This is supported by the study conducted by Jalilian and Weiss, 2002. The study revealed a negative relationship between poverty and GDP per Capita which implies that as per capita GDP increases, poverty reduces in emerging economies.

Social Grant: Many economies view social grant as an avenue to redistribute income and reduce poverty (Ngwakwe and Badar, 2021). Its main objective is to assist in reducing the burdens of the vulnerable in our society. For the purpose of this study, it is measured as national expenditure on social welfare as a percentage of GDP in municipalities at local level in South Africa. Based on the findings of previous empirical literatures, this study anticipates a negative relationship between social grant and poverty in municipalities at local level in South Africa.

African Population: Black Africans in South Africa have been observed to experience higher levels of poverty when compared to their white counterparts (Gradin, 2013). Studies have shown that ethnic diversity play a significant role in poverty reduction in developing economies (Olarewaju et al., 2020). This study has included the African population to analyse its role in poverty reduction in the local municipalities in South Africa. It is measured as a percentage of total population in municipalities at local level in South Africa. As observed in extant studies, it is expected to have a positive relationship with poverty.

Rural Ratio: This is the ratio of people residing in the rural areas in municipalities at local level in South Africa. Higher rural ratio indicates a high poverty rate and low employment rate in an economy (David et al., 2018). Poverty is mainly concentrated in the rural areas because of the unbalanced socio-economic development in emerging economies (Liu et al., 2017). This

implies that rural areas contribute to increased poverty. As a result, a positive correlation with poverty is anticipated.

2.5 Empirical Analysis

2.5.1 Descriptive Statistics of key variables

Table 2.1 represents the summary statistics of dependent and independent variables at the national level. Table 2.2 reveals the average FDI inflows at the provincial level from 2000-2016 in South Africa. As seen in table 2.2, North West, Northern Cape, KwaZulu Natal provinces appears to receive the highest FDI inflow while Free State province receives the lowest FDI inflow in South Africa.

Table 2. 1 Summary Statistics of Variables at local municipal level in South Africa

Variables	Obs.	Mean	Std. Dev	Min	Max
Dependent Variable					
Poverty Rate (%)	844	0.608	0.147	0.277	0.910
Independent Variables					
FDI (%)	852	28.950	141.714	0.003	2138.8
Employment Rate (%)	852	38.083	15.938	0.741	78.474
Matriculation Education (%)	724	42114.06	135671.9	562.09	1246303
University Education (%)	732	2745.35	11500.77	21.65	119497
Average Household Size (%)	852	3.929	0.576	2.497	6.087
Age Dependency Ratio (%)	804	62.64	15.99	25.80	132.736
GDP Growth Rate (%)	852	8.279	3.707	-2.240	25.129
GDP Per Capita (rands)	852	0.0543279	0.195	0.0027	3.530
Social Grant (%)	639	1.03e+08	2.40e+07	7.07e+07	1.28e+08
African Population (%)	835	95.16874	203.6298	2.233278	3028.792
Rural Ratio (%)	852	54.304	67.148	0.0012427	443.717

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 2. 2 Average FDI Inflow (million USD) at the Provincial Level in South Africa

Province	**Local Municipalities**	**2000-2004**	**2005-2009**	**2010-2014**	**2015-2016**	**Average over Years**
Eastern Cape	33	2.788	31.399	58.095	1.421	23.426
Free State	19	0	7.465	22.781	0	7.562
Gauteng	9	0.926	37.833	34.711	4.052	19.381
Kwa-Zulu-Natal	45	12.468	55.582	33.368	9.510	27.732
Limpopo	21	0.909	36.973	33.991	15.173	21.762
Mpumalanga	17	8.829	48.991	32.382	14.594	26.199
Northern Cape	26	2.138	16.285	129.026	69.893	54.336
North West	18	54.050	133.322	74.306	2.236	65.979
Western Cape	25	0.200	12.426	21.089	19.152	13.217
Total	213	82.308	380.276	439.749	136.031	259.591

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 2.3 represents the average poverty rate at the provincial level from 2000-2016. Poverty is seen to be higher in KwaZulu-Natal, Eastern Cape, and Limpopo and relatively lower in Western Cape, Gauteng, and Northern Cape provinces.

Table 2.4 represents the average employment rate according to provinces from 2000-2016. Rate of employment is higher in Western Cape, Gauteng, and Mpumalanga provinces and observed to be lower in KwaZulu-Natal, Eastern Cape, and North West provinces.

Table 2.5 on the other hand, reveals the top 10 local municipalities receiving FDI in South Africa. As seen in the table, FDI inflow is observed to be higher in City of Matlosana in North West province, Mier in Northern Cape, and Nelson Mandela Bay in Eastern Cape.

Table 2. 3 Average Poverty Rates (%) at the Provincial Level in South Africa

Province	Local Municipalities	2000-2004	2005-2009	2010-2014	2015-2016	Average over Years
Eastern Cape	33	0.763	0.707	0.662	0.642	0.674
Free State	19	0.626	0.580	0.552	0.541	0.575
Gauteng	9	0.445	0.433	0.429	0.423	0.433
Kwa-Zulu-Natal	45	0.738	0.716	0.669	0.654	0.694
Limpopo	21	0.750	0.697	0.644	0.614	0.676
Mpumalanga	17	0.671	0.607	0.567	0.560	0.601
North West	18	0.709	0.656	0.616	0.600	0.645
Northern Cape	26	0.591	0.484	0.454	0.438	0.492
Western Cape	25	0.468	0.399	0.417	0.415	0.425
Total	213	5.761	5.279	5.010	4.887	5.234

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 2. 4 Average Employment Rates (%) at the Provincial Level in South Africa

Province	Local Municipalities	2000-2004	2005-2009	2010-2014	2015-2016	Average over Years
Eastern Cape	33	36.088	37.598	36.647	37.699	37.008
Free State	19	37.163	39.083	38.175	39.006	38.357
Gauteng	9	41.016	42.798	41.076	40.782	41.418
Kwa-Zulu-Natal	45	31.930	33.502	32.732	33.092	32.814

Limpopo	21	35.490	38.330	37.529	38.663	37.503
Mpumalanga	17	41.719	42.152	40.572	41.134	41.394
North West	18	36.064	37.734	36.712	37.618	37.032
Northern Cape	26	37.390	39.469	38.973	40.272	39.026
Western Cape	25	44.665	46.076	45.125	46.496	45.591
Total	213	341.525	356.742	347.541	354.762	350.143

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 2. 5 Top 10 Local Municipalities receiving FDI (%) in South Africa in

2010-2014

Local Municipalities	**Province**	**FDI**
City of Matlosana	North West	1100.17
Mier	Northern Cape	1068.1
Nelson Mandela Bay	Eastern Cape	1037.72
Mogalekwena	Limpopo	747.8
Khai-Ma	Northern Cape	630
Endumeni	Kwa-Zulu Natal	557.36
Bushbuckridge	Mpumalanga	329.19
Lesedi	Gauteng	314

Tsantsabane	Northern Cape	311.68
Sol Plaatjie	Northern Cape	279.3

Source: Estimates using data from Quantec, IHS and Financial Times.

2.5.2 Preliminary Analysis

2.5.2.1 Night Lights Imagery and ArcMap

In this section, this study explores the spatial dimensions of key variables employed in analyzing the impact of FDI at local municipal level in South Africa. This is achieved with the use of night lights imagery. According to Addison and Stewart (2015), night lights data are captured by the United States Air Force Meteorological Satellite Program (DMSP). Two satellites simultaneously circle the earth every night collecting low-imaging data solely to detect cloud reflections of the moonlight. It was later discovered that in the absence of clouds, city lights associated with human activities can be monitored (Addison and Stewart, 2015).

In recent times, researchers have used satellite imagery (nights lights) to investigate economic activities in the world (Levine and Duke, 2012). It was first used in economics by Chen and Nordhaus (2011) and Henderson (2012). Addison and Stewart (2015) further stressed that economic development researchers have found it to be positively correlated with some socio-economic variables across different economies. It is therefore used as a proxy for some economic variables such as populations, growth rates, poverty rates, per capita GDP etc. This is because night light is a unique dataset that can see in clear details the daily activities of people which might be impossible to capture by the traditional economic variables (Addison and Stewart, 2015). In addition, night lights can be used as an indicator for socio-economic variables at the regional level because it is a means of evaluating intraregional peculiarities (Levin and Duke, 2012; Mveyange, 2015).

This study therefore employs the use of night light imagery to depict economic activities at the regional level. The night lights data used was downloaded from the National Geophysical Data Center (NGDC), National Oceanic and Atmospheric Administration (NOAA) (Version 4 DMSP-OLS Nighttime Light Time Series). It is a raster file data set called the average visible stable lights collected by two satellites which includes pixels and contains lights from cities and towns. Each pixel is assigned a digital number which ranges from 0 (total darkness) to 63 (Lowe, 2014).

In addition, this study employed ArcGIS a geography software which is used to analyze spatial interactions across regions. The ArcMap is an ArcGIS tool used to create map layouts of various regions in a bid to show the spatial relationships across various countries, regions, and municipalities (Pradhan et al., 2014). ArcMap is therefore employed to disclose spatial interaction effect across local municipalities in South Africa.



Figure 2.1 Nights Light in municipalities at local level in South Africa**.**

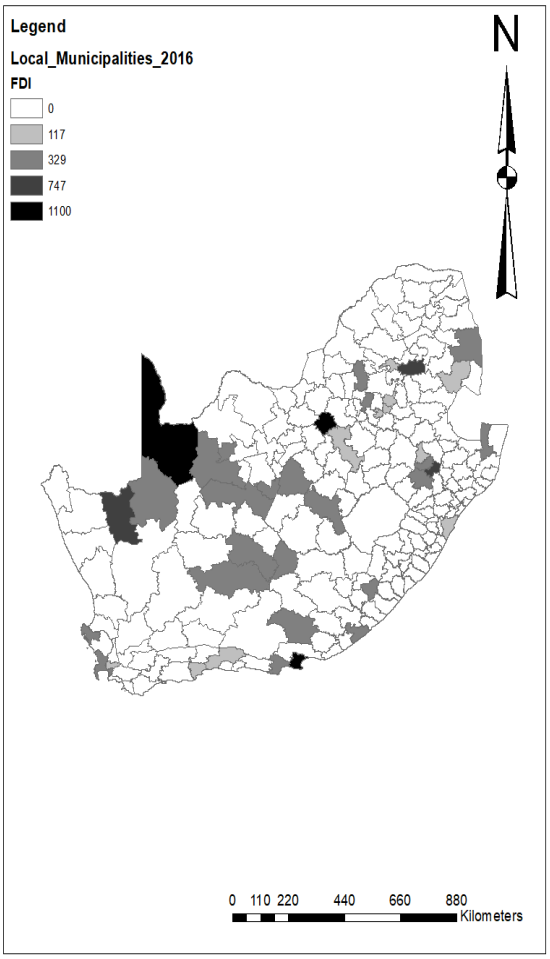


Figure 2.2 Pattern of FDI Inflow across Local Municipalities, 2010-2014.

Source: Estimates using data from National Geophysical Data Center (NGDC), National Oceanic and Atmospheric Administration (NOAA).

Figure 2.1 represents nights lights data per local municipality in South Africa. As mentioned earlier, night lights could be used as a proxy for some economic variables (Addison and Stewart, 2015). From the figure, Gauteng and Western Cape exhibits very high night lights

luminosity, Northern Cape and Eastern Cape on the other hand exhibits the lowest night lights luminosity.

Figure 2.2 represents the pattern of FDI inflow across local municipalities in South Africa. FDI inflow is limited and observed in Northern Cape, KwaZulu Natal, Mpumalanga, Western Cape, and Gauteng provinces, and in local municipalities such as Tsantsabane, Kareeberg, Abaqulusi, Alfred Duma, Albert Luthuli, Bushbuckridge, City of Cape Town, Stellenbosch, City of Johannesburg, Mogale City.

Figure 2.3 shows the spatial distribution of poverty in municipalities at local level in South Africa from 2010-2014. Our findings revealed that poverty rate is low and ranges between 0% - 45% in local municipalities situated in Western Cape such as Cape Agulhas, Hessequa, Laingsburg, Matzikama, Saldanha Bay, Swellendam, City of Cape Town, Theewatersklof and Gauteng like Midvaal, City of Tshwane, City of Johannesburg, Erkurhuleni, Mogale City, and Westonaria. On the other hand, poverty rate is very high and ranges between 70% - 85% in local municipalities located in KwaZulu-Natal such as Msinga, Nongoma, Maphumulo, Daanhuser, eDumbe, Nqutu, Ndwedwe and in Eastern Cape like Port St John, Mbizana, Ntanbankulu, Ngquza Hill, Nyandeni, Mhlontlo, Engcobo. The highest poverty rate is found in local municipalities Port St Johns, Mbizana, Ntanbankulu, Ngquza Hill, Nyandeni in Eastern Cape and Msinga, Nongoma, Maphumulo, Daanhuser, eDumbe in KwaZulu-Natal. The lowest poverty rate, however, is found in local municipalities Karoo Hoogland, Richtersveld, Hantam, Gamagara, and Khai-Ma in Northern Cape, Cape Agulhas, Hessequa, and Saldanha Bay in Western cape, Midvaal in Gauteng, and Rustenburg in North West provinces.

It is evident from the poverty rate figure that provinces (Gauteng, Western Cape) that exhibit very high night light luminosity have low poverty rates while provinces (Northern Cape, Eastern Cape) that exhibit the lowest night lights luminosity have very high poverty rates. This suggests that provinces and local municipalities with higher poverty rates experience lower economic activity.

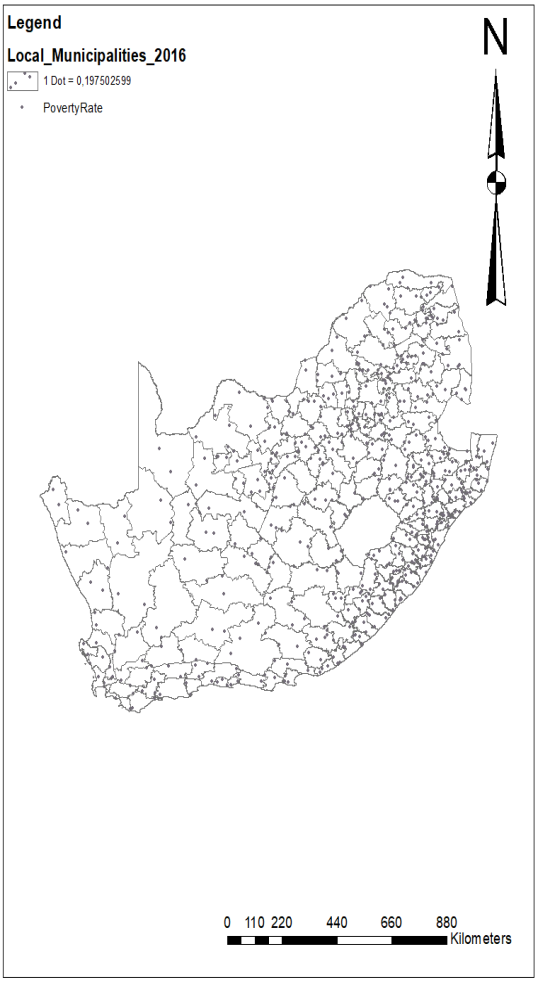


Figure 2.3 Poverty Rate per Local Municipality, 2010-2014.

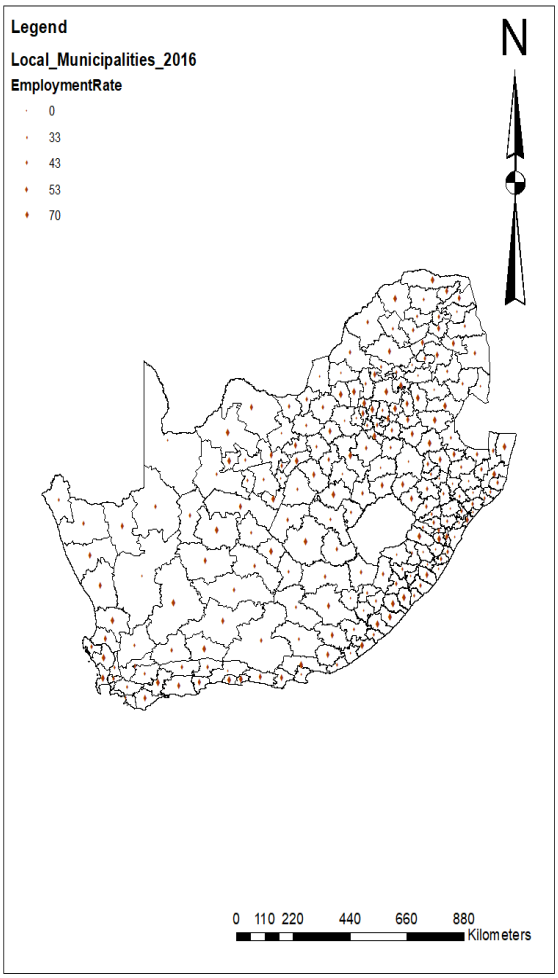


Figure 2.4 Employment Rate per Local Municipality, 2010-2014

Source: Estimates using data from National Geophysical Data Center (NGDC), National Oceanic and Atmospheric Administration (NOAA).

With regards to figure 2.4 which presents the employment rate in municipalities at local level in South Africa, employment is concentrated and ranges between 45% -70% in local municipalities Knysna, Swellendam, Cederberg, Bitou, Swartland, Cape Agulhas, Prince Albert, City of Cape Town, Hessequa in Western Cape province, Mogale City, City of Tshwane, City of Johannesburg, Lesedi, Westonaria in Gauteng province. Interestingly, the study also found high rates of employment in local municipalities in the Eastern Cape such as Nyandeni, Sundays River Valley, Buffalo City, Mnquma, Mbizana and in KwaZulu-Natal like

The Big 5 False Bay, Richmond, Umhlabuyalingana, Mkhambathini, Kwa Sani, eDumbe, Kwadukuza, Okhahlamba, Emadlangeni, Umdoni, Uphongolo. A possible reason is that people residing in KwaZulu-Natal and Eastern Cape tend to move to the big cities like Johannesburg, Cape Town in search of jobs. On the contrary, employment rate is relatively lower and ranges between 0%-35% in local municipalities in Northern Cape province like Hantam, Magareng, Kgatelopele, Thembelihle, Richtersveld, Tsantsabane, Dikgatlong, Ga-sengonyana and municipalities in Mpumalanga province such as Nkomazi, Emakhazeni, Dr Js Moroka, Mbombela, Mkhondo, Thaba Chweu, as well as municipalities located in Limpopo province like Ephraim Mogale, Elias Motsoaledi, Ba- Phalabourwa, Mogalekwena, Makhado, Lephalale, Makhuduthamaga, Greater Letaba.

The highest employment rate is observed in Kysna in Western Cape, Metsimahola in Free State, Swellendam in Western Cape, Kwa Sani in KwaZulu-Natal, Cederberg in Western Cape, Chief Albert Luthuli in Mpumalanga, Bitou in Western Cape, Richmond in KwaZulu-Natal, Nyandeni in Eastern Cape, Swartland in Western Cape, Rustenburg in North West. In contrast, the lowest employment rate has been discovered in Ephraim Mogale in Limpopo, Moses Kotane in North West, Mandeni in KwaZulu-Natal, Phulamela in Free State, Ngqushwa in Eastern Cape, Nkomazi in Mpumalanga, Nketoana in Free State, Hantam in Northern Cape, Ethekwini in KwaZulu-Natal, Nqutu in KwaZulu-Natal, Matatiele in Eastern Cape. This implies that local municipalities with high employment rate exhibit high night lights luminosity showing the presence of high economic activities in such areas and vice versa.

In conclusion, the figures reveal an indirect link between FDI, and economic activities captured by night lights data in South Africa. This is because FDI is mainly resource-based and is observed in remote regions of the country such as Northern Cape. However, night lights did not capture luminous lights in these regions, indicating that economic activities are lower in these regions when compared to places like Johannesburg, Cape Town. Our findings suggested that local municipalities with higher foreign investment inflows did not exhibit high night lights luminosity and higher employment rate.

2.6 Regression Results and Discussions

2.6.1 Results Estimations

To decide on the appropriate static panel data estimation technique, the Hausman test statistics was employed. Based on its result, the random effect model was chosen as the best panel data

model. The OLS model was estimated as the Standard Linear Model (SLM) which serves as the baseline and diagnostic tool for comparing spatial models.

Table 2. 6 Fixed and Random Effect Results on poverty

	Fixed Effect	**Random Effect**
Variables	**Poverty Rate**	**Poverty Rate**
FDI	-0.000132***	-0.000138***
	(4.92e-05)	(5.17e-05)
Age Dependency Ratio	0.000963***	0.00121***
	(0.000351)	(0.000257)
Employment Rate	-0.000437	-0.000742**
	(0.000470)	(0.000332)
GDP per capita	0.0765	0.00898
	(0.0739)	(0.0274)
Average Household Size	0.139***	0.146***
	(0.0172)	(0.0106)
GDP Growth Rate	0.000771***	0.000751**
	(0.000288)	(0.000302)
Matriculation Education	3.31e-07	-1.32e-07
	(2.52e-07)	(1.94e-07)
University Education	-2.63e-07	2.25e-06
	(2.44e-06)	(1.94e-06)
Rural Ratio	0.878	0.227
	(0.773)	(0.154)
Social Grant	-6.42e-10***	-5.92e-10***
	(0)	(0)
African Population	-0.000303	4.61e-05
	(0.000248)	(5.45e-05)
Metropolitan Municipalities	0.000248	0.000411
	(0.000696)	(0.000721)
Constant	0.0402	0.0105
	(0.0761)	(0.0448)
Observations	852	852
R-squared	0.751	0.745
Number of Local Municipalities	213	213
Moran's I Statistics (p-value)		0.0350
Hausman Test (p-value)		0.8892

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

As seen in the random effect column, FDI has a negative significant relationship with poverty rate. Age dependency ratio, average household size, GDP growth rate revealed a positive significant relationship, while employment rate and social grant revealed a negative significant relationship with poverty. On the other hand, GDP per capita, university education, rural ratio,

African population, and metropolitan municipalities revealed a positive insignificant relationship while matriculation education revealed a negative insignificant relationship with poverty.

Since the random effect model is the baseline of the analysis, it does not take into consideration the spatial interdependencies across local municipalities. This study therefore proceeds by using spatial models to reveal the significance of spatial interactions across local municipalities when examining the impact of FDI on poverty in South Africa. As previously explained, spatial regression is dependent on the result of the Moran' s I statistics. The Moran's I result shows that a positive spatial interaction exists between the local municipalities. Therefore, a spatial analysis can be conducted.

Table 2. 7 Result for Spatial Models

	SAR	**SLX**	**SDM**
Variables	**Poverty Rate**	**Poverty Rate**	**Poverty Rate**
FDI	-0.000130***	-0.000116**	-0.000105**
	(4.64e-05)	(4.54e-05)	(4.42e-05)
Age Dependency Ratio	0.00110***	0.00103***	0.000960***
	(0.000330)	(0.000343)	(0.000334)
Average Household Size	0.136***	0.130***	0.127***
	(0.0163)	(0.0169)	(0.0164)
Employment Rate	-0.000590	-0.000478	-0.000551
	(0.000443)	(0.000447)	(0.000435)
Matriculation Education	3.02e-07	4.84e-07*	4.35e-07*
	(2.39e-07)	(2.51e-07)	(2.44e-07)
University Education	-1.37e-07	-2.21e-06	-1.83e-06
	(2.31e-06)	(2.46e-06)	(2.40e-06)
GDP per capita	0.0434	0.0575	0.0458
	(0.0700)	(0.0690)	(0.0671)
GDP Growth Rate	0.000405	-0.000113	-6.65e-05
	(0.000275)	(0.000312)	(0.000304)
Social Grant	-5.72e-11	-1.63e-09***	-1.63e-09***
	(7.73e-11)	(2.40e-10)	(2.33e-10)
African Population	-0.000176	-0.000253	-0.000197
	(0.000236)	(0.000232)	(0.000226)
Rural Ratio	0.369	1.311*	0.912
	(0.734)	(0.735)	(0.717)
Constant	0.0258***	0.0249***	0.0242***
	(0.000724)	(0.000697)	(0.000681)
Rho	0.7369131***		0.7057478***
Lambda (FDI)		-0.0022019***	-0.0015934***
Observations	852	852	852

Number of groups	213	213	213
Log Likelihood	1426.02	1452.77	1466.48
Likelihood ratio test			27.40***
Pseudo R2	0.155	0.192	0.141
Wald test of spatial terms	68.18***	95.69***	141.72***
AIC/BIC	-2828.05/-2771.08	-2867.55/-2777.34	-2892.95/-2797.99

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. 8 Result for cumulative (direct, indirect, and total) spatial models on Poverty

	SAR	**SLX**	**SDM**
Direct Effect	**Poverty Rate**	**Poverty Rate**	**Poverty Rate**
FDI	-0. 0001323*** (0. 0000474)	-0.000116** (0.0000454)	-0.0001471 *** (0.0000499)
Age Dependency Ratio	0. 0011277*** (0. 000338)	0.0010271*** (0.0003435)	0.0009593*** (0. 0003314)
Employment Rate	-0. 0006019 (0. 0004522)	-0.0004781 (0.0004472)	-0. 0005037 (0. 0004519)
Average Household Size	0.1391934*** (0.0166909)	0.1301221*** (0.0168689)	0. 1288575*** (0. 0170562)
Matriculation Education	3.08e-07 (2.44e-07)	4.84e-07* (2.51e-07)	3.04e-06* (2.84e-07)
University Education	-1.40e-07 (2.35e-06)	-2.21e-06 (2.46e-06)	-3.40e-06 (2.81e-06)
GDP per Capita	0.0443082 (0.0714435)	0.0575041 (0.0689747)	0.0341665 (0. 0719483)
GDP Growth Rate	0.0004133 (0.0002805)	-0.0001134 (0.0003125)	0. 0000402 (0. 0003005)
Social Grant	-5.84e-11 (7.84e-11)	-1.63e-09*** (2.40e-10)	-1.62e-09*** (2.33e-10)
African Population	-0.0001799 (0.0002403)	-0.0002528 (0.0002322)	-0.0002183 (0.0002379)
Rural Ratio	0.3765524 (0.7486472)	1.310586* (0.7347719)	1.380228* (0.7608135)
Indirect Effect			
FDI	-0.0003563* (0.0002076)	-0.0021833*** (0.0006066)	-0.0055638* (0.0026942)
Age Dependency Ratio	0.0030379* (0.0017101)	-0.0017509 (0.0016161)	-0.0000402 (0.0052084)
Employment Rate	-0.0016215 (0.0014513)	0.0049707* (0.0028071)	0.0062521 (0.0093229)
Average Household Size	0.3749747** (0.1775452)	0.0806564 (0.1205288)	0.2395721 (0.406246)

Matriculation Education	8.30e-07** (7.54e-07)	8.31e-06*** (2.73e-06)	0.0000246* 0.0000126
University Education	-3.77e-07 (6.34e-06)	-0.0000694** (0.0000269)	-0.0002065* 0.0001165
GDP per Capita	0.1193625 (0.1971721)	-0.450438 (0.6678273)	-1.538051 (2.281441)
GDP Growth Rate	0.0011133 (0.0008418)	0.0074113*** (0.0010455)	0.0140675*** (0.0047986)
Social Grant	-1.57e-10 (1.50e-10)	9.38e-10*** (3.03e-10)	9.81e-10 (7.73e-10)
African Population	-0.0004847 (0.0006712)	-0.0011289 (0.002045)	0.0027841 (0.0067937)
Rural Ratio	1.014399 (2.032466)	21.05615*** (5.473904)	61.71827** (28.27129)
Total Effect			
FDI	-0.0004886** (0.0002404)	-0.0022991*** (0.0006118)	-0.0057109** (0.0027178)
Age Dependency Ratio	0.0041656** (0.0019325)	-0.0007238 (0.0015601)	-0.0009191 (0.0052168)
Employment Rate	-0.0022234 (0.001856)	0.0044926 (0.0028677)	0.0057485 (0.0094748)
Average Household Size	0.514168*** (0.1833719)	0.2107785* (0.122259)	0.3684296 (0.4116356)
Matriculation Education	1.14e-06 (9.73e-07)	8.79e-06*** (2.82e-06)	0.0000253** (0.0000128)
University Education	-5.16e-07 (8.70e-06)	-0.0000716* (0.000028)	-0.0002099* (0.0001182)
GDP per Capita	0.1636707 (0.2666191)	-0.3929339 (0.6775871)	-0.503884 (2.310616)
GDP Growth Rate	0.0015266 (0.001081)	0.0072979*** (0.0009486)	0.0141078*** (0.004798)
Social Grant	-2.16e-10 (2.27e-10)	-6.93e-10*** (2.40e-10)	-6.38e-10 (7.91e-10)
African Population	-0.0006646 (0.0009019)	-0.0013817 (0.0020699)	-0.0030024 (0.0068769)
Rural Ratio	1.390951 (2.767112)	22.36674*** (5.605108)	63.0985** (28.53676)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.7 reveals the spatial regression result for evaluating the impact of FDI on poverty in municipalities at local level in South Africa. As previously explained, this study estimated the SAR, SLX and SDM spatial models to critically examine the importance of spatial interactions across local municipalities when evaluating the impact of FDI. Furthermore, this study

conducted a likelihood ratio test which revealed that the SDM is significantly superior to the SAR and SLX and should be preferred as the best model.

In a bid to explain the spatial interactions, a post estimation model was estimated. This encapsulates the direct, indirect, and total effects of the three spatial models estimated table 2.8 presented the results in detail. As seen in the SDM column, the direct effect revealed the impact of FDI and other explanatory variables in local municipality "i" on poverty in the same municipality. FDI revealed a negative significant impact on poverty in local municipality 'i". This result supports the existence of correlation between regional poverty and FDI and echoes the findings of Zaman et al., 2012; Fowowe and Shuaibu, 2014 who found that FDI contributes to poverty reduction in emerging economies.

The age dependency ratio also revealed a positive significant impact on poverty. This corroborates the findings of Sinnathurai, (2013) which revealed a positive relationship between age dependency ratio and poverty. This is in line with the apriori expectation since higher age dependency ratios of an economy indicates a lower population suggesting that lesser percentage of the population are working thereby increasing poverty levels in an economy.

Similarly, average household size revealed a positive significant impact on poverty which is in line with the findings of Meyer and Niyimbanira, (2016) that revealed a positive relationship between poverty and household size. This suggests that an increase in household size contributes to increasing poverty levels in an economy.

With regards to employment rate, the analysis revealed a negative insignificant relationship with poverty suggesting that no relationship exist between employment rate and poverty in local municipality "i". This finding differs from that of Ogunniyi, (2014) who found a positive relationship between unemployment and poverty in Nigeria. One reason for this can be attributed to the motivation behind FDI inflow into the economy. As proven by extant studies, MNCs tend to provide job opportunities for a limited percentage of skilled labour rather than the higher percentage of unskilled or semi-skilled labour prominent in developing economies (Jenkins 2006).

Matriculation Education showed a positive significant relationship with poverty indicating that lower education increases poverty in the local municipality "i". This finding is not anticipated since education is expected to reduce the rate of poverty in economies. This differs from the finding of Isreal, 2014 who found that education reduces poverty in Nigeria. One possible explanation to this might be based on the level of education required to secure an employment opportunity with a multinational organization. Since MNCs tend to create jobs for skilled labour, the educational requirement to attain that level of skill is higher than what is available

in developing countries. This argument is supported by the University education result which revealed a negative but insignificant relationship with FDI at the local municipal level. Although the sign is in line with previous studies, however the result does not contribute to poverty reduction in the local municipalities. This might be due to the lower levels of higher education enrollment in the local municipalities. Hence, attainment of further education levels should be encouraged in order to reduce poverty in local municipalities.

As for GDP per capita and GDP growth rate, the result revealed a positive coefficient which is unexpected. These results contradict findings by Jalilean and Weiss, 2002 who revealed that a negative relationship exist between GDP per capita and poverty in the ASEAN region. This can be explained through the argument put forth by Turok (2018). In a bid to access better living standards, rural-urban migration occurs. However, migrants are forced to live in unsuitable and low-standard accommodations typically known as "shacks" located in the outskirts of the urban regions due to their inability to afford housing in the cities. This results in higher poverty and inequality levels. This is in line with the coefficients of GDP growth rate and GDP per capita which reveals an unexpected positive impact on poverty.

Social grant on the other hand revealed a negative significant relationship with poverty in local municipality "i" suggesting that government contributions such as social grants play a vital role in reducing poverty levels in local municipalities. This result is in line with apriori expectation and the finding of Satumba et al., (2017) who found that social grant significantly reduced poverty in South Africa.

African population revealed a negative insignificant relationship with poverty indicating that at in local municipality "i", there is no relationship between the African population and poverty.

Rural ratio on the other hand showed a positive significant relationship with poverty in local municipality "i" indicating that the percentage of rural population contributes to increased poverty levels. This is in line with the findings of David et al., (2018) who found that higher rural areas indicated high poverty levels in an economy as well as that of Liu et al., (2017) who found that poverty is concentrated in rural areas due to uneven distribution of economic activities.

These results have shown the direct effect that FDI and other explanatory variables in local municipality "i" have on poverty in the same municipality. This study then proceeds to examine the impact of FDI and other independent variables on poverty in neigbouring local municipalities. This result is presented under the indirect effect in the SDM column. FDI inflow in neighbouring municipality is observed to have a negative significant indirect effect on poverty in local municipality "i" indicating that spatial spillover exists between regions in

South Africa. This result is as anticipated because the inflow of FDI into a region is expected to reduce poverty in closer municipalities due to the migration of people from one region to the FDI region in search of employment opportunities (Turok, 2018). Age dependency ratio, employment rate, average household size, GDP per capita, social grant, and African population however showed no relationship with poverty. As anticipated, the results of the SDM are observed to be larger as indicated by Golgher and Voss, 2016. Matriculation education, university education, GDP growth rate and rural ratio in the closest neighbouring municipality on the other hand revealed a significant relationship with poverty also suggesting the existence of spatial spillover.

The total effect is the sum of the direct and indirect effect of the selected explanatory variable on poverty in various local municipalities in South Africa. FDI maintained a negative significant relationship indicating that when global and local effects are combined, spatial interactions still exist across local municipalities in South Africa.

2.7 Study Limitations

Before concluding, it is necessary to highlight some limitations of the study. This study's limitations emanate from not taking into consideration the sectoral analysis of FDI. It is important to empirically investigate how FDI in different sectors affect employment and poverty in municipalities at local level in South Africa. Future research should include a sector wise analysis for a more focused investigation of the sectoral impact of foreign investment. In addition, due to data restriction, the study focused only on the impact of greenfield FDI. It will be interesting to do a comparative analysis on the impact of brownfield and greenfield FDI on poverty at the sub-national level. Further studies should therefore consider analysing the impact of various types of foreign investment at the regional level.

2.8 Conclusion and Recommendations

This study examined the impact of FDI inflows on poverty at the sub-national level in South Africa using data from 213 local municipalities for the period 2000-2016. The data obtained was averaged on a 5-year interval since investment inflow is not annually constant. The study claims the use of spatial models as an improvement from the existing studies to account for the spatial interaction effects across local municipalities in South Africa. The South African government developed strategies such as social grants and provision of basic amenities to combat the rate of poverty that daily challenges the economy. Nevertheless, poverty remains a

major challenge since many households still live below the poverty line. Most emerging economies have regarded FDI as the essential instrument for fighting poverty. This is because it has proven to be a major source of capital investment required by emerging economies to generate employment and alleviate poverty (Jenkins, 2006). It is therefore important to examine its impact on poverty in the local municipalities in South Africa.

An additional motivation of the study is the presence of high spatial inequality across regions in South Africa. Determining the magnitude of spatial clustering among poor municipalities is crucial in pointing policymakers in the right direction, which is to focus on increasing employment opportunities, eradicating poverty and enhancing local economic development through FDI.

Taking into consideration the importance of spatial interactions across local municipalities in South Africa, which is the motivation behind this study, it finds that FDI has a negative significant impact on poverty suggesting that foreign investment reduces poverty in the local municipality "i". This finding is consistent with the results obtained by Fowowe and Shuaibu (2014) who found that FDI positively reduces poverty in Nigeria. Similar findings are reported by Fauzel et al., (2016). The results of the study therefore underline the need for more equitable distribution of development across local municipalities.

In a bid to understand the spatial correlation across municipalities, it is important to account for the spatial spillover effects. The indirect effect revealed a negative significant impact on poverty indicating a spatial spillover effect. The total effect which includes the direct intra-municipality and the indirect inter-municipality effects also revealed a negative significant relationship between FDI and poverty. The findings indicates that FDI significantly reduced poverty in the FDI-location (direct), neigbouring municipalities (indirect) and in municipalities at local level in South Africa (total). This confirms the existence of spatial interdependencies (spillovers) across local municipalities in South Africa.

Interestingly, FDI is spatially clustered in North West, Northern Cape, KwaZulu-Natal and Mpumalanga provinces and in local municipalities such as City of Matlosana, Ditsobotla, Dikgatlong, Emthanjeni, Abaqulusi, eDumbe, Dipaleseng, Dr JS Moroka. One possible reason for this is the presence of the South African mining industry in these provinces. However, our findings showed that KwaZulu-Natal and Northern Cape exhibit higher poverty rate in the country suggesting that the presence of FDI does not reduce poverty in these provinces. One possible reason could be that since FDI is not equally distributed across local municipalities, only municipalities that receive foreign investment and its neighbouring municipalities benefits. In other words, although some local municipalities in a province might benefit from

FDI, however, the benefit is not felt across the entire province. This implies that the concentration of foreign investment in fewer local municipalities does not encourage inclusive growth and development across the province. Hence, there is need for more spatial equality in the distribution of FDI for the province or the economy to benefit as a whole. Another explanation could be that the inflow of FDI into these provinces is capital rather than labour intensive and does not necessarily increase employment or reduce poverty.

Furthermore, previous empirical studies have shown that foreign investment inflow is unevenly distributed across local municipalities (Driffield, 2007; Wei et al., 2009; Dunstan et al., 2018). Therefore, in order to further reduce poverty in the local municipalities, policies to stimulate equal distribution of FDI across regions should be implemented. Each municipality need to identify their local advantage in order to compete for FDI, therefore, policy initiatives to discover and develop them would be beneficial in attracting more foreign investment. In addition, policymakers should focus on empowering the people of KwaZulu-Natal and Northern Cape with the required skills necessary to work in the MNCs located in these areas.

It is worth acknowledging that this study did not investigate the sectoral analysis of foreign investment at local municipalities. Clearly, further research is recommended for a better understanding of the impact of FDI on poverty at sub-national levels.

CHAPTER THREE

The Impact of FDI on Income Inequality at Local Municipal Level in South Africa.

3.1 Introduction

Research on the effect of FDI inflows in emerging countries has increased rapidly over the years (Wei et al., 2009). Eregha (2014) highlighted that foreign investment is the most acceptable form of resources flow relative to long term debt flow. This is because it is more beneficial than debt flow since it does not require interest or loan repayment. It is seen as a key determinant of growth and development in developing countries which has led many African economies to adjust their policies in other to attract foreign investment (Eregha, 2012; Mazenda, 2014). It is said to contribute to growth through transfer of modern technologies, increased employment opportunities, reduced poverty rates and increased GDP in emerging economies (Adams, 2009; Mazenda,2014).

Despite these benefits, there is an increasing debate that FDI also contributes to widen income distribution gap in emerging economies since it is more capital- than labour-intensive (Rye, 2016; Wei et al., 2009). One possible explanation for this is the movement of factors of production caused by the presence of foreign enterprises in emerging economies. In other words, the introduction of new technologies by multinational companies leads to a shift in labour demand from unskilled to skilled labour. This is because the technologies used in production process by these companies requires a certain level of skill usually possessed by skilled workers (Figini and Gorg, 1999). This leads to increased wage earnings since MNCs tend to pay higher wages when compared to local firms which creates a wide income disparity between the skilled, semi-skilled and unskilled workers in an economy (Bornschier and Chase-Dunn, 1985; Chen et al., 2010; Babatunde, 2018).

Although FDI inflow in South Africa has grown increasingly over the past years, however, it is characterized by a significant rise in income inequality (Malindini, 2017). Reports showed a Gini coefficient of 0.85 as at 2010, which dropped to 0.66 in 2015 (StatSA, 2019). Despite this decrease, income inequality is still on the high side when compared with other economies in the world. In addition, studies showed that the labour market contributes largely to overall income inequality at 74.2% suggesting that race and gender discrimination is observed in labour market in South Africa (StatSA, 2019). This is because a smaller percentage of the population benefits from wages equivalent to people's earning in developed economies while a larger percentage of the population earn as low as people living in the poorest economies (World Bank, 2018). To add to this, increased levels of inequality in South Africa is characterized by increasing rates of unemployment and significant disparity in earnings in the labour market (Leibbrandt et al., 2012). In other words, unemployment rate is vital in determining the magnitude of income inequality in most developing economies. In addition,

the labour market income accounts for about 84 to 90 percent of total Gini coefficient indicating that it contributes significantly to inequality in South Africa (Leibbrandt and Pabon, 2021).

There are several ways through which income inequality can be reduced in affected economies. According to Deardoff and Stern (1994), when capital investment either from foreign or local investment positively impacts an economy and an equal beneficial effect is felt, it tightens the income gap. Also, income inequality can be reduced if policymakers attract foreign investment to sectors that creates employment opportunities for unskilled workers (Pan-Long, 1995). The type of foreign investment inflow determines its impact on income inequality regions. This is very important in most developing economies and South Africa is not left out.

In South Africa, high levels of spatial inequality in economic activities are observed (Todes and Turok, 2017). Even after the apartheid regime that promised equal opportunity and improved living standards, inequality remains a persistent challenge faced by the country (Naude and Krugell, 2003; Turok, 2018; Woolard, 2002). According to Wilson (2011), although measures such as basic amenities provision, social grants targeting rural areas were put in place in a bid to reduce poverty and inequality in the economy however, high levels of inequality are still observed across the South African regions. In a bid to determine whether specific types of FDI contribute to income inequality in emerging economies, Bogliaccini and Egan (2017) conducted a study on sectoral FDI and inequality in emerging countries. They found that due to high demands for skilled worked in manufacturing industry, income gap was widened. As explained earlier, the employment of skilled workers creates a high wage inequality gap that further increases the levels of inequality in developing economies.

The need for a study evaluating the effect of FDI on income inequality at local municipal level is based on the impact of spatial concentration of FDI in fewer urban regions in developing economies. FDI is known to be spatially unevenly distributed across regions and tends to be dominated in urban areas with high population densities where maximum return on investment is achievable (Wei et al., 2009). By so doing, it further contributes to widening income gaps in countries like South Africa where inequality is already prevalent (Leibbrandt and Pabon, 2021; Malindini, 2018). Hence the need for a sub-national study to encourage the divergence of foreign investment in a bid to promote regional development in South Africa. As mentioned earlier, income inequality remains a challenge facing most developing economies in the world and most importantly South Africa. Therefore, further rise in income gap hinders the economy from attaining a sustainable environment suitable for economic growth and development (United Nations, 2015). The United Nations in 2015 proposed a set of Sustainable Development Goals (SDGs) built on the Millenium Development Goals (MDGs) of 2015.

These goals are the "world's shared plan to end extreme poverty, reduce income inequality and protect the planet" all set to be achievable by 2030 (United Nations, 2015; Hak et al., 2016). The main aim being to create an inclusive and sustainable environment for all. It is worth noting that achieving these goals is challenging to developing economies like South Africa because of consistent rise in poverty, unemployment, and income inequality. Hence, foreign investment is crucial to the attainment of these goals since it has proven to enhance economic growth by creating job opportunities, reduce poverty and increase technical skills in host economies (Adams, 2009; Jenkin, 2006; Masipa, 2018). FDI can also contribute to tightening income gap if the right form of investment is attracted. This will accelerate the achievement of the SDGs in the South African economy and help to create an inclusive and sustainable environment where all South Africans in every region play a role in enhancing growth and development.

Spatial inequality remains a barrier to achieving inclusive growth in South Africa since fewer urban metropolitan cities develop at the expense of other regions (Naude and Krugell, 2003; Turok, 2018; David et al, 2018). Therefore, understanding the magnitude of inequality at the sub-national level is crucial to eradicating socioeconomic challenges such as poverty, crime, unemployment and most importantly, income inequality. Studies have shown that spatial inequalities in certain regions frustrates policy measures targeted at eradicating inequality, poverty, crime rates, promotions targeted towards inclusive growth, and intergenerational mobility (Demombynes and Ozler, 2005; Chetty et al., 2014). A sub-national study is therefore important since examining this impact at the national level can lead to generalization, loss of information, and biased results (Ascani et al., 2012; Mahalakshmi et al., 2017; Iammarino, 2018; Gutierrez-Portilla et al., 2019). To add to this, FDI inflow does not only impact the region where it is located but neighbouring regions as well since it drives labour movement from one region to the other, hence the need to study spatial interactions across regions (Huang and Chand, 2015).

In addition, a national study merges both inter- and intra-regional disparity which can lead to growth of one region at the expense of others (Gutierrez-Portilla et al., 2019). Therefore, conducting a regional study is crucial because it sheds more light on regions that are not presently benefitting from foreign investment inflows and the measures to take to attract more investment into these regions. Also, it highlights lacking regions, making it easy to critically examine policies that will enhance foreign investment inflows into these regions. Each local municipality has its natural advantage over others, a regional study will therefore help policymakers to implement suitable policies required to enhance economic growth and

development of each municipality leading to overall growth, reduction in income disparities in these regions and South Africa as a whole.

Although various studies have examined the impact of FDI on income inequality (Feenstra and Hanson, 1997; Figini and Gorg, 1999; Hertzer and Nunnenkamp, 2012; Malindini, 2018), however, these studies were conducted at the national level and do not take into consideration spatial interactions across regions. A study by David et al., (2018) demonstrated the impact of spatial poverty and inequality on local municipalities in South Africa, however, the study admits to a single census being used in the analysis making it difficult to depict how changes in the variables employed affects poverty and inequality in the long run posing a challenge in making informed economic decisions. This study therefore contributes to extant studies by employing data from 2000-2016 to examine the impact of FDI on income inequality in municipalities at local level in South Africa.

The rest of the chapter is structured as follows: Section 2 reviews literature on FDI and income inequality followed by an empirical literature review. Section 3 reveals the methodology, data capturing and estimation strategy. Results are presented and discussed in section 4 while section 5 concludes.

3.2 Theoretical and Empirical Literature Review

3.2.1 Income Inequality in South Africa: An Overview

According to State of the African cities Report (2016), during the apartheid regime, health, education, and housing services were mainly provided for the white minority while the black Africans were denied access to these services. The labour market policies such as job reservations, limited competition from other races etc. only protected the white employees. The study further stressed that resources such as land, capital, mining were unevenly allocated which resulted in the marginalization of a greater part of the population. Black Africans were subjected to menial and low-paying jobs resulting in a struggle for survival (Woolard, 2002). These restrictive government policies led to wide regional disparity in government expenditure thereby establishing a correlation between location and poverty (Wilson, 2011). This is because the social distance between the haves and the haves not in South Africa is very wide. For instance, poor households are mostly dominated by blacks and coloured and live in the outskirts of major cities. The ethnic discrimination is also stressed by cultural and language differences. In most countries, variations in income, race and geographical location is often coincidental but in South Africa, these disparities are a result of discriminatory policies and legislations in

the apartheid regime (Burger et al., 2017; Wilson, 2011; State of South African Cities Report, 2016).

Following the fall of apartheid in 1994, the government has invested significantly in policies to improve equity among the South African citizens (Woolard, 2002). For instance, Nelson Mandela's post-apartheid government restructured the provinces and granted budgetary movements to empower the deprived provinces (State of the African cities Report, 2016). These policy reforms have granted the vulnerable access to major services such as electricity, clean water, formal housing etc. In spite of all these, inequality remains a major challenge in South Africa with race and geographical location serving as a major pointer of deprivation and poverty (Burger et al., 2017). This is because the location of the low-income housing opportunities continues to segregate the urban poor (State of the African cities Report, 2016).

In a recent study conducted by Statistics South Africa, it was discovered that about 67 percent of total inequality is attributed to income inequality and about 33 percent is attributed to high levels of unemployment in the economy. The study stressed that unemployment is a major determinant of income inequality with racial population being the main driver of unemployment in South Africa. This is because black Africans tend to be at a disadvantage when it comes to seeking job opportunities (StatSA, 2019; Leibbrandt and Pabon, 2021). In addition, the distribution of income between the employed also contributes significantly to income inequality. The study further argued that black Africans tend to be less paid when compared with the other racial groups in South Africa. All these factors are tied to the historical structure of the country regarding the apartheid regime and its impact on the segregation of the black race (StatSA, 2019; Wittenberg and Leibbrandt, 2017).

Based on past literature, several determinants of income inequality in South Africa have been discovered (Bahmani-Oskooee et al., 2014; Malindini, 2018). This chapter therefore critically examines these factors and their impact on income distribution. National income and trade openness is said to play a vital role in income distribution of many developing economies like South Africa (Bahmani-Oskooee et al., 2014). This is because national income leads to a reduction in income disparity in the long run due to increased opportunities in securing well paid manufacturing jobs because of an economy switching from agricultural to manufacturing production (Kuznets, 1995; Bahmani-Oskooee et al., 2014). Likewise, Bahmani-Oskooee et al., (2014) argued that trade openness tightens income gap in developing economies. This is justified based on the Stolper-Samuelson and Heckscher-Ohlin theory. These theories states that increased returns on trade increases labour income and further leads to a significant reduction in the income gap (Bahmani-Oskooee et al., 2014; Malindini, 2018).

In addition, according to Mihaylova (2015), education has proven to reduce income inequality in emerging countries due to the benefits that accrue from people attaining higher levels of education. This leads to significant increase in the supply of skilled labour thereby tightening income gap. GDP per capita as a determinant of economic development has been observed to also reduce income inequality (Odedokun and Round, 2001). FDI increases income inequality in early stages of development because as income increases, income inequality is expected to increase initially but as the economy stabilizes, it gradually reduces.

Bhorat et al., (2009) examined FDI on income inequality, it was discovered that racial population has a significant impact on income disparity in South Africa. Also, unemployment play a key role in determining income inequality because higher unemployment rate contribute significantly to widening income gap in most developing economies (Bogliaccini, 2017). To add to this, Bhorat et al., (2009) stressed that fiscal transfer in terms of social grants is a major driver of income inequality in South Africa. It is said to be one of the successful policies that the government introduced due to its ability to target the vulnerable and ensure that their basic needs are met by augmenting total household income (Bhorat et al., 2009; Pauw and Mncube, 2007). It is expected to tighten the income gap in the South African economy.

After careful review of the factors determining income inequality in South Africa, this chapter has determined some key factors influencing inequality such as unemployment rate, social grant, ethnic diversity etc. These factors have been included as control variables in the model specification and estimation and will be further explained in subsequent sections.

3.2.2 Theoretical Perspective to the causation between FDI and Income Inequality

Two main theoretical perspectives on impact of FDI on income inequality exists (Pan-long, 1995). These are: the modernization theory which is also referred to as the developmental theory and the dependency hypothesis also referred to as the world system theory (Pan-long, 1995). Although both theories recognize the role of foreign investment in emerging economies, however, they have different perspectives on the impact of FDI on economies.

The Modernization theory was postulated in the early 1950 by the neoclassical economists. The theory states that emerging economies experience different stages of development, and each stage has an implication on income inequality (Kaulihowa and Adjasi, 2017). In other words, inequality is a necessary precondition for improvement in overall income. This is buttressed by Kuznets's inverted U hypothesis that states that a rise in income disparity is unavoidable during early developmental stages, however as development progresses, income

inequality reduces. In other words, in early stages of development, emerging economies are associated with a wide gap between high- and low-income sectors leading to a general increase in income inequality (Adelman and Robinson, 1989; Pan-long, 1995). As development progresses, more output is produced and a shift in labour from traditional agriculture to modern industrial sector is observed. This shift in labour is associated with increase in income and economic growth gradually evening out income distribution (Fei and Ranis, 1964).

Furthermore, the modernization theorists treat both FDI and domestic investment as homogenous goods and are more interested in the presence rather than the origin of investment. They believe that investment whether foreign or local enhances growth and development and eventually benefits the economy (Pan-long, 1995, Mihaylova, 2015). Investment inflow to a particular sector has a lasting impact on the whole economy and facilitates more employment opportunities while reducing income inequality. In addition, modernization theorists believe that developing economies should focus more on what determines income distribution such as economic system and development strategies because the type and magnitude of investment does not increase income inequality.

The Dependency hypothesis on the other hand, was founded based upon critical reaction to the modernization theory. It views inequality from a world system and historical perspective. The theory emphasizes on social control and organization as the determinant of income inequality rather than economic output and wealth. In other words, the major determinant of income distribution is an economy's position in the globe (Girling, 1973). The main ideology of the theory is the existence of the core and periphery economies. The core comprises of the developed (rich) while the periphery comprises of the underdeveloped (poor) economies. The theory believes that there are factors that aid development such as international trade and foreign investment and for development to take place in the periphery economies, FDI must be attracted. As a result, the periphery is dominated by the core which constrains them from creating their own development path (Rubinson, 1976; Mihaylova, 2015).

Industrialization in the form of FDI led to the employment of locals in the MNCs who then form a new social class known as the "labour elites" since they are paid higher wages compared to the local firms (Girling, 1973; Pan-long 1995). Even though FDI increases income in the traditional sector, it also enhances capital-intensive production process (through technology transfer) which results in increased unemployment, thereby contributing to increased inequality.

The local labour elites aim at maintaining their social and wealth status and sometimes work in conjunction with foreign investors to drive local firms out of the market. One of the

assumptions of the dependency/world system framework is that the state has exclusive power to affect market and production. Labour elites form an "economic-cum-political" alliance since they are powerful people in the Country. This group then manipulates the state power in their interest. In other words, they form a destructive force (cabal) in frustrating policies aimed at the redistribution of income (Pan-long, 1995; Mihaylova, 2015).

3.2.3 Empirical Review of FDI and Income Inequality

After careful review of literature on FDI and income inequality, it is evident that it is far from conclusive (Herzer and Nunnenkamp, 2011; Malindini, 2018; Mah, 2003). Some studies assert that the inflow of foreign investment initially increases income inequality but declines in the long run (Herzer and Nunnenkamp, 2011; Figini and Gorg, 1998). Others state that FDI eventually increases income inequality (Pan-long, 1995; Chen et al., 2011). In contrary, other studies show that it reduces income inequality (Jensen and Rosas, 2007; Malindini, 2018) while several other studies show no linkage at all (Mah, 2003; Sylwester, 2005). This study therefore critically examines various empirical contributions to research as well as their conclusions.

Herzer and Nunnenkamp (2011) examined the impact of FDI on income inequality using panel co-integration techniques for the period 1980-2000. The findings showed that FDI widened income inequality in the short run while reducing it in the long run. This implies that FDI initially deepens income inequality but eventually tightens the income gap. The study also revealed a long-run reverse causality suggesting that increased FDI inflow reduces income inequality and increased income inequality reduces FDI inflows. However, the study did not take into consideration the spatial interaction effect across regions of the selected countries.

Similarly, in a bid to empirically support Kuznets's inverted-U hypothesis, Figini and Gorg (1998) examined the impact of foreign enterprises on income inequality in Ireland from 1979 to 1995. The introduction of capital technologies as a result of the presence of MNCs results in a higher demand for skilled labour, thereby, deepening wage disparity between white-collar and blue-collars workers. In the long run however, local firms master the usage of the new technologies and train unskilled workers who then become skilled, resulting in a significant tightening of income gap. This is in line with the modernization hypothesis which argues that income inequality is a necessary precondition for improvement in the overall income of the population. However, the study only took into consideration the manufacturing sector in Ireland, hence findings cannot be generalized as it is only specific to the selected sector.

Pan-long (1995) evaluated the impact of FDI on inequality in Less Developed Countries (LDCs). The study showed that FDI increases inequality in East/Southeast Asia. However, it is a cross country analysis that does not take into consideration spatial interaction effect within regions of an economy. Chen et al., (2011) evaluated the impact of FDI on wage inequality in the Chinese manufacturing industry using data from 1998 to 2007. The study revealed that foreign investment inflow increases inter-enterprise wage inequality in China. However, the study is sector specific and recommendations from this study does not necessarily apply to other sectors or total foreign investment inflow. Similarly, Choi (2006) conducted an empirical study on FDI and domestic income inequality using pooled Gini coefficient data from 119 economies. The study revealed that the inflow of foreign investment negatively impacts domestic income inequality in the selected economies.

In another study to evaluate the relationship between FDI and income inequality in Central and Eastern Europe, Mihaylova (2015) used several fixed effects models to analyze data from the period 1990-2012. The study revealed that although FDI potentially increases income inequality, however, the effects vary on the educational level and economic development of the host economies. However, the study is a cross country analysis and did not consider spatial correlation across regions of an economy. Similarly, in a study conducted by Basu and Guariglia (2007) using panel data showed that FDI increases inequality in the recipient countries. To evaluate the effect of sectoral FDI on inequality, Bogliaccini and Egan (2017) carried out a sectoral analysis of FDI and inequality in developing countries using error correction models to analyze data from 1989 to 2010. The findings revealed that FDI has the potential of increasing inequality in the service sector. Likewise, the study is a cross country analysis and does not account for the importance of spatial interactions across regions.

In Africa, Khaulihowa and Adjasi (2017) conducted a study on FDI and income inequality using pooled mean group estimator regression model on panel data from 16 African economies from 1980 to 2013. The findings revealed that FDI increases income inequality in Africa. However, the study does not take into consideration the within effects of spatial correlations across regions. In contrast, Malindini (2018) examined FDI on income inequality in South Africa using ARDL regression and error correction method to analyze time series data from 1970-2015. It revealed that FDI reduces income disparity in South Africa. However, it is a national study therefore results and recommendations are aggregated.

Jensen and Rosas (2007) conducted a study on foreign investment and income inequality using data from 1990 to 2000. The study revealed that FDI inflow reduces income inequality in Mexico. Similarly, in another study conducted by Bhandari (2007) to examine FDI inflow on

income inequality in emerging economies using fixed effects model from 1990 to 2002. It showed that FDI increased wage income inequality but has a relationship with per capita income inequality. This implies that FDI inflow reduces per capita income inequality in developing countries. To evaluate the linkage between FDI and income inequality, Sylwester (2005) conducted a study on FDI and income inequality in Less Developed Countries (LDCs). The study found no evidence of FDI increasing income inequality in the selected countries. Similarly, Mah (2003) examined the effect of globalization on earnings distribution using data from 1975 to 1995. The study did not find enough evidence to support the influence of globalization on income distribution in Korea. However, the study is a national study that does not take into consideration the importance of a sub-national study in producing a more accurate information without generalizing and bias.

It is evident from the empirical studies reviewed in this section that the need for a sub-national study is crucial. It is important to consider the role of spatial interactions across local municipalities on FDI and income inequality in order to get a more detailed information needed for policy recommendations. A sub-national study is important in highlighting the regions that are more affected by disparity in income and provides the opportunity to proffer a better solution in resolving this challenge facing lots of developing economies.

3.2.4 Empirical Evidence of FDI and Regional Income Inequality

Several studies revealed that FDI tends to increase regional income inequality in emerging economies since it is highly unevenly distributed spatially (Mallick and Zdrazil, 2018; Lessman, 2013; Yu et al., 2011; Wei et al., 2009; Wan et al., 2007). This is because various regions of an economy receive FDI based on their level of attraction to foreign investors. Hence, FDI inflows varies across regions and can lead to regional income disparity. This study therefore critically examines existing literature on the FDI and regional income inequality in developing economies.

Lessman (2013) examine FDI on regional inequality using panel data from 55 countries. The study showed that income inequality increased in low- and middle-income economies but no evidence of increase was observed in high income countries. Although the study is a regional study, however it is a cross country regional study which does not take into consideration the within effects of spatial interactions in an economy. In another study conducted by Mallick and Zdrazil (2018) on FDI and regional income inequality in Czech Republic using panel fixed effect regression in 14 regions from 1989-1999. The study revealed that FDI crucially

determines regional income disparity in the examined regions. However, the study did not consider the use of spatial analysis to take into account the importance of spatial interactions across the selected regions.

Wan et al., (2007) examined globalization and regional income inequality because of aggravating concerns of the impact of globalization on the increasing inter-region income disparity in China. The study employed the shapely value decomposition technique to analyse its data. It revealed that globalization positively impacted regional income inequality in China. Likewise, the study did not employ the use of spatial models to account for spatial correlation across regions in China. Similarly, in a bid to examine FDI on regional inequality in China, Wei et al., conducted a study using augmented cobb-douglas production function from 1979 to 2003. It revealed that FDI is responsible for regional inequality in China. It further suggested that it is the uneven distribution is the main cause of regional disparity.

None of the empirical studies examined used spatial models to investigate the importance of spatial interactions on the impact of FDI on regional inequality. Employing the use of spatial models in examining FDI on income inequality in municipalities at local level in South Africa is important because of the role of spatial interactions across regions. According to Tobler's first law of geography, "everything relates to everything else, but near things are more related than distant things" (Tobler, 1970). Hence, a spatial study helps to determine how spatial spillovers from local municipality 'i' to 'j' affect income inequality in South Africa. This study therefore takes a step further to contribute to existing empirical research by employing SAR, SLX and SDM models in analysing FDI on income inequality at local municipal level in South Africa. By so doing, spatial interactions across local municipalities are accounted for in South Africa.

3.3 Methodology

This section explores the model specifications and econometric framework employed in analyzing the impact of FDI on income inequality in municipalities at local level in South Africa for the period 2000 to 2016. Using static panel and spatial models, this study establishes the bases for a sub-national study with focus on the local municipalities.

3.3.1 Model Specification

The framework underpinning this chapter is based on the New Economic Geography postulated by Krugman in 1991. The theory purports that economic activities are concentrated in fewer

geographic locations leading to spatial disparities across regions. Following Malindini (2018), this section explores the specification of a multiple linear regression to account for key determinants of income inequality in South Africa and their part in determining income distribution in municipalities at local level in South Africa in the economy**.** The following variables are employed in the analysis. Income inequality is expressed as a function of FDI, domestic investment, GDP per capita, GDP growth rate, education, unemployment rate, age dependency ratio, social grant, African population, trade openness and rural ratio.

The model specification is expressed as:

$$INI=f(FDI_{i,t}, DI_{i,t}\ GDPC_{i,t}, GDPGR_{i,t}, EDU_{i,t}, UNEMP_{i,t},\ AGE_{i,t}, SOCGR_{i,t}, AFR_{i,t}, RR_{i.t},\ OPEN_{i,t},) \quad (3.1)$$

where:

INI represents income inequality measured as GINI coefficient for the ith local municipality for (i = 1,…,213) at time t for (t = 2000,…, 2016), FDI is the greenfield FDI, *DI* represents domestic investment measured as gross fixed capital formation in municipalities at local level in South Africa, *GDPC* is GDP per capita measured as gross domestic product divided by population for ith local municipality at time t, *GDPGR* is GDP growth rate measured as the difference between the current and prior GDP in municipalities at local level in South Africa divided by prior GDP, *EDU* represents education measured as matriculation qualification in municipalities at local level in South Africa, *UNEMP* is unemployment rate measured as the proportion of labour force currently unemployed, *AGE* is the age dependency ratio measured as the percentage of dependent population in municipalities at local level in South Africa, $SOCGR$ is social grant measured as expenditure incurred on grants such as child care etc., *AFR* represents African population measured as African population as a percentage of total population in municipalities at local level in South Africa. $RR_{i.t}$ represents rural population measured as percentage of rural population in municipalities at local level in South Africa. Finally, *OPEN* represents trade openness measured as sum of import and export expressed as a percentage of GDP.

3.3.2 Econometric Framework

This study estimates static panel and spatial models to analyze the impact of FDI on income inequality in municipalities at local level in South Africa. The baseline of the analysis is the static panel data estimations which includes the fixed and random effects model. The first approach to estimating a spatial model is to determine if a spatial autocorrelation exists across

local municipalities (Anselin, 2003). This study used the Moran's I statistic to test for the presence of spatial interdependencies across local municipalities in South Africa before estimating spatial models. We then proceed with the use of spatial estimation techniques. The SAR, the SLX and SDM are estimated to present the spatial interactions across local municipalities in South Africa. The static panel data estimation is expressed as:

$$y_{i,t} = a_i + \beta x_{i,t} + \varepsilon_{i,t}, \qquad \varepsilon_(i,t) \sim N(0, \sigma^2) \tag{3.2}$$

Where, $y_{i,t}$ is the income inequality coefficient (Gini coefficient) in local municipality 'i' (i=1,…,213) at year't' (t = 2000,...2016), α represents the intercept coefficient, β comprises of all the coefficients of the explanatory variables in matrix form. x_t represents a row vector that comprises of all the explanatory variables which includes FDI, domestic investment, GDP per capita, GDP growth rate, education, unemployment rate, age dependency ratio and trade openness and $\varepsilon_{i,t}$ is the white noise error term.

However, the static panel data estimation technique does not account for spatial interactions across regions. It is important to analyze how spatial interactions across regions affects FDI inflows and income inequality at the local municipalities in South Africa. Spatial analysis assumes that spatial interactions exist between dependent variables, explanatory variables, and residuals across regions (Elhorst, 2014). Ignoring the importance of spatial interaction effects might lead to biased results, rendering the static panel estimation technique inadequate. Therefore, to address the static panel limitation, spatial models were employed.

First, the Moran's I statistics determines the existence of spatial interdependencies across local municipalities. A positive value shows that spatial interactions exists and vice versa (Cliff and Ord, 1981; Moran, 1950). The Moran's I statistics is expressed as:

$$I = \frac{N}{W} \frac{\sum_i^N \sum_j^N w_{i,j}(x_i - \overline{x})(x_j - \overline{x})}{\sum_i^N (x_i - \overline{x})^2} \tag{3.3}$$

Where, x_i represents the municipality "i" intercept, x_j is the municipality j intercept, $\overline{x}$ represents the mean, $w_{i,j}$ is spatial weights for municipality i and j, and W represents the sum of all $w_{i,j}$. This chapter then proceeds to estimating the spatial models based upon the Moran's I statistics result.

A spatial weights matrix is essential to conducting a spatial analysis because it reveals the quantification of spatial interactions that is present among the attributes of a dataset (Anselin,

2003). This study therefore conducts a spatial analysis using a distance decay spatial weights matrix expressed as:

$$w_{ij} = \frac{1}{d_{ij}}$$

Where d_{ij} is the distance between local municipality "i" and "j". This is calculated using the maximum eigen value instead of the row-standardized matrix. This is because a row-standardized inverse distance weight matrix that is formulated based on distance decay will lead to loss of information and invalid economic interpretation (Anselin, 1988; Vega and Elhorst, 2013). An inverse distance matrix is selected over a contiguity-based matrix because a contiguity-based matrix is limited to effects from adjacent local municipalities alone while the inverse distance matrix accounts for all neighbouring municipalities (Vega and Elhorst, 2013).

For the purpose of this analysis, three spatial models were estimated, the SAR, SLX, and the SDM. The SAR model reveals the spatial interactions and the effect of changes in the dependent variables of a certain region on the dependent variable of surrounding regions (Golgher and Voss, 2016). In other words, it determines the effect of income inequality in local municipality "i" on income inequality in local municipality "j". It is estimated as:

$$y_{i,t}=a_{in} + \rho W y_{j,t} + \beta' x_{i,t} + \varepsilon_i, \qquad \varepsilon \sim \mathrm{N}(0, \sigma^2 \mathrm{In}) \qquad (3.4)$$

Where, $y_{i,t}$ represents income inequality in local municipality 'i' at year 't', a is measured as the intercept coefficient, i_n is the n-dimensional column vector containing 1. ρ represents the spatially lagged 'y' parameter measuring the degree of spatial dependence of dependent variables between neighbouring municipalities.

W measures the inverse distance spatial weight matrix, $Wy_{j,t}$ is the spatially lagged dependent regressor.β' is the coefficient of the explanatory variables, $x_{i,t}$ is a row vector that comprises of all the explanatory variables for local municipality 'i' at year 't'. ε_i measures the independent and identically distributed error term.

The SLX model on the other hand reveals spatial interactions in the explanatory variables of a region on the dependent variable of neighbouring regions. In other words, the impact of explanatory variables of local municipality "i" on income inequality in local municipality "j". It is expressed as:

$$y_{i,t}= a_{in} + \beta' x_{i,t} + W x_{j,t}\lambda + \varepsilon_i, \qquad \varepsilon \sim \mathrm{N}(0, \sigma^2 \mathrm{In}) \qquad (3.5)$$

Where: $y_{i,t}$ is income inequality in local municipality 'i' at year 't', a is the intercept coefficient, i_n is measured as the n-dimensional column vector containing 1, β' represents the coefficient of the explanatory variables, $x_{i,t}$ is a row vector that comprises of all the explanatory variables which includes FDI, education, age dependency ratio etc. for local municipality 'i' at year 't'. λ represents the spatial lag "x" parameter, W is the inverse distance weight matrix, $Wx_{j,t}$ is the spatially lagged 'x' variable.

Finally, the SDM reveals spatial interdependencies between dependent and explanatory variables (Lesage and Pace, 2009). More specifically, the SDM shows spatial interactions between income inequality coefficient and explanatory variables such as FDI, domestic investment, GDP per capita, education, age dependency ratio, social grant, race groups, trade openness in municipalities at local level in South Africa. It is expressed as:

$$y_{i,t} = ai_n + \rho W y_{j,t} + \beta' x_{i,t} + W x_{j,t}\lambda + \varepsilon_i, \qquad \varepsilon \sim N(0, \sigma^2 In) \tag{3.6}$$

$Where,$ $y_{i,t}$ represents income inequality coefficient in local municipality 'i' at year 't', a is the intercept coefficient, i_n is measured as the n-dimensional column vector containing 1, ρ is the spatially lagged 'y' parameter measuring the degree of spatial dependence of dependent variables between neighbouring municipalities. W represents the inverse distance spatial weight matrix, $Wy_{j,t}$ is the spatially lagged 'y' variable.

β' on the other hand, is the coefficient of the explanatory variables that are not spatially lagged, $x_{i,t}$ is a row vector that comprises of all the explanatory variables for local municipality 'i' at year 't'. W is the inverse distance spatial weight matrix which encapsulates the effect from nearby municipalities, $Wx_{j,t}$ represents the spatially lagged 'x' variable. λ represents the spatially lagged 'x' parameter measuring the degree of spatial dependence of the neighbouring municipality's explanatory variables and the dependent variable of municipality 'i'. ε_i is the error term.

3.4 Data Sources and Variable Descriptions

3.4.1 Data Sources

The FDI data employed in this study is obtained from Financial Time markets database (Financial Times, 2017). This type of investment is different from Mergers and Acquisitions because it directly facilitates the growth of capital formation in foreign markets. Hence, this study therefore refers to greenfield FDI as FDI. The poverty data is obtained from the HIS Markit Regional explorer while all other explanatory data is obtained from Quantec survey due

to the availability of local municipalities data. Furthermore, empirical studies have shown that FDI data is annually sparse (Dunstan et al., 2018). Hence, this study investigates the impact of FDI on income inequality at 5-year intervals. The FDI data is summed over the period of 5 years while the 5th year for all other variables is employed, resulting in 4 panel observations i.e., 2000-2004, 2005-2009, 2010-2014 and 2015-2016.

3.4.2 Variable Descriptions

3.4.2.1 Dependent Variable

Gini Coefficient: This coefficient is measured as the degree of income inequality in municipalities at local level in South Africa. It is the mostly used as measure of income inequality. This is because it has proven to be a straightforward and comprehensive measure (Deininger and Squire, 1996). The values of a Gini coefficient ranges from 0 to 1 where 0 implies perfect equality and 1 implies perfect inequality. This study therefore uses the Gini coefficient to measure the degree of income inequality in municipalities at local level. The inflow of foreign investment is expected to reduce the magnitude of income inequality in emerging economies. Following the study conducted by Jensen and Rosas (2007) who found that FDI reduce income inequality in Mexico, this study therefore anticipates a negative relationship between FDI and income inequality in South Africa.

3.4.2.2 Independent Variables

FDI: For the purpose of this study, it is measured as total FDI as a percentage of GDP in municipalities at local municipal level in South Africa. The inflow of FDI is expected to reduce income inequality and enhance equal income distribution in developing economies. This is because attracting foreign investment is an efficient way of boosting economic development (Wang et al., 2020). Following the findings of Herzer and Nunnenkamp (2011), this study anticipates a negative relationship between FDI and income inequality in the long run. The data is obtained from Financial Times FDI database and is measured in million USD.

Domestic Investment: This study defines domestic investment as the capital investments by the citizens of South Africa. Due to data availability, fixed capital formation is employed as a proxy for domestic investment. This is because research have confirmed that fixed capital formation can be used as a proxy for domestic investment since it contains a significant percentage of domestic investment (Hejazi and Pauly, 2002; Meyer and Sanusi, 2019). Hence, fixed capital formation is obtained from Quantec database for the period 2000 to 2016. It is

measured as Gross Fixed Capital Formation in million Rands as a percentage of GDP in municipalities at local level. For consistency with the FDI data, the domestic investment data is grouped into 5- year intervals. Contrary to Malindini (2018), this study anticipates a negative relationship between domestic investment and income inequality in municipalities at local level in South Africa.

GDP per capita: For the purpose of this study, is defined as the total gross domestic product divided by population in municipalities at local level in South Africa. In this context, GDP per capita is crucial because it helps to determine the income of individuals in the local municipalities which can help in ascertaining income trends that leads to reduction in the income gap. Studies have shown that as economy develops, per capita GDP increases, and income gap reduces. This is confirmed by the study conducted by Mihaylova (2015) where it was revealed that GDP per capita had a positive relationship with income inequality as a result of the lower level of economic development. Based on this finding, it is expected to have a negative relationship with income inequality in municipalities at local level.

GDP growth rate: For the purpose of this study, GDP growth rate represents total income in the local municipalities in South Africa. It is measured as the difference between current and previous GDP divided by previous GDP in local municipalities. Higher GDP growth rate is expected to reduce income gap in the long run (Bahmani-Oskoee et al., 2014). This study therefore expects a negative relationship with income inequality.

Education: Plays a vital role in achieving a more even income distribution in emerging economies. For the purpose of this study, education is measured as the percentage of people in a local municipality with matriculation and university qualification in South Africa. Higher educational attainment has proven to contribute significantly to income inequality reduction (Gregorio and Lee, 2002). Hence, the motivation behind the inclusion of university education to show the impact of different education levels on income inequality at the local municipal level in South Africa. Therefore, this study anticipates a negative relationship between education and income inequality at local municipal level in South Africa.

Unemployment Rate: Is measured as the rate of working population currently without job in local municipalities. Higher levels of unemployment contribute to widening income inequality in developing countries (Stats SA, 2019; Bogliaccini, 2017). It is therefore expected to impact income inequality positively in municipalities at local level in South Africa.

Age Dependency Ratio: Is measured as the proportion of the dependent population between the ages of 0 to 14 years of age and 65 years and above at local municipal level in South Africa. Studies have shown that the age dependency ratio of an economy can determine the levels of

income inequality (Dong et al., 2018). Therefore, this study anticipates a negative relationship between age dependency ratio and income inequality in local municipalities.

Social Grant: It is included in this study because the provision of social grants has assisted many households in South Africa to afford basic living standards, thereby contributing to reducing the income gap between the rich and the poor (Puaw and Mncube, 2007; Bhorat et al., 2009). As a result, this study anticipates a negative relationship between social grant and income inequality. It is measured as national expenditure on social grant as a percentage of GDP in municipalities at local level in South Africa.

Race Groups: This study acknowledges the four main race groups in South Africa: African, White, Coloured, Indian and the crucial role they play in determining income inequality levels in the economy. This is as a result of the historical background of the country and the impact of the apartheid system (Woolard, 2002; Bhorat et al., 2009). In order to avoid multicollinearity, this study includes only African population in its analysis. This is because past research has shown that Africans experience higher income inequality levels when compared with the other ethnic category in South Africa (Gradin, 2013). It is measured as a percentage of African population to total population at local municipal level in South Africa.

Trade Openness: Measured as the sum of imports and exports expressed as a percentage of GDP in municipalities at local level in South Africa. It determines the level of an economy's involvement in international trade. This variable is important to reducing income gap because increase in international trade involvement is expected to increase growth and development in an economy which in turn reduces income inequality (Malindini, 2018; Kaulihowa and Adjasi, 2017). This study therefore anticipates a negative relationship with income inequality in local municipalities.

Rural Ratio: The percentage of rural population in most developing economies have been observed to bear most of the burden of income inequality in various economies. This is due to restricted levels of development of the rural regions and gross migration from rural to urban areas in search of better living standards (David et al., 2018). This study measures rural ratio as the percentage of population that falls below the population density mark of 500 per land area. Based on Luo et al., (2020), it is expected to have a positive relationship with income inequality.

3.5 Empirical Analysis

3.5.1 Descriptive Statistics of Key Variables

Table 3.1 presents a summary of all the variables used in analyzing the impact of FDI on income inequality at local municipal level in South Africa. Table 3.2 on the other hand reveals the average FDI inflow at the provincial level from 2000-2016. As seen in table 3.2, it is observed that the highest FDI receiving provinces are North West, Northern Cape and KwaZulu-Natal while Free State appears to receive the lowest foreign inflow in South Africa.

Table 3. 1 Summary Statistics of Variables in municipalities at local level in South Africa

Variables	**Obs.**	**Mean**	**Std. Dev**	**Min**	**Max**
Gini Coefficient (%)	636	0.6350093	0.0329677	0.55123	0.76465
FDI (%)	852	28.9495	141.7143	0.003	2138.8
Domestic Investment (%)	852	9177.025	31990.14	5.16391	395099.3
GDP per capita (rands)	852	0.0543279	0.1951455	0.0027	3.529536
GDP growth rate (%)	852	8.279	3.707	-2.240	25.129
Matriculation Education (%)	724	42114.06	135671.9	562.09	1246303
University Education (%)	732	2745.35	11500.77	21.65	119497
Unemployment Rate (%)	852	28.32641	12.91068	2.227099	66.93624

Age Dependency Ratio (%)	804	62.64	15.99	25.80	132.736
Social Grant (%)	639	1.03e+08	2.40e+07	7.07e+07	1.28e+08
African Population (%)	835	95.16874	203.6298	2.233278	3028.792
Rural Ratio (%)	813	0.0832047	0.2946114	0.0001532	4.12431
Trade Openness (%)	852	0.3702644	1.092086	0.019476	19.91156

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 3. 2 Average FDI Inflow (%) at the Provincial Level in South Africa

Province	**Local Municipalities**	**2000-2004**	**2005-2009**	**2010-2014**	**2015-2016**	**Average over selected years**
Eastern Cape	33	2.788	31.399	58.095	1.421	23.426
Free State	19	0	7.465	22.781	0	7.562
Gauteng	9	0.926	37.833	34.711	4.052	19.381
Kwa-Zulu-Natal	45	12.468	55.582	33.368	9.510	27.732
Limpopo	21	0.909	36.973	33.991	15.173	21.762
Mpumalanga	17	8.829	48.991	32.382	14.594	26.199

Northern Cape	26	2.138	16.285	129.026	69.893	54.336
North West	18	54.050	133.322	74.306	2.236	65.979
Western Cape	25	0.200	12.426	21.089	19.152	13.217
Total	213	82.308	380.276	439.749	136.031	259.591

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 3.3 presents the average Gini coefficient at the provincial level from 2000-2014. It is observed that income inequality is higher in Free State, Northern Cape, Gauteng and lower in Limpopo, Western Cape, and Mpumalanga provinces. The income inequality in places like Gauteng, Western Cape, Mpumalanga is due to the presence of overcrowded townships and shack settlements located in various urban areas in South Africa (Turok, 2018). This is as a result of mass in-migration that occurs through the movement of people from other provinces to large cities in search of a better life.

Table 3. 3 Average Gini Coefficient (%) at the Provincial Level in South Africa

Province	**Local Municipalities**	**2000-2004**	**2005-2009**	**2010-2014**	**Average over selected years**
Eastern Cape	33	0.665	0.652	0.620	**0.646**
Free State	19	0.691	0.679	0.648	**0.673**
Gauteng	9	0.662	0.655	0.631	**0.649**
KwaZulu-Natal	45	0.655	0.642	0.612	**0.636**

Limpopo	21	0.594	0.587	0.574	**0.585**
Mpumalanga	17	0.627	0.620	0.601	**0.616**
Northern Cape	26	0.676	0.664	0.634	**0.658**
North West	18	0.648	0.640	0.620	**0.636**
Western Cape	25	0.588	0.594	0.591	**0.591**
Total	213	5.806	5.733	5.531	**5.690**

Source: Estimates using data from Quantec, IHS and Financial Times.

Table 3. 4 Average GDP per capita (%) at the Provincial Level in South Africa

Province	**Local Municipalities**	**2000-2004**	**2005-2009**	**2010-2014**	**2015-2016**	**Average over selected years**
Eastern Cape	33	0.012	0.021	0.032	0.037	**0.026**
Free State	19	0.021	0.037	0.049	0.055	**0.041**
Gauteng	9	0.097	0.150	0.209	0.231	**0.172**
KwaZulu-Natal	45	0.045	0.075	0.106	0.118	**0.086**
Limpopo	21	0.020	0.038	0.052	0.063	**0.044**
Mpumalanga	17	0.020	0.034	0.047	0.050	**0.038**

Northern Cape	26	0.021	0.035	0.052	0.057	**0.041**
North West	18	0.020	0.031	0.043	0.048	**0.036**
Western Cape	25	0.030	0.045	0.063	0.062	**0.050**

It is evident from literature that higher income levels are associated with low-income inequality in most developing economies (Odedokun and Round, 2001). This is true for provinces such as Western Cape province, however, this theory does not hold true for all provinces in South Africa. For instance, this study discovered that although Limpopo is categorized with low-income levels, it is also associated with low-income inequality. One possible explanation for this is attributed to Limpopo being one of the poorer regions in South Africa mainly dominated by the black Africans. Income inequality tends to be lower in poorer regions since wages are mostly on the same pay scale and unemployment tends to be predominantly higher in such areas like Limpopo.

Another province worth highlighting is the Gauteng province. This study finds that Gauteng province has the highest income levels in South Africa, however, it is also associated with higher levels of income inequality when compared with other provinces. As previously explained, this is justified based on the rural-urban migration and the inability of the migrants to secure affordable housing resulting in their seclusion and segregation to areas known as shacks.

3.5.2 Preliminary Analysis

3.5.2.1 Night Lights Imagery and ArcMap

This section explores the use of nights light imagery and ArcMap in analyzing the spatial dimensions of FDI inflow and income inequality in local municipalities.



Figure 3. 1 Night lights showing light luminosity in municipalities at local level in South Africa

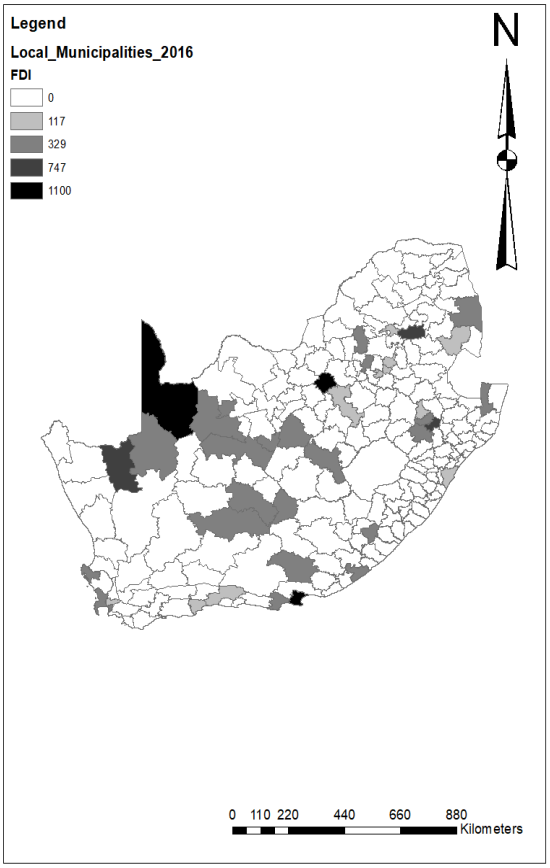


Figure 3.2 FDI inflow in municipalities at local level in South Africa

Figure 3.1 represents the light luminosity which presents economic activities of local municipalities in South Africa. As seen in the figure, economic activities are observed to be dominant in Gauteng, Western Cape, Mpumalanga while Northern Cape, Eastern Cape and Free State showed very low lights depicting minimal economic activities in these regions. This implies that economic activities are dominant in the urban areas of South Africa while the rural regions suffer from very minimal economic interactions. This buttress the findings of Zhao et al., (2003) who found that population, FDI and employment opportunities (economic activities) are concentrated in urban regions in China.

Figure 3.2 reveals the concentration of FDI inflows in Northern Cape, Gauteng, Western Cape, while minimal foreign inflow is observed in Limpopo and North West provinces. However, it is important to point out that although Northern Cape depicted higher foreign investment inflows, it however revealed very low lights (economic activities). One possible explanation to this could be due to the requirements for getting job opportunities with foreign companies.

Studies have shown that foreign organizations mostly employ semi-skilled and skilled labour (Figini and Gorg, 1999). Thus, if the labour present in Northern Cape is unskilled, foreign investment inflow will not have a significant impact on its economic activities.

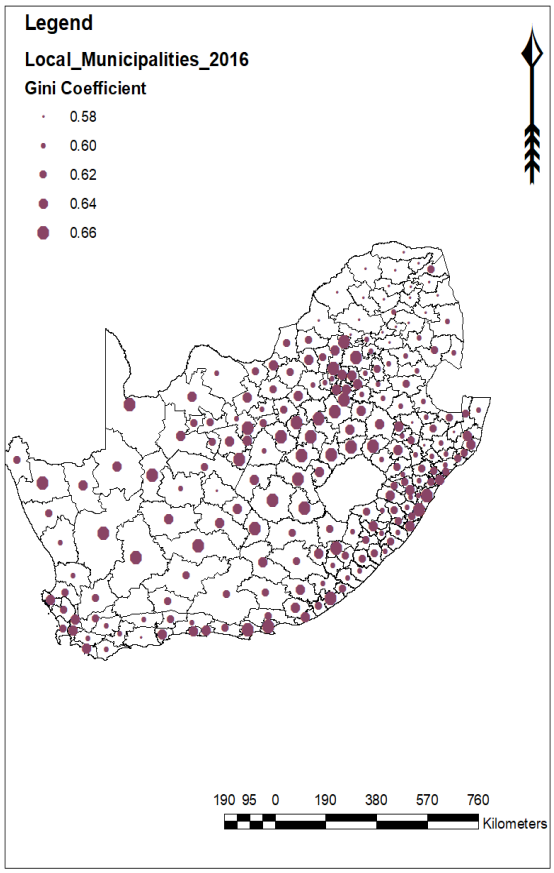


Figure 3.3 Pattern of income inequality in municipalities at local level in South Africa

With regards to figure 3.3 which shows the income inequality level in local municipalities, higher levels of income inequality are observed to be higher in Free State, Northern Cape, Gauteng, and Eastern Cape and in local municipalities such as Letsemeng, Kopanong, Mokokare, City of Johannesbuurg, Mogale City, Merafong City, Senqu, Elundini, Nyandeni. Lower levels of income inequality are observed in Limpopo, Western Cape, and Mpumalanga and in local municipalities like Greater Giyani, Greater Letaba, Thabazimbi, Langeberg, Swellendam, Witzenberg, Thembisile, Thaba Chweu, and Nkomazi.

It is evident from this finding that income inequality is also present in large cities due to the high level of income disparities between the citizens in the location. For instance, income inequality is prominent in Johannesburg because of the significant difference in the living

standards of its people. Due to spiral increase in migration levels in the search of better standard of living, many migrants are forced to dwell in lower standard accommodations popularly referred to as shacks as a result of lack of affordable housing. This has resulted in high levels of income disparities present even in large cities (Turok, 2018).

3.6 Regression Results and Discussion

This section presents the result estimations on the impact of FDI on income inequality in municipalities at local level in South Africa. Table 3.5 reveals the fixed and random effects regression results. Based on the Hausman statistics test, this study chose the fixed effect method as the most appropriate method of analysis. As seen in table 3.5, FDI revealed a positive significant relationship with income inequality. Domestic investment showed a positive significant relationship with income inequality while unemployment rate, age dependency ratio and social grant revealed a negative significant relationship with income inequality. Unemployment rate, age dependency ratio and social grant revealed a negative significant relationship with FDI. On the other hand, GDP per capita, GDP growth rate, matriculation education, African population, trade openness, and rural ratio revealed a positive insignificant relationship with income inequality while university education showed a negative insignificant relationship. As previously discussed, social grant plays a vital role in the determinant of income inequality in South Africa. As seen in this result, it revealed a negative significant relationship with income inequality indicating that the provision of social grant such as child support grant has helped to significantly reduce income gap between the rich and the poor in the local municipalities in South Africa.

Table 3. 5 Fixed and Random Effect Results on Income Inequality

	Fixed Effect	**Random Effect**
Variables	**Gini Coefficient**	**Gini Coefficient**
FDI	0.000725*	0.000707**
	(0.000403)	(0.000335)
Domestic Investment	0.000678***	8.06e-05***
	(9.56e-05)	(2.89e-05)
GDP per capita	-0.638	-0.242*
	(0.538)	(0.129)
GDP Growth Rate	0.00343	0.000686
	(0.00236)	(0.00205)
Matriculation Education	1.69e-06	8.27e-08
	(2.07e-06)	(3.07e-07)

University Education	-1.30e-05	-7.27e-07
	(1.99e-05)	(3.21e-06)
Unemployment Rate	-0.0266***	-0.00210***
	(0.00345)	(0.000732)
Age Dependency Ratio	-0.00759***	0.000147
	(0.00290)	(0.000395)
Social Grant	-3.80e-09***	-3.46e-09***
	(2.09e-10)	(1.56e-10)
African Population	0.00154	0.000225*
	(0.00181)	(0.000122)
Trade Openness	0.000998	-0.00531
	(0.0143)	(0.00723)
Rural Ratio	0.401	-0.103***
	(0.380)	(0.0257)
Constant	1.707***	0.778***
	(0.234)	(0.0322)
Observations	852	852
R-squared	0.515	
Number of Local Municipalities	213	213
Hausman Statistics (p-value)	0.0000	
Moran's I Statistics (p-value)	0.0000	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Taking into consideration spatial interactions effect across local municipalities in South Africa, this section presents the results of spatial analysis in table 3.6. As seen in the table, column one, two and three revealed the SAR, SLX, and SDM results respectively. Conducting these analyses was mainly dependent on the outcome of the Moran's I statistics. The result was positive and highly significant indicating that spatial interaction exist across local municipalities in South Africa and thus a spatial analysis can be conducted.

Table 3. 6 Spatial results on income inequality

	SAR	**SLX**	**SDM**
Variables	**Gini Coefficient**	**Gini Coefficient**	**Gini Coefficient**
FDI	8.45e-05	0.000427***	0.000149***
	(6.49e-05)	(0.000162)	(5.72e-05)
Domestic Investment	-1.33e-05	0.000122***	-1.45e-05
	(1.57e-05)	(3.95e-05)	(1.40e-05)
GDP per capita	-0.0798	-0.0532	-0.0602
	(0.0867)	(0.221)	(0.0778)
GDP Growth Rate	-0.000346	-0.00312***	3.97e-05

	(0.000380)	(0.00111)	(0.000393)
Matriculation Education	9.30e-08	4.64e-08	-6.88e-08
	(3.33e-07)	(8.38e-07)	(2.95e-07)
University Education	-2.01e-07	-5.72e-07	8.19e-07
	(3.20e-06)	(8.03e-06)	(2.83e-06)
Unemployment Rate	0.00135**	0.00202	0.00132**
	(0.000570)	(0.00169)	(0.000594)
Age Dependency Ratio	-0.000298	-0.00115	-0.00105**
	(0.000468)	(0.00122)	(0.000431)
Social Grant	1.47e-12	-4.02e-09***	-3.72e-09***
	(3.79e-11)	(8.22e-10)	(2.89e-10)
African Population	0.000217	0.000184	0.000223
	(0.000291)	(0.000742)	(0.000261)
Trade Openness	0.00283	0.00396	0.00439**
	(0.00231)	(0.00579)	(0.00204)
Rural Ratio	0.381***	0.297*	0.377***
	(0.0611)	(0.153)	(0.0540)
Constant	0.0359***	0.0892***	0.0314***
	(0.00101)	(0.00250)	(0.000880)
Rho	1.0111***		1.0382***
Lambda (FDI)		0.0261***	0.0008493
Observations	852	852	852
Number of groups	213	213	213
Log Likelihood	1201.47	641.8533	1290.40
Likelihood Ratio test			177.86***
Pseudo R2	0.0155	0.2202	0.1728
Wald test of spatial terms	47639***	3340.71***	3284.76***
AIC/BIC	-2376.95/ -2432.36	-1239.71/-1135.26	-2536.81/-2432.36

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. 7 Result for Cumulative (direct, indirect, and total) Spatial Models on Income Inequality

	SAR	**SLX**	**SDM**
Direct Effect	**Gini Coefficient**	**Gini Coefficient**	**Gini Coefficient**
FDI	0.0000511 (0.0000411)	0.0004267*** (0.0001621)	0.0000485 (0.0001121)
Domestic Investment	-8.02e-06 (0.0000102)	0.0001225*** (0.0000395)	0.0000173 (0.0000166)

GDP per capita	-0.0482357 (0.0536745)	-0.0517048 (0. 2209549)	0.0697113 (0.1149159)
GDP growth rate	-0.0002088 (0.0002393)	-0.003122*** (0.001111)	0.0002415 (0.0004271)
Matriculation Education	5.62e-08 (2.01e-07)	4.64e-08 (8.38e-07)	-1.17e-07 (2.79e-07)
University Education	-1.21e-07 (1.93e-06)	-5.72e-07 (8.03e-06)	7.34e-07 (2.54e-06)
Unemployment Rate	0.0008134* (0.0004532)	0.0020211 (0.0016866)	0.0010376 (0.0006521)
Age Dependency Ratio	-0.0001802 (0.0002835)	-0.0011509 (0.0012247)	-0.0008344 (0.0005339)
Social Grant	8.89e-13 (2.30e-11)	-4.02e-09*** (8.22e-10)	-3.74e-09*** (2.88e-10)
African	0.0001313 (0.000179)	0.0001836 (0.0007417)	-0.0000678 (0.0003514)
Openness	0.001707 (0.0014745)	0.0039625 (0.0057938)	0.0026962 (0.0025462)
Rural Ratio	0.2303571*** (0.0740274)	0.2971903* (0.1532262)	0.4320457*** (0.0698178)
Indirect Effect			
FDI	-0.0073869 (0.0065252)	0.0257868*** (0.0021441)	-0.0258365 (0.025618)
Domestic Investment	0.0011599 (0.0013596)	0.0053713*** (0.0001875)	-0.0258365*** (0.025618)
GDP per capita	6.979366 (8.158295)	2.428729 (2.507081)	33.5505 (25.32682)
GDP growth rate	0.0302097 (0.0348324)	-0.0036692 (0.0036501)	0.052102 (0.035514)
Matriculation Education	-8.13e-06 (0.0000293)	7.77e-07 (1.86e-06)	-0.0000125 (0.0000186)
University Education	0.0000176 (0.0002799)	0 (0)	-0.0000219 (0.0000759)
Unemployment Rate	-0.1176966* (0.0605725)	-0.027493*** (0.0061565)	-0.0740817 (0.0544448)
Age Dependency Ratio	0.0260991 (0.0429417)	-0.012029 (0.0078785)	0.0566839 (0.0736832)
Social Grant	-1.29e-10 (3.29e-09)	-2.70e-10 (9.38e-10)	-5.27e-09 (4.91e-09)
African	-0.0189916 (0.0267391)	-0.0086686 (0.0074241)	-0.0751793 (0.0720387)
Openness	-0.2469915 (0.2245406)	0.0518826 (0.0510471)	-0.4381949 (0.500013)
Rural Ratio	-33.33106** (14.46298)	-1.908195 (1.315329)	14.1424 (13.19099)
Total Effect			
FDI	-0.0073358 (0.0064975)	0.0262136*** (0.0021603)	-0.025788 (0.0257144)

Domestic Investment	-0.0011519 (0.001351)	0.0054938*** (0.000188)	0.0082461*** (0.0019366)
GDP per Capita	6.931131 (8.114216)	2.370388 (2.550329)	33.62021 (25.4118)
GDP growth rate	0.0300009 (0.0346355)	-0.0067912 (0.0033133)	0.0523435 (0.0356898)
Matriculation Education	-8.07e-06 (0.0000291)	8.23e-07 (1.97e-06)	-0.0000126 (0.0000185)
University Education	0.0000174 (0.000278)	-5.72e-07 (8.03e-06)	-0.0000212 (0.0000734)
Unemployment Rate	-0.1168832* (0.0604873)	-0.0254719*** (0.005729)	-0.0730441 (0.0547244)
Age Dependency Ratio	0.0258989 (0.0426835)	-0.0131799* (0.0077031)	0.0558496 (0.074)
Social Grant	-1.28e-10 (3.27e-09)	-4.29e-09*** (5.10e-10)	-9.01e-09* (4.91e-09)
African	-0.0188603 (0.0265818)	-0.0084849 (0.0075315)	-0.0752471 (0.0722766)
Openness	-0.2452844 (0.2235036)	0.0558451 (0.0519715)	-0.4354987 (0.5015784)
Rural Ratio	-33.10071** (14.50917)	-1.611005 (1.330355)	14.57444 (13.23572

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.7 presents the cumulative spatial results which revealed the direct, indirect, and total effect. Based on the likelihood ratio test, the SDM is selected as the most preferred model of analysis because it is the combination of the dependent and the independent spatial interaction effect across local municipalities. As seen under the direct effect, FDI revealed a positive insignificant relationship with income inequality indicating that no relationship exists between FDI inflow and income inequality in local municipality “i”. This finding is in line with that of Sylwester, (2005) and Mah, (2003), who found that FDI does not have a relationship with income inequality.

Similarly, domestic investment revealed a positive insignificant relationship with income inequality suggesting that in local municipalities in South Africa, local investment has no relationship with income inequality. This finding does not meet apriori expectations and is not in line with the findings of Bhandari (2007) who found that domestic investment has a negative relationship with income inequality. One possible explanation for this is that domestic investment in the local municipalities is not substantial enough to contribute to reducing income gap.

GDP per capita also showed a positive insignificant relationship with income inequality indicating that no relationship exist between GDP per capita and income inequality in at local municipal level. Although theoretical knowledge has proven that as GDP per capita increases, income inequality reduces (Odedokun and Round, 2001), however, this study did not find enough evidence to support that. Also, this finding contradicts the findings of Kaulihowa and Adjasi (2017) who found that GDP per capita worsens income inequality in South Africa. Similarly, GDP growth rate also revealed a positive insignificant relationship with income inequality in local municipality "i". This is not in line with the recommendations of Bahmani-Oskooee et al., 2014 who indicated that national income could reduce income gap in the long run.

Matriculation Education on the other hand showed a negative insignificant relationship with income inequality in local municipality "i". This finding is not in line with theory where education is expected to tighten the income gap in economies. One possible reason for this could be that basic education does not supposedly increase the income of the citizens of South Africa. University Education also revealed a positive insignificant relationship with income inequality indicating that higher level of education shows no relationship with income inequality in local municipality "i". Although education at higher level should have portrayed a more desirable result since foreign investors employ the best hands, however, the rate of attainment play a significant role. This finding is in line with that of Kaulihowa and Adjasi (2017) who found that education showed a positive relationship with income inequality. One possible reason for this might be based on the percentage of population attaining further education. From the result, it is evident limited percentage of the population further their education after matriculation. Hence, further education attainment should be encouraged in the local municipalities.

Unemployment rate showed a positive insignificant correlation with income inequality. This is not in line with theoretical expectations because increased levels of unemployment in an economy is expected to contribute to widening the income gap further (Bogliacinni, 2017). As seen in Mackett, (2020), one possible reason for this is that studies have shown that social grant such as unemployment benefits and the Unemployment Insurance Fund are aimed at tightening income gap in South Africa. In addition, most unemployed tend to live in a grant-receiving household and might be categorised as low-income earners making it difficult for unemployment to significantly impact income inequality in local municipality "i".

Age dependency ratio revealed a negative insignificant relationship with income inequality. This is not in line with apriori expectations since higher levels of age dependency ratio is

expected to cripple an economy and further widen income gaps (Dong et al., 2017). This finding however indicates that no relationship exist between age dependency ratio could increase income gaps in the local municipalities in South Africa. One possible reason for this could be due to the pre-existing levels of income inequality and as a result age dependency does not significantly influence income distribution in municipalities at local level in South Africa.

Social grant revealed a negative significant relationship with income inequality suggesting that social grant contributes to tightening income inequality in local municipality 'i". This finding is buttressed by that of Pauw and Mncube (2007) who highlighted that social grant has proven to be a significant income aimed at tightening income gap in South Africa. This study found no relationship between African population and income inequality in local municipality 'i". This does not corroborate the finding of Gradin (2013) who found that higher levels of income inequality is observed to exist in the African population group.

Trade openness on the other hand, showed a positive insignificant relationship with income inequality in municipalities at local level. This finding is not in line with that of Malindini (2018), and Adams (2008) who found that trade openness contributes to reducing income inequality. One possible explanation to this is the case of the rich getting richer while the poor keep getting poorer. Due to the high levels of spatial inequality in the economy, only a few percentages of the population benefit from the ability to import or export thereby further widening the income gap.

Lastly, rural ratio revealed a positive and highly significant relationship with income inequality. This finding indicates that the percentage of rural population contributes to widening income gap at local municipal level in South Africa. In order words, as rural population increases, income inequality increases. This finding is in line with apriori expectations since lack of rural development increases levels of migration thereby widening income gaps in developing economies (United Nations, 2021).

With regards to the indirect effect which revealed the impact of neighbouring explanatory variables on income inequality in local municipality "i'. As observed, majority of the impact are not significant indicating that spatial spillover is not very strong when examining the selected explanatory variables and income inequality at the local level. This is in line with the findings of David et al., (2018) who also discovered a weak spatial indirect effect using the SDM estimation technique. One possible explanation to this is that spatial interactions strong mobility between and across local municipalities is not observed.

Looking at the total effect results which revealed the impact of the explanatory variables on income inequality in municipalities at local level having accounted for the spillover effect of surrounding municipalities, this study observed that FDI inflow has no relationship with income inequality. Domestic investment on the other hand, revealed a positive significant relationship with income inequality suggesting that it contributes to widening inequality gap at local municipal level. A possible explanation for this is that domestic investment is location-based and has been observed in the metro municipalities and urban areas, hence income disparity will increase since the rural areas in South Africa do not benefit. Social grant maintains a negative significant relationship with income inequality although after taking into consideration spillover effect, the level of significance dropped. All other explanatory variable showed no relationship with income inequality at local municipal level.

3.7 Study Limitations

It is important to point out that sectoral analysis of FDI inflow is outside the scope of this study. Future research can consider the impact of FDI inflow into various sectors such as manufacturing and service industries. Also, this study only focused on the greenfield investment. It would be useful to examine the different types of FDI like brownfield investment which mainly comprises of mergers and acquisitions and its impact on income inequality in municipalities at local level in South Africa. Finally, the determinants of foreign investment and its impact on income inequality at the sub-national level is an avenue for further studies.

3.8 Conclusions and Recommendations

This study examined the impact of FDI on income inequality in municipalities at local level in South Africa using fixed effects, and spatial models for the period 2000 - 2016. Although previous empirical studies have examined this in South Africa, however, this study contributes to empirical literature by taking a step further in analyzing the importance of spatial interactions across local municipalities using spatial models. This is critical for the enhancement of growth and development in regions. Considering spatial correlation across regions results in a more intensified analysis and cuts out the peripheral of national studies which might lead to bias and incomplete information (Gutiérrez-Portilla et al., 2019).

South Africa is categorized as one of the countries with the highest level of inequality in the world (Woolard, 2002; David et al., 2018, Stats SA, 2019). The foundation of this draws back to the period of Apartheid when the blacks were segregated and marginalized. This affected the development of certain regions and people at the expense of others. Therefore, to achieve

the SDGs, measures be put in place to ensure that all regions develop simultaneously. This will enhance regional economic growth and development, tighten the income inequality, and create an inclusive and sustainable environment for all (United Nations, 2015). Hence the need for a sub-national study.

The findings of this study are worth noting, the outcome of this analysis did not find enough evidence to justify a relationship between FDI and income inequality at local municipal level in South Africa. In other words, FDI does not contribute to tightening the income gap at local level. However, based on the benefits of FDI revealed in several literature, it can help to reduce income gap in South Africa if the right measures are implemented. One of such is that FDI should be distributed equally across local municipalities. This can be achieved when regional policymakers find out the natural advantage that each local municipality have over others to attract foreign investors. By so doing, neighbouring local municipalities also tend to benefit from the inflow of FDI (Iammarino, 2018). Also, backward, and forward linkage should be encouraged to ensure that foreign investors source their inputs locally and engage business owners in advertising and marketing their finished goods (Orlic et al., 2018). This will further increase employment opportunities and gradually reduce income inequality across South African local municipalities.

In addition, this study found a positive significant relationship between domestic investment and income inequality when spatial interactions are accounted for. This type of relationship was not anticipated, it indicates that domestic investment contributes to widening income gap in municipalities at local level in South Africa. This could be because domestic investment is location-based and concentrated in fewer urban regions of South Africa, hence rural regions do not benefit and as a result widens income gap. Policymakers should therefore ensure that local investment is further encouraged across all regions in South Africa. Increased spread of local investment can significantly reduce income gap in local municipalities, this will further promote the development of poorer regions thereby encouraging inclusive growth and development.

In addition, higher educational attainment should be encouraged since foreign investors tend to employ skilled workers. Higher levels of education across local municipalities indicates that better paying jobs can be sourced for, which will further increase the living standards of citizens and gradually reduce the income gap (Gregorio and Lee, 2002). This will result in a more inclusive and sustainable environments thereby accelerating the attainment of the SDGs. It is evident from this study that income inequality is dominant in provinces such as Free State, Northern Cape, Gauteng, and Eastern Cape and in local municipalities such as Letsemeng,

Kopanong, City of Johannesburg, Mogale City, Senqu, and Elundini. This study therefore recommends that foreign investment inflow that is line with the average educational attainment of the people within these regions be encouraged and attracted. This is because foreign inflow can accelerate increased employment opportunities that will further result in tightened income gaps in these regions. This will further trickle down to surrounding regions and enhance inclusive and sustainable regional overall growth and development.

It is important to point out that this study found no relationship between unemployment rate and income inequality at local municipal level in South Africa. This could be based on the impact of social grant such as unemployment benefit in tightening income gap in South Africa. Notwithstanding, it is important to address the issue of unemployment by encouraging more foreign investment that meets the labour needs of the South African people. It is important to note that this study finds high levels of income disparity in large cities such as City of Johannesburg in Gauteng due to in-migration across cities in search of better living standards. Policymakers should therefore ensure that affordable housing and better living standards be encouraged and provided (Turok, 2018). This is achievable by encouraging attainment of higher levels of education to better increase individual income in order to afford housing in cities and eradicate substandard housing known as shacks.

CHAPTER FOUR

The Impact of Foreign Direct Investment on Domestic Investment at Local Municipal Level in South Africa.

4.1 Introduction

Since the decrease in foreign aid to developing countries observed in recent decades, FDI is seen as a major non-debt creating channel to enhance economic growth in developing economies (Asiedu, 2004; Jenkins, 2006; Adams, 2009). The emergence of FDI as an alternative capital flow has contributed to the growth of emerging economies since it is perceived as an important catalyst for technology diffusion, employment generation and poverty reduction (Fedderke and Romm, 2004; Wall et al.,2018). To attract FDI, developing economies have improved their business climate by adjusting investment policies to create a conducive environment for foreign investment through Multi-National Companies (MNCs) (Eregha, 2012). However, the net benefit of FDI to the host economy is crucially dependent on how it interacts with local investment.

According to Ndikumana and Verick (2008) a bi-directional correlation exists between FDI and domestic investment as both are driven by the investment climate of the host economy. FDI in turn has the further potential of increasing local investment through backward and forward linkages leading to a circular causation of investment and growth (Agosin and Meyer, 2000; Ndikumana and Verick, 2008; Ghazali, 2010). This mechanism underpins the correlation between foreign and domestic investment in emerging economies. Therefore, FDI plays a major role in achieving economic growth by enhancing backward and forward linkage effects in developing economies which in turn increases employment opportunities and reduces poverty (Agosin and Mayer, 2000; Eregha, 2012; Shah et al., 2020).

However, according to Titarenko (2006), the possibility of substituting and limiting domestic investment is also flagged in literature through direct competition between MNCs and local producers, as well as through increased imports of intermediary inputs from the global value chain of the MNCs rather than within the host economy. The study argued that substituting can be detrimental to the growth of the host country. This is because FDI substituting domestic investment contradicts its purpose for developing economies and raises questions as to how it drives economic growth. Hence, any attempt to substitute domestic investment implies that local organizations are unable to conduct business effectively due to fierce competition from MNCs. This impacts growth negatively since domestic investment is perceived as investment

made by the nationals of an economy to further increase growth (Szkorupova, 2014; Farla et al., 2016).

The need to evaluate the effect of FDI on domestic investment is therefore necessary. Following the preliminary Millenium Development Goals (MDGs) which was introduced in 2015, the United Nations took a step further to introduce the Sustainable Development Goals (SDGs) achievable by 2030 (United Nations, 2015). These goals are targeted towards building a sustainable and inclusive global economy as well as creating "the future we want" (United Nations, 2015; Hak et al., 2015). The growth of domestic investment is therefore crucial and can go a great length in achieving the SDGs peculiar to each emerging economy (Kardos, 2014). In other words, increased productivity of local firms will encourage more innovative ideas and entrepreneurial skills and abilities (Ndikumana and Verick, 2008). This will in turn lead to more employment opportunities, poverty reduction, and a more sustainable and inclusive environment that enhances overall growth of the economy. FDI plays a major role in achieving these goals as well as creating a global inclusive economy (Adams, 2009).

Despite the benefits of FDI, several studies have been inconclusive on its impact on domestic investment (Eregha, 2012; Misun and Tomsk, 2014). The increase in its inflow into developing economies have raised crucial questions and concerns as to whether it crowds-in or -out) domestic investment (Ndikumana and Verick, 2008; Eregha, 2012). FDI crowding-in domestic investment implies that it augments the growth of local businesses which further creates more employment opportunities, reduces poverty, and promotes inclusive growth and development. Hence, enhancing the attainment of their SDGs while crowding-out implies that foreign investment inflow poses a threat on the productivity level of local firms thereby creating a barrier in achieving these SDGs.

Despite the ambiguity regarding FDI and domestic investment, efforts have been made to ease foreign investment inflow in emerging economies due to the perceived benefits (Agosin and Mayer, 2000). According to Fedderke and Romm (2006), following the end of the apartheid era in 1994, development plans such as the "reconstruction and development plan" were implemented in South Africa to enhance the integration of the economy into the global economy. Policies such as trade and exchange rate liberalisation, investment incentives, bilateral investment treaties were implemented to strengthen the economy's attractiveness to foreign investors and create a suitable environment for FDI (Fedderke and Romm, 2006; Xolani, 2011; Tshepo, 2014; Magombeyi and Odhiambo, 2017).

The concerns regarding the effect of FDI is also driven by the significant levels of regional inequality in South Africa because of apartheid policies of the past (Leibbrandt and Woolard,

2002; The World Bank, 2018). FDI concentration along the lines of existing spatial disparities further aggravates inequalities. Globalization and technological change through FDI have demonstrated a negative impact on economies through the rising uneven spatial distribution of wealth across regions (Iammarino, 2018). It is worth noting that the underdevelopment of certain regions can lead to negative effects which does not only affect that region but the overall economy (Kersan-Skabic and Tijanic, 2014). This underlines the importance of a sub-national study analysing FDI and domestic investment in the South African economy.

The need for a sub-national study is rooted in the New Economic Geography theory postulated by Paul Krugman in 1991. The theory explicitly explains the negative effect of economic concentration on an economy in the long run. The concentration of economic activities in fewer regions results in the development of those regions at the expense of others. Although argument has been put forth on the benefits of economic convergence such as economies of scale, access to labour, technological spillover, easy access to goods and services produced (Hoover, 1948). However, it is important to point out that this has a detrimental effect on regional development in the long run because population concentration in fewer regions leads to the underdevelopment of others (Krugman, 1991). This study is therefore further rooted in the centrifugal forces that militate against the concentration of production activities in fewer areas as explained by Krugman (1998). Hence, to enable the development of local firms in various municipalities in South Africa, economic convergence must be discouraged, and regional spillovers encouraged. Encouraging innovation and entrepreneurial skills across South Africa is crucial to increasing employment opportunities, eradicating poverty, and enhancing an inclusive environment suitable for the achievement of the SDGs (Xolani, 2011; Tshepo, 2014). Furthermore, a critical review of African literature on FDI and domestic investment confirms the lack of a study that considers this issue at sub-national level. To this effect, this study stands out from existing studies on the effect of foreign investment on domestic investment in host economy. A regional study on the correlation between FDI and domestic investment in South Africa is important because investment is unequally distributed across regions of an economy (Zhang, 2017). Therefore, estimating the impact of FDI nationally might result in biased and incorrect estimates (Chua, 1993; Iammarino, 2018). Hence, the need for a study examining the impact of FDI on domestic investment in local municipalities. This study will enlighten regional policymakers in discovering the strengths and natural advantage of each local municipality and implementing policies aimed at attracting FDI thereby enhancing regional growth and development.

Based on this backdrop, contribution is made to existing literature by examining the impact of FDI on domestic investment at local municipal level in South Africa with the use of fixed effects and system GMM estimators. To the best of our knowledge, there has been little to no study addressing this issue in municipalities at local level in South Africa. This justifies the motive behind the utilization of local municipalities as regional units for the purpose of this study. Although regional studies have examined the impact of FDI (Ng, 2006; Kersan-Skabic and Tijanic, 2014; Wei et al., 2009); however, these studies are limited in their findings since majority focus on only a small fraction of the regions that cover a large geographic area. For example, FDI studies in Eastern and Western European countries and China use large geographical areas like provinces and majority of these geographical locations are as large as a nation with reference to their population sizes. Also, many of the provinces comprise of several urban centres which may be recognized as separate locations on their own. In addition, some of the studies were conducted in developed economies making it difficult to relate the findings to developing economies due to peculiarities in structure (Driffield and Hughes, 2003). The rest of the paper is organized as follows: the next section (2) reviews some of the important literature reviewing the crowding-in, crowding-out and mixed effect of FDI. It is followed by the methodology in section 3 which investigated capturing of the data and the estimation strategy. The results are presented and discussed in Section 4. Section 5 finalizes the research.

4.2 Theoretical and Empirical Literature Review

An attempt is made to analyze the impact of FDI on domestic investment by grouping the theoretical and empirical literature review into three categories based on the impact of MNCs on local firms. These are the crowding-in, crowding-out and the mixed effects. According to Ndikumana and Verick (2008), the crowding- in effect is observed when the presence of MNCs increases local firm's productive level while crowding out effect occurs as a result of fierce competition between foreign and domestic enterprises leading to forceful exit of the latter. The mixed effect on the other hand, occurs when MNCs initially crowds out local investment but complements local investment in the long run. This study therefore critically examines theoretical and empirical literature review using this breakdown.

4.2.1 The Crowding-in Effect

FDI is expected to add to the capital investment of an economy since its inflow introduces a new line of product as well as new technology in the host economy (Adams, 2009). Crowding in effect is said to exist when foreign investment augments the growth of domestic investment

(Romer, 1993; Agosin and Machado, 2005; Farla et al., 2016). In a study conducted by Farla et al., (2016) on the impact of FDI on domestic investment, building on the empirical study of Morrisey and Udomkerdmongkol (2012), the study observed a crowding-in effect in developing countries. However, the study is a cross-country study and did not account for within country effect of FDI on domestic investment. Boreinsztein et al., (1998) examined FDI and domestic investment in 69 transitioning economies. It revealed a positive impact on local firms since the inflow of MNCs is associated with technology diffusion which in turn reduces local firm's cost of embracing it. According to Gallagher and Zarsky (2007), there are two types of crowding-in effect. First, the backward linkage effect, which occurs when domestic firms provide the MNCs with locally made inputs required for production process. In other words, the presence of MNCs in downstream sectors leads to increased demand for local intermediate products thereby increasing productivity and profitability of local firms. Second, the forward linkage effect that occurs when MNCs supplies local firms with goods and services used up in their production process. To be more precise, local investors might serve as advertising and distributing agencies for MNCs products providing that they function in different industries.

In a study conducted by Aitken and Harrison (1999), it was discovered that domestic enterprises in sectors dominated by MNCs were less productive. The study further revealed that FDI could increase domestic investment through human capital if foundation of new enterprises in the host country is observed. These new enterprises help in the distribution process of MNCs products thereby creating employment opportunities and increasing productivity levels of domestic firms. De Backer and Sleuwagen (2003) argued that increased productivity is the result of MNCs employing skilled labour in developing economies and paying them higher wage rate. As a result of the trainings received and the ability to save more, they might decide to eventually set up their own businesses leading to increased domestic investment in the host economy.

In addition, the crowding-in effect may be through knowledge spillover from MNCs to local firms. Blomstrom and Kokko (1998) stressed that FDI accelerates domestic investment if new technologies brought in by MNCs are used in production process. Their study revealed that the competition between MNCs and domestic firms could result in the local firm's ability to efficiently use the new resources and in the long run purchase modern equipment in order to remain in the market. The study further revealed that the spillover effect will occur in the long run, if domestic companies employ workers that have been trained by the MNCs. Similarly, Fedderke and Romm (2004) evaluated FDI on economic growth in South Africa. It observed a

crowding-in effect in the long run suggesting that a positive technological spillover occurs between FDI and domestic investment.

One prominent study on the impact of FDI on domestic investment is the study conducted by Ndikumana and Verick, (2008). It examined FDI on domestic investment in Sub-Saharan Africa using data from 38 Sub-Saharan African countries for the period 1970 to 2005. It revealed that FDI positively impacts domestic investment, and a two-way linkage is observed. However, the study is a cross-country analysis that did not take into consideration spatial variations within country.

Similarly, Tang et al., (2008) conducted a study on FDI, domestic investment and economic growth using time series analysis from 1988 to 2003. Findings showed that FDI augments domestic investment in China. However, it is important to note that a time series analysis does not contain enough information, variation, and efficiency to make policy recommendations.

Razin (2003) evaluated the correlation between foreign investment inflows and domestic investment in 64 developing economies. The study revealed that foreign investment significantly complements domestic investment when compared to other types of investment like international loans. It is however important to point out that the study did not take into consideration the interaction effects across sub-nationals in the selected countries.

Likewise, Bosworth and Collins (1999) analyzed data from 58 emerging economies for the period 1978 to 1995. Although the study revealed a positive relationship between foreign inflows and domestic investment, it was however conducted at the aggregate national level and did not consider the impact of spatial interactions across regions.

4.2.2 The Crowding-out Effect

The crowding-out effect occurs when MNCs mostly located in same industry as domestic entreprises force the latter out of the market thereby substituting them. Acar et al., (2012) revealed that there are various ways through which the crowding-out effect occurs. First, the entrance of FDI into sectors dominated by local firms can result in MNCs taking advantage of the opportunities available because of their access to huge capital leaving local firms at a disadvantage. Hence, local firms find it difficult to compete with MNCs leading to their crowding-out. In other words, the presence of MNCs might increase fierce competitions that the local firms are not able to withstand, hence forcing them out. Similarly, Barrios et al (2005) revealed that crowding-out effect occurs when MNCs increases the number of firms (both MNCs and local firms) in an industry. The study further stressed that a reduction in the prices

of goods produced is observed leading to the crowding-out of domestic enterprises due to their inability to sustain profitability. Likewise, Leahy and Montagna (2000) revealed that MNCs reduces the productivity and profitability of local firms which can eventually lead to their crowding-out.

Second, MNCs are usually accessible to global products and capital markets making them better competitors than local firms. Since the domestic firms might not be able to withstand the competition, they are eventually crowded out. According to Titarenko (2006), FDI inflows in Latvia were in sectors already dominated by local firms such as banking, insurance, and real estate. As a result of the huge foreign capital, domestic enterprises are unable compete with MNCs which eventually led to their acquisition and crowding-out. Third, MNCs pay above the average labour wage, hence, they tend to employ the best hands thereby increasing their productivity and making it challenging for the domestic firms to compete hence resulting in their crowding-out (Gallagher and Zarsky, 2007). A study by Wang (2010) demonstrated that domestic enterprises' strength is very crucial because they can be easily crowded out of the market with the entry of foreign enterprises.

Fourth, some government policies are more beneficial to MNCs than domestic firms. This is supported by a study conducted by Szkorupova (2013) which revealed that FDI crowded out domestic investment in Europe because the government policies mainly favoured foreign companies. The study further revealed that due to the low capital investment of domestic firms, their product does not meet up with the international standards. Thus, local firms could not compete with MNCs at the international level and were crowded out. The possibility of MNCs sourcing their production inputs abroad can also lead to the crowding-out of local enterprises. That is, when MNCs purchase intermediate goods from foreign countries instead of buying from local suppliers, it tends to lower productivity of local firms and hence force them out of the market (Mileva, 2008; De Backer and Sleuwagen, 2003). In addition, the introduction of new technologies by MNCs might negatively impact domestic firms due to the lack of technical know-how in using it or the lack of financial resources in purchasing leading to their crowding-out. Also, Kim and Seo (2003) opined that new technological equipment transfer by MNCs might result in technological obsolescence of traditional technologies used by the domestic companies, which can eventually lead to their crowding-out.

In a study conducted by Morrissey and Udomkerdmongkol (2012) investigating the impact of governance on FDI and domestic investment. The study employed data from 46 economies from 1996-2009. The study found evidence of crowding-out in the selected countries. However, it did not take into consideration the importance of spatial interactions across regions of the

selected developing economies. Likewise, Titarenko (2006) examined FDI on domestic investment using the total investment technique. The study showed FDI crowding-out domestic investment suggesting that it substitutes domestic investment in Latvia. However, the study assumed FDI as an exogenous variable and did not consider endogeneity bias arising out of simultaneity questioning the validity of the findings.

In addition, Yahia et al., (2018) evaluated the impact of FDI on domestic investment in Sudan using the ARDL estimation technique from 1976 to 2016. The study confirmed a crowding-out effect in Sudan. Similarly, Szkorupova conducted a study on FDI and domestic investment in Europe using panel regression for 1993-2012. It found that FDI substitutes domestic investment. In an attempt to analyze firm entry and exit, Backer and Sleuwagen used data from 129 manufacturing industries for the period 1990 to 1995. It observed a crowding-out effect in the selected industries. However, the study only focused on the manufacturing industries making it difficult to make overall decisions on FDI inflows. In another study conducted by Eregha (2012) examining the linkages between FDI and domestic investment using panel cointegration estimation technique for the period 1970 to 2008. Although the findings revealed evidence of crowding-out in Africa, however, it did not clearly define the type of FDI inflow. This is because studies have shown that the type of FDI greatly determines its impact on domestic investment. Brownfield FDI also known as mergers and acquisitions majorly involves the acquisition of existing businesses and does not necessarily create new ones (Wall et al., 2018).

4.2.3 The Mixed Effect

The mixed effect occurs when the presence of foreign investment initially substitutes domestic investment but complements it in the long run. A mixed effect also occurs when the presence of foreign investment has different effects on various countries in a cross-country study. For instance, Agosin and Machado (2005) examined the crowding-out or -in effect in 12 emerging economies. The study revealed evidence of crowding-out in Latin America and crowding-in in Africa and Asia. However, it did not take into consideration endogeneity issues arising from simultaneity. In another study conducted by Apergis et al., (2006) to examine linkages between FDI inflows and domestic investment in 30 economies for the period 1992 to 2002. The study revealed a crowding-in effect for Asian and African countries and a crowding-out in American and European countries.

It further stressed that a significant bi-directional relationship exists in the selected countries. That is, inflow of foreign investment is determined by the presence of local investment and vice versa. Similarly, Shah et al., (2020) investigated the impact of sectoral FDI inflows in Pakistan for the period 1980-2012 revealing varying impact of FDI across sectors. FDI inflow observed in the manufacturing and service sectors crowded-in while FDI in the primary sector showed no relationship with domestic investment in Pakistan.

Driffield and Hughes (2003) conducted a study using Generalized Method of Moments (GMM) approach. FDI was observed to generally complement domestic investment, it was found to displace domestic investment in particular areas such as Scotland. It further explained that the displacement effects could have resulted from the technology gap between foreign and domestic enterprises. However, the study was conducted in a developed economy making it difficult to relate its findings to a developing economy like South Africa due to its peculiarities. Similarly, in another study conducted by Misun and Tomsk (2014) on the crowding-in or -out effect of FDI on domestic investment. The study employed the total investment model from 1990 to 2000 and observed crowding-out in Poland and crowding-in effect in Czech Republic and Hungary. However, differences in the timing of the analysis greatly influenced the findings which might have resulted in a biased study. This is due to the high levels of FDI inflow in Czech Republic during the period investigated. Also, Jude (2019) conducted a study with the aim of evaluating FDI and domestic investment in Central and Eastern Europe. The study found that FDI crowds-out domestic investment in the short term but crowds-in domestic investment in the long term.

In South Africa, Fedderke and Romm (2004) examined the impact of FDI in South Africa from 1956 to 2003. It acknowledged a crowding-out effect in the short run and a crowding-in effect in the long run. This finding suggests that FDI inflow initially substitutes but eventually complements domestic investment in South Africa. However, the study did not take into consideration the importance of the spatial interaction effects in the country. Finally, Wang (2010) analyzed data from 50 developed and less developed countries for the period 1970-2004. The findings revealed that cumulative FDI had neutral impact on domestic investment in Developed Countries (DCs) while a positive significant effect is observed in Less Developed Countries (LDCs).

Majority of the above cited studies (Misun and Tomsk, 2014; Titarenko, 2006; Szkorupova, 2013) were carried out at the aggregate national level. However, there is need for research at the sub-national level due to spatial inequality in economic activities as well as regional development in South Africa. Hence, a municipal level study will provide a distinct approach

since it exploits variations in trends across sub-national. Also, it enables policymakers to clearly identify the measures to enhance and complement domestic investment in various regions. To add to this, although Driffield and Hughes (2003) evaluated the impact of FDI on domestic investment at the regional level. However, the study concentrated on UK regions which is a developed economy creating a difficulty in finding its relevance to developing economies due to its peculiarities. This study therefore is an improvement to literature by examining the impact of FDI on domestic investment at local municipal level in South Africa keeping in mind that South Africa is a developing economy with higher magnitude of spatial inequality across and within municipalities. The findings of this study will therefore assist policymakers not only in South Africa but other developing economies in implementing policies targeted at attracting foreign investment for the growth of domestic investment in various local municipalities in order to achieve sustainable and inclusive growth in South Africa and other African economies.

Table 4. 1 Summary of selected empirical literatures

Author	**Scope**	**Findings**	**Econometric Methodology and Study Limitation**
Ndikumana et al., (2008)	38 Sub-Saharan African Countries (1970-2005).	FDI complements domestic investment.	Fixed Effects. The study did not account for spatial variations within country.
Razin (2003)	64 transitioning economies (1976-1997).	FDI crowds-in domestic investment.	Two Stage Least Square. The study did not take into consideration spatial interaction effects within country.
Morrissey and Udomkerdmongkol (2012)	46 developing economies (1996-2009).	FDI crowds-out domestic investment	Generalized Methods of Moments (GMM). The study did not account for spatial interaction effects.
Farla et al., (2016)	46 developing economies.	FDI crowds-in domestic investment	Generalized Methods of Moments (GMM).

			The study is a cross-country study that did not account for interactions within the country.
Titarenko (2006)	Latvia	FDI substitutes domestic investment	Ordinary Least Square. FDI was categorized as an exogenous variable. The study did not consider endogeneity bias arising out of simultaneity.
Shah et al., (2020)	Pakistan	FDI substitutes domestic investment in the short run but complements in the long run	ARDL cointegration technique. Study was conducted on a national level and did not account for spatial interactions.
Misun and Tomsk (2014)	Czech Republic, Hungary, and Poland (1990-2000)	FDI crowds-out domestic investment in Poland and crowds-in domestic investment in Czech Republic and Hungary	Ordinary Least Square. The findings relating to Czech Republic is attributed to very high foreign investment inflows experienced during the period of analysis. Also, the study is a cross country analysis which did not consider spatial differences within country.
Driffield and Hughes (2003).	United Kingdom	FDI generally complements domestic investment, however, in regions such as Wales and Scotland, FDI substitutes domestic investment.	Generalized Methods of Moments (GMM). United Kingdom is a developed economy; hence it is difficult to relate the findings of this study to a

			developing economy like South Africa due to peculiarities in structure.

4.3 Methodology

This section outlines the theoretical framework and econometric methodologies employed in evaluating the impact of FDI on domestic investment at local municipal level for the period 2000-2016. This study employed the use of static and dynamic panels estimation technique to justify the need for a sub-national study in South Africa.

4.3.1 Theoretical Framework

Based on the objectives of this study, a theoretical framework is presented. This framework sheds more light and helps to understand a model of the causation between FDI and domestic investment at local municipality level. The model of investment with regards to its crowding-in or -out effect was initially developed by Agosin and Mayer (2000). This study then modifies the model to incorporate the conditions of South Africa from a local municipal perspective. The framework is rooted in the neoclassical investment theory which was founded by Hall and Jogenson (1967) and further revised by Rama (1993) to incorporate its implementation in emerging countries.

It is based on the context of total investment indicating that total investment is the sum of foreign and domestic investment:

$$I_t = I_{f,t} + I_{d,t} \tag{4.1}$$

Where: I_t is total investment, $I_{f,t}$ represents foreign investment and $I_{d,t}$ is domestic investment across all municipalities in South Africa. Foreign investment is a function of FDI because resources termed as FDI are usually not used up when financing real investment suggesting that a lag exist between FDI and foreign investment. As a result, foreign investment is not only dependent on current FDI but on its lagged values as well:

$$I_{f,t} = \psi_0 F_{i,t} + \psi_1 F_{i,t-1} \tag{4.2}$$

Where: $F_{i,t}$ represents FDI for the ith local municipality for (i = 1,…,213) at time t for (t = 2000,…, 2016) and $F_{i,t-1}$ is its lagged value. Following the modelling of foreign investment,

domestic investment needs to be specifically modelled. There are lots of existing literature on investment in emerging economies and what needs to be included as explanatory variables (Rama, 1993). This study stands on the viewpoint of Agosin and Mayer (2000) that investment is observed as a stock adjustment variable that responds to changes in desired and actual capital stock. This is mainly because companies experience limitations in terms of investment liquidity and this adjustment can be time consuming (Agosin and Mayer, 2000; Gujaratti, 2003). Based on this backdrop, the model is specified as:

$$I_{d,t} = \lambda(k^*_{d,t} - k_{d,t}) \quad (4.3)$$

Where $k^*_{d,t}$ represents the capital stock desired by domestic firms in local municipalities at time t and $k_{d,t}$ is the actual capital stock of domestic firms in local municipalities at time t and $\lambda < 1$.

The desired capital stock is dependent on expected growth (G^e) which is specified as:

$$k^*_{d,t} = \Phi_0 + \Phi_1 G^e_t \quad (4.4)$$

where $\Phi_1 > 0$

Capital stock is then expressed as:

$$k_{d,t} = (1\text{-d})\, k_{d,t-1} + I_{d,t-1} \quad (4.5)$$

where d represents annual depreciation rate at local municipal level.

Combining equation (3), (4) and (5):

$$I_{d,t} = \Phi_0 + \Phi_1 G^e_{i,t} + \lambda I_{d,t-1} \quad (4.6)$$

where: $\Phi_0 = \Phi_0 + \lambda^2(1-d)^2 k_{d,t-2}$

$\Phi_1 = \lambda\Phi_1$

We then proceed to adding equation (4.2) and converting the domestic investment model into total investment in order to incorporate foreign investment.

Substituting (4.6) and (4.2) into equation (4.1) and collecting like terms, we have:

$$I_t = \Phi_0 + \Phi_1 G^e_t + \psi_0 F_t + \psi_1 F_{t-1} + \lambda I_{t-1} \quad (4.7)$$

where: $\psi_1 = +\psi_1 - \lambda$

If expectations are rational, expected growth should equal actual growth i.e., $G^e_t = G_t$.

4.3.2 Empirical Model Specification

Equation 4.7 in the framework section shows the causation between domestic and foreign investment. We then proceed by specifying the empirical model for this study which shows the effect of FDI on domestic investment at local municipality level in South Africa.

It is expressed as follows:

$$D_{i,t} = \beta_0 + \beta_1 F_{i,t} + \beta_2 F_{i,t-1} + \beta_3 G^e_{i,t} + \beta_4 O_{i,t} + \beta_5 C_{i,t} + \beta_6 H_{i,t} + \varepsilon_{i,t} \quad (4.8)$$

Where: $D_{i,t}$ is domestic investment for the ith local municipality for (i = 1,…,213) at time t for (t = 2000,…, 2016), $F_{i,t}$ represents FDI, $G^e_{i,t}$ represents growth rate, $O_{i,t}$ is trade openness, $C_{i,t}$ is average crime rate, $H_{i,t}$ is human capital and $\varepsilon_{i,t}$ for local municipality i at time t.

The inclusion of average crime rate and human capital in the model is driven by empirical studies on its impact on investment. Crime rate has played significant negative role in the flow of investment as well as the growth of local firms in developing economies (Islam,2014). In South Africa, due to high levels of inequality and poverty, empirical studies have proven that the economy is associated with high levels of crime and is considered as one of the countries with the highest rate of crime in the world (Kollamparambil, 2019). It is crucial to examine its effect on domestic investment and hence justifies its inclusion in this analysis. Human capital on the other hand has proven to increase productivity and encourage entrepreneurial skills development which further increases the number of local firms, thereby contributing immensely to economic growth (Ozturk, 2001). In addition, the availability of these variables in municipalities at local level in South Africa also justifies the need to include in the model specification.

As previously discussed, a reverse causality is anticipated between FDI and domestic investment, hence the need for a dynamic panel estimation technique. To establish the use of dynamic panel estimation, there is need to first run a basic static panel estimation. Therefore, this study employed the use of static prior to the dynamic panel data estimation models (system GMM) to analyze the relationship between FDI and domestic investment at local level.

The static panel estimation assumes that no correlation exists between the independent variables and the error term (Baltagi, 2006). The equation is therefore stated as:

$$D_{i,t} = \beta_0 + \beta x_{i,t} + \varepsilon_{i,t}, \qquad \varepsilon_{i,t} \sim N(0, \sigma^2) \quad (4.9)$$

Where: $D_{i,t}$ is domestic investment measured as gross fixed capital formation in local municipality ‘i’ at time ‘t’ for (t = 2000, …, 2016). β_0 is intercept Coefficient. β includes all

coefficients of the explanatory variables in a matrix form. x_t is a row vector that includes all the explanatory variables and $\varepsilon_{i,t}$ is the error term.

Static panel regression technique has its own limitations which poses a challenge on the relevance of the analysis. This study recognizes the possibility of the reverse causality endogeneity issue arising due to bi-directional effect of FDI on domestic investment. As seen in the study conducted by Apergis et al., (2006) who observed a two-way linkage between FDI and domestic investment in the selected countries, this study therefore recognizes the possibility of reverse causality endogeneity and employs the system Generalized Methods of Moment (GMM) estimation technique to address this issue.

The model formulated by Arellano and Bover (1995) and Blundell and Bond (1998) is generally used for economic models with "small T and large N panels" (C.F Baum, 2014). The system GMM is preferred to the difference GMM because it encapsulates more instruments, therefore, making it more efficient (Roodman, 2006). One unique feature of the system GMM is that it provides an easy method of testing the specification of a proposed model and helps to eliminate the problem of biased estimates that would result from the static panel data estimation technique. It also contains at the minimum one lagged dependent variable. Although both the one and two-step GMM are asymptotically normal, and the two-step estimator reveals a slighter asymptotic difference indicating more asymptotic advantage when compared with the one-step estimator. However, the two-step should only be estimated when the benefits outweigh the cost of estimation (Hwang and Sun, 2018; Windmeijer, 2005). To this effect, this study employed the use of system GMM estimator which is expressed as:

$$D_{i,t} = \delta D_{i,t-1} + \beta x_{i,t} + \varepsilon_{i,t} \quad (4.10)$$

Where: $y_{i,t}$ is domestic investment in local municipality 'i' at time 't' (2000, 2001, …, 2016). $\delta D_{i,t-1}$ is one-year lagged value of domestic investment. β comprises of all the coefficients of the explanatory variables in matrix form. $x_{i,t}$ is a row vector that includes all the explanatory variables and $\varepsilon_{i,t}$ is the error term.

4.4 Data Sources and Variables Descriptions

4.4.1 Data Sources

The FDI data at the municipality level in South Africa was sourced from the Financial Times fDi Markets database (Financial Times, 2015). Greenfield FDI are new investments made by

Multi-National Corporations, this type of investment is preferred because it increases output level and employment in the host economy.

Other South African variables were sourced from Quantec Survey primarily due to the availability of local municipality data. In addition, since FDI and domestic investment are not annually constant, this study grouped the two into 5-years interval. A sum of the interval for FDI and domestic investment variables and the 5^{th} year value for other variables is used, resulting in 4 panel observations. This study is conducted at local municipal level in South Africa for the period 2000-2016 using spatial analysis.

4.4.2 Variable Definitions and Expected Signs

4.4.2.1 Dependent Variable

Domestic Investment: Is defined as the investment expenditure incurred by the private and public sector in the domestic economy at local municipal level. Empirical studies have proven that fixed capital formation can be used as a proxy for domestic investment (Hejazi and Pauly, 2002; Meyer and Sanusi, 2019). This is due to it being a significant fraction of domestic investment. To this effect, this study uses fixed capital formation as a proxy for domestic investment. It is measured as fixed capital formation as a percentage of GDP in municipalities at local level in South Africa. As explained previously, domestic investment and FDI data is aggregated into 5-year intervals. Based on previous studies (Ndikumana et al., 2008; Tang et al., 2008), the inflow of foreign investment is expected to complement domestic investment in host economies. Hence, a positive relationship is anticipated.

4.4.2.2 Independent Variables

FDI: Is defined as the investment made by a resident of another country in a host economy in which the resident has the controlling interest (UNCTAD, 2007). For the purpose of this study, it is measured as FDI inflow as a percentage of GDP in municipalities at local level in South Africa. Several empirical studies have shown that FDI can either crowd-in or crowd-out domestic investment in the host economy (Razin, 2003; Eregha, 2012; Misun and Tomsk, 2014). The crowding-in effect is beneficial to the development of local investment because it results in increased productivity and employment generation in the host economy. The inflow of foreign investment complements domestic investment through the enhancement of forward and backward production linkages (Wang, 2010). As seen in the study conducted by Ndikumana et al., (2008), FDI crowds-in domestic investment in Sub-Saharan African

countries. Therefore, this study anticipates a positive relationship between FDI and domestic investment in South Africa. In addition, the study employs greenfield FDI as an appropriate proxy for total FDI because it involves the creation of new investment.

Average Crime Rate: Is measured as the ratio of crimes reported per total population at local municipal level in South Africa. Criminal activities can be likened to a form of tax on an economy since it is a major discouragement to both foreign and domestic investment and has a detrimental effect on economic activities. If measures are not put in place to mitigate crime, it can result in uncertainties and inefficiencies and reduce competitiveness among companies (Drugowick and Pereda, 2019). Islam (2014) examined the causation between economic growth and crime and how it affects small and medium enterprises in developing economies. The study revealed firm's losses as a result of crime negatively impacts economic growth. Thus, this study anticipates a negative relationship between crime and domestic investment at local municipal level.

Human Capital: For the purpose of this study, education is taken as a proxy for human capital. Education is measured as the percentage of the population who completed matriculation at local municipal level in South Africa. It is a crucial determinant of economic growth because it improves the standard of living and increases social benefits. It also increases productivity, creativity and encourages entrepreneurship (domestic investment) which is beneficial to the growth and development of developing economies (Ozturk, 2001). This study argues that people with higher education tend to earn more resulting in higher savings and investment. This is supported by the findings of Furham and Cheng (2019) on the factors influencing adult savings and investment. The study indicated that education has a positive impact on savings and investment. To this effect, this study anticipates a positive relationship between education and domestic investment in municipalities at local municipal level.

GDP growth rate: Is defined as the annual average change rate of the GDP at market prices in municipalities at local level in South Africa. In other words, it measures the rate at which an economy grows over a certain period of time usually on an annual basis. The GDP growth of an economy is a major determinant of domestic investment in an economy given the fact that investment is as a result of the ability to save. As seen in Eregha (2012), GDP growth is expected to have a positive impact on domestic investment in municipalities at local level.

Trade Openness: Is defined as a measure of the extent to which an economy engages in international trade. It is measured by the exact size of imports and exports of a nation. For the Trade openness is calculated by taking the sum of import and export divided by total GDP at local municipal level in South Africa. This variable is crucial to domestic investment because

it measures the possibility of creating an opportunity for the exportation of locally made goods and services in South Africa which will further enhance regional and overall economic growth and development. It is anticipated to have a positive impact on domestic investment (Eregha, 2012).

4.5 Empirical Analysis

4.5.1 Descriptive Statistics

The following tables presents the descriptive statistics of the variables used in the study. Table 4.2 reveals the summary statistics which includes mean, standard deviation, minimum and maximum of the variables used in the study. Table 4.3 on the other hand revealed the average FDI inflow at the provincial level with the highest rate of FDI located in North West, Northern Cape, and KwaZulu Natal provinces. One possible explanation for this is that the domination of South African mines in these provinces greatly influences the attraction of foreign investment suggesting that FDI inflow is majorly in the mining industry in South Africa.

Table 4. 2 Summary Statistics of Variables in municipalities at local level in South Africa

Variables	**Obs.**	**Mean**	**Std. Dev**	**Min**	**Max**
Dependent Variable					
Domestic Investment (%)	852	9175.081	31990.58	5.164	395099.3
Independent Variables					
FDI (%)	852	28.950	141.714	0.0030419	2138.8
Human Capital (%)	724	42122.61	135669.9	562.09	1246303
Average Crime Rate (%)	852	709.629	2722.271	0.0040242	30695.31
GDP growth rate (%)	852	8.293313	3.715074	-2.240323	25.12871
Trade Openness (%)	852	0.3702644	1.092086	0.019476	19.91156

Source: Estimates using data from Quantec and Financial Times.

Table 4. 3 Average FDI Inflow (million USD) at the Provincial Level in South Africa

Province	Local Municipalities	2000-2004	2005-2009	2010-2014	2015-2016	Average over selected Years
Eastern Cape	33	2.788	31.399	58.095	1.421	23.426
Free State	19	0	7.465	22.781	0	7.562
Gauteng	9	0.926	37.833	34.711	4.052	19.381
Kwa-Zulu-Natal	45	12.468	55.582	33.368	9.510	27.732
Limpopo	21	0.909	36.973	33.991	15.173	21.762
Mpumalanga	17	8.829	48.991	32.382	14.594	26.199
Northern Cape	26	2.138	16.285	129.026	69.893	54.336
North West	18	54.050	133.322	74.306	2.236	65.979
Western Cape	25	0.200	12.426	21.089	19.152	13.217
Total	213	82.308	380.276	439.749	136.031	259.591

Source: Estimates using data from Quantec and Financial Times.

Table 4. 4 Average Domestic Investment (million Rand) at the provincial level in South Africa

Province	Local Municipalities	2000-2004	2005-2009	2010-2014	2015-2016	Average over selected Years
Eastern Cape	33	1962.901	4334.007	6159.342	3353.476	3952.432
Free State	19	2730.535	6335.523	8834.650	4625.214	5631.481
Gauteng	9	34497.140	79135.830	114863.500	60357.550	72213.505
Kwa-Zulu-Natal	45	3611.445	8054.856	11811.630	6242.116	7430.012
Limpopo	21	2753.208	6123.005	10294.280	5163.269	6083.441

Mpumalanga	17	4273.563	9959.778	16528.21	8632.193	9848.436
Northern Cape	26	760.435	1698.246	2769.339	1358.568	1646.647
North West	18	3364.116	7432.952	12707.550	6111.999	7404.154
Western Cape	25	5378.415	11891.690	16283.680	8474.239	10507.006
Total	213	4385.167	9902.795	14741.280	7671.121	9175.091

Source: Estimates using data from Quantec and Financial Times.

Table 4. 5 Top 10 Local Municipalities receiving FDI (million USD) in South Africa for the period 2010-2014

Local Municipalities	**Province**	**FDI**
City of Matlosana	North West	1100.17
Mier	Northern Cape	1068.1
Nelson Mandela Bay	Eastern Cape	1037.72
Mogalekwena	Limpopo	747.8
Khai-Ma	Northern Cape	630
Endumeni	Kwa-Zulu Natal	557.36
Bushbuckridge	Mpumalanga	329.19
Lesedi	Gauteng	314

Tsantsabane	Northern Cape	311.68
Sol Plaatjie	Northern Cape	279.3

Source: Estimates using data from Quantec and Financial Times.

Table 4. 6 Top 10 Local Municipalities receiving domestic investment (million Rand) in South Africa for the period 2010-2014

Local Municipalities	**Province**	**Domestic Investment (in Rands)**
City of Johannesburg	Gauteng	395099.31
City of Cape Town	Western Cape	293226.15
Ethekwini	KwaZulu Natal	288919.4
Ekurhuleni	Gauteng	258796.81
City of Tshwane	Gauteng	256813.63
Rustenburg	North West	93105.935
Nelson Mandela Bay	Eastern Cape	85439.58
Emalahleni	Mpumalanga	81004.676
Mangaung	Free State	53074.858

Source: Estimates using data from Quantec and Financial Times

Table 4.4 presents the average domestic investment at the provincial level in South Africa. Domestic investment is observed to be higher in Gauteng, Western Cape and Mpumalanga provinces while Northern Cape, Eastern Cape and Free State provinces have the lowest domestic investment. In table 4.5, City of Matlosana and Mier are observed as the local municipalities with the highest FDI inflow in South Africa. Table 4.6 on the other hand presents the local municipalities with the highest domestic investment. The study observed that City of Johannesburg and City of Cape Town have the highest domestic investment. This is not surprising because these two cities are the major urban areas in South Africa.

In conclusion, this study observed that the inflow of FDI into local municipalities is not strictly correlated with domestic investment and vice versa. FDI seems to be attracted to areas where the mining industries are located while domestic investment is present in more developed areas suggesting that natural resources influence FDI inflows while market influences domestic investment in South Africa.

4.5.2 Preliminary Analysis

4.5.2.1 Night Light Imagery

This section examines the use of night light on the impact of FDI and domestic investment in South Africa with focus on local municipalities.



Figure 4. 1 Night Light Imagery at Local Municipal Level in South Africa.

Source: Estimates using data from National Geophysical Data Center (NGDC), National and Atmospheric Administration (NOAA).

Figure 4.1 reveals the night light imagery at local municipal level in South Africa. This study observed very high nights luminosity in Gauteng and Western Cape provinces and in local municipalities such as City of Johannesburg, City of Tshwane, City of Cape Town, and Stellenbosch etc. Low lights luminosity on the other hand is observed in Northern and Eastern Cape provinces and in local municipalities such as Dikgatlong, Gamagara, Port St John, and Mbizana. This suggests that economic activities is dominant in the urban areas while limited activities occurs in the rural regions in South Africa.

Figure 4.2 represents the pattern of FDI inflows into local municipalities using the ArcMap. The highest rate of FDI is observed in Northern Cape, Limpopo, Western Cape with reasons previously explained and in local municipalities such as Tsantsabane, Kareeberg, Sol Plaatjie, Elias Motsoaledi, Makhado, City of Cape Town, Stellenbosch, Cape Agulhas.

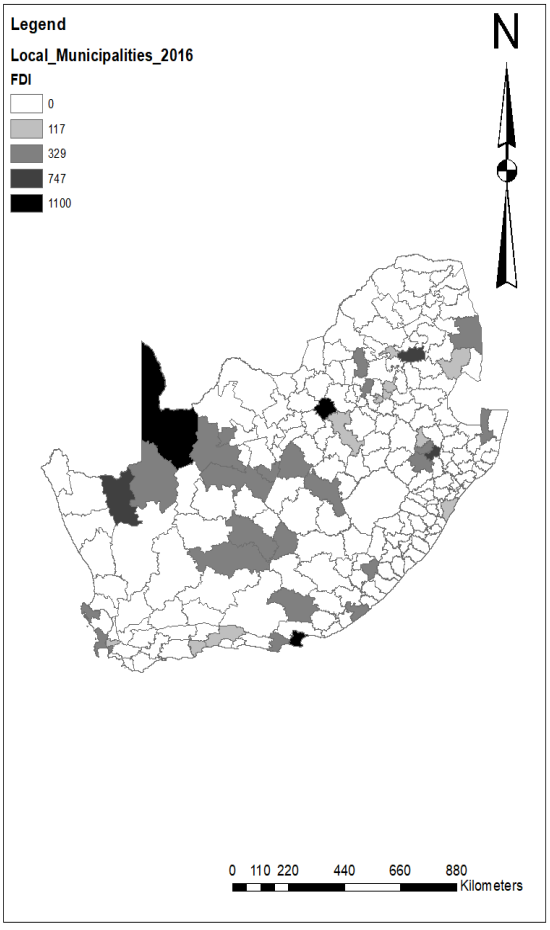


Figure 4.2 Pattern of FDI Inflow across Local Municipalities, 2010-2014.

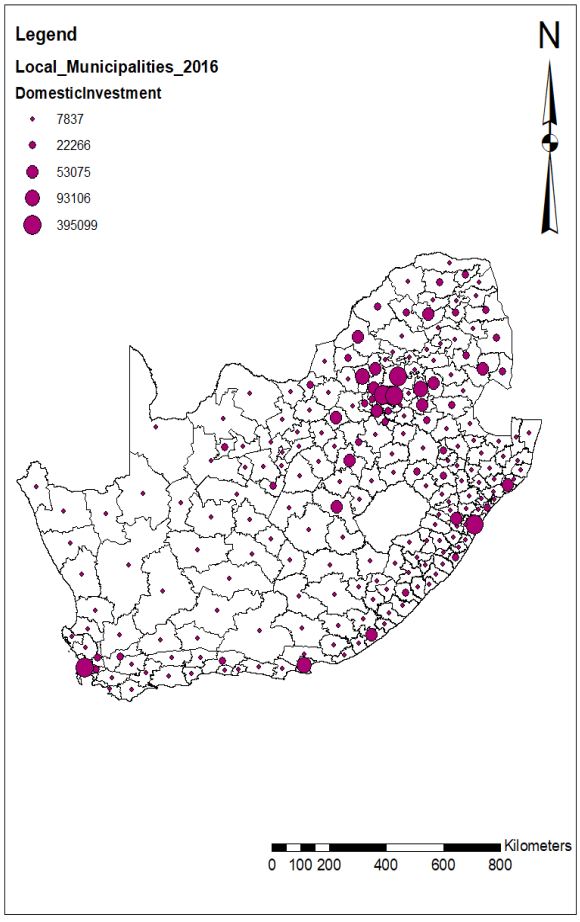


Figure 4.3 Domestic Investment in municipalities at local level in South Africa, 2010-2014.

Source: Estimates using data from Financial Times, FDi Markets database and Quantec Survey.

Domestic investment is concentrated in the Gauteng, Western Cape, and Mpumalanga provinces in local municipalities such as City of Johannesburg, City of Tshwane, Mogale City, City of Cape Town, Stellenbosch, Cape Agulhas, Nkomazi, Emakhazeni, Mbombela as observed in figure 4.3. There appears to be a positive correlation between domestic investment and the nights lights imagery. Areas with higher domestic investment also exhibits very high lights luminosity and vice versa. This implies that the presence of local investment in a particular region increases economic activities in that region and neighbouring regions.

It is therefore important to note that FDI and domestic investment seems to be concentrated in different regions in South Africa. FDI is mainly natural resource-based while domestic investment is observed to be concentrated in the urban regions. However, it is surprising to observe that there is no linkage between FDI inflow and night light imagery in Northern Cape. One possible explanation for this might be that the presence of FDI has no significant impact on economic growth in the province. As a result, no change is observed in the economic activity level. It is worth noting that these findings therefore justifies the need for a sub-national level of analysis.

4.6 Regression Results and Discussions

Table 4. 7 Fixed Effects and Random Effects Results on Domestic Investment

	Fixed Effect	**Random Effect**
Variables	**Domestic Investment**	**Domestic Investment**
FDI	0.127	0.138
	(0.167)	(0.169)
Human Capital	-0.001	-8.79e-05
	(0.001)	(0.000118)
Average Crime Rate	3.746	2.975
	(5.833)	(5.451)
GDP Growth Rate	-0.098	-0.101
	(0.957)	(0.969)
Trade Openness	4.298	15.35***
	(5.935)	(5.720)
Constant	95.819***	90.12***
	(11.140)	(19.33)
Observations	852	852
R-squared	0.031	
Number of Local Municipalities	213	213
Moran's I Statistics (p-value)	0.9086	

Hausman Test (p-value)	0.0000	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.7 presents the fixed and random effect result of the impact of FDI on domestic investment at local municipal level in South Africa. Based on the Hausman specification test, the fixed effect is selected as the best estimation model of analysis. FDI, GDP growth rate and trade openness revealed a positive but insignificant effect while human capital and average crime rate revealed a negative insignificant relationship with domestic investment. It is important to point out here that the Moran's I result of 0.9086 is not significant at 5 % level of significance indicating that no spatial correlation exists, hence, spatial analysis cannot be conducted.

Table 4. 8 One and two-step system GMM results on domestic investment

	One Step System GMM	**Two Step System GMM**
Variables	**Domestic Investment**	**Domestic Investment**
Domestic Investment (Lag)	-0.173	-0.182
	(0.214)	(0.347)
FDI	-7.460	-4.096
	(20.68)	(23.36)
FDI (Lag)	13.71	8.305
	(21.49)	(30.75)
GDP Growth Rate	46.22*	2.452
	(26.14)	(25.34)
Human Capital	-0.00105**	-0.000881*
	(0.000430)	(0.000479)
Average Crime Rate	80.50*	59.37
	(45.89)	(65.96)
Trade Openness	963.9***	937.6**
	(275.2)	(380.9)
Year 2	97.21	31.00
	(68.33)	(32.67)
Year 4	-45.26	-23.29
	(44.42)	(34.33)
Constant	-619.6***	-216.4
	(227.8)	(242.9)
Observations	639	639

Number of Local Municipalities	213	213
Hansen OIR (p-value)	0.179	0.179
AR (1)	0.222	0.669
Instruments	15	15
Time dummies	Yes	Yes
Number of Lags	1	1

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
OIR: Over Identifying Restrictions test. AR (1) is the test statistics for first-order autocorrelation.
Instrumented: domestic investment, education.
Included instruments: GDP.

As previously explained, this study employed the system GMM to account for anticipated reverse causality endogeneity issue. For robustness checks, the one-step and two-step system GMM was estimated. As seen in Hwang and Sun (2015), the two-step model should only be estimated when the benefits of weight matrix outperforms the cost. This is because in estimating the two-step model, precautionary measures must be implemented since efficiency gains do not necessarily take place in finite samples.

Looking at the one-step system GMM presented in table 4.8, this chapter takes into consideration the short and long run effect of FDI on domestic investment by including the current and lagged value of FDI. FDI revealed a negative insignificant relationship with domestic investment while the lagged value revealed a positive insignificant relationship. This finding indicate that there is no significant relationship between current and past FDI inflow and domestic investment in municipalities at local level in South Africa. One possible explanation could be that foreign investors do not engage the services of local investors in their production process. In other words, FDI does not promote backward and forward linkages in municipalities at local level as highlighted in theory. This finding is different from that of Eregha (2012) who found FDI to have a negative effect on domestic investment in ECOWAS countries.

Looking at other independent variables, GDP growth revealed a positive significant relationship with domestic investment. This indicated that GDP growth rate plays a vital role in enhancing local investment in municipalities at local level in South Africa. This is in line with the findings of Eregha (2012) who found that changes in domestic investment are significantly affected by growth rate. Human capital revealed a negative significant relationship with domestic investment. This is not in line with the findings of Furham and Chen (2019) who found that higher education has a positive impact on investment. This finding

indicates that education contributes negatively to domestic investment. This result is not expected, and a possible explanation could be because higher levels of education is required to contribute positively to increased domestic investment due to the levels of skills involved in running an investment that is expected to contribute positively to economic growth in South Africa.

Similarly, average crime rate also revealed a positive significant relationship with domestic investment. As stated earlier, this is not expected and contradicts the findings of Islam (2014) who found that increased crime rate negatively affects economic growth in any economy. The positive impact of crime on domestic investment might be associated to the high rate of crime in South Africa. South Africa is considered as one of the countries with the highest reported crime statistics in the world. This is not surprising, due to the high rates of poverty, income inequality and racial discrimination in the economy (Schonteich and Louw, 2001; Bhorat et al., 2017). Increased crime rate has been observed in urban areas such as Johannesburg, Pretoria, Cape Town, and Durban. Interestingly, domestic investment is dominant in these big cities. This finding therefore suggests that crime rate does not explain variations in local investment across municipalities in South Africa. In other words, crime rate does not influence the decision to invest locally in South Africa.

Trade openness revealed a positive and significant impact on domestic investment at local municipal level in South Africa. This is also in line with the findings of Eregha (2012) who found that degree of openness reveals a significant effect on domestic investment in the long run. This finding indicates that domestic firms can expand their market by introducing their products to the global market through international trade which further enhances regional and national economic growth in South Africa.

In order to examine whether the system GMM estimation is correctly specified, this study considered the Arellano Bond test for first and second order autocorrelation and the Hansen test of over identifying restrictions. The findings indicate the presence of first-order autocorrelation; however, the second order correlation was not derived due to the grouping of the data into 5-year interval which created only 4 categories. This indicated that a fourth lagged period which was required to derive the second-order autocorrelation could not be generated. Notwithstanding, the analysis provides a Hansen test of $P > chi2=0.179$ indicating the validity of the instruments as suggested by Roodman, (2009).

4.7 Study Limitations

It is important to emphasize that this study focused on greenfield FDI as the only FDI inflow in South Africa. Future research on the impact of FDI on domestic investment should take into consideration other types of foreign investment inflow such as brownfield FDI, total FDI (brown and greenfield) on domestic investment. In addition, the purpose of foreign investment inflow can also offer an interesting perspective for future research. Further studies should consider the impact of FDI inflow in Research and Development (R&D), marketing and production within a sector.

4.8 Conclusion and Policy Recommendations

This chapter was aimed at evaluating the impact of FDI on domestic investment in municipalities at local level in South Africa using data from 213 municipalities for the period 2000-2016. For the purpose of this study, the data obtained was grouped into 5 years interval since both foreign and domestic investment are not constant on an annual basis. Although FDI is observed to positively impact the host economy by increasing employment opportunities, improving technological know-how, eradicating poverty, and enhancing overall economic performance. However, there is a vast debate around its impact on domestic investment. This is because increased FDI inflows to developing economies have raised major concerns as to whether it crowds-in or -out domestic investment. This study therefore contributes to existing literature by examining the crowding-in or -out effect of FDI on domestic investment in South Africa.

An additional motivation behind the study was to analyse this effect at the sub-national level. This is because FDI is unequally distributed among regions since foreign investors often target regions that are more developed or areas where there is potential for higher sales (Adams, 2009; Zhang, 2017). As a result, analysing the inflow of FDI on domestic investment at the aggregate national level might lead to loss of information and biased results. In addition, to the best of my knowledge, there exist little to no studies on the impact of FDI on domestic investment in municipalities at local level in South Africa, hence, the need for a sub-national study.

Using system GMM approach, this study builds on the findings of Agosin and Mayer, 2000 and Eregha, 2012 by incorporating the importance of a regional study and the spatial interactions across local municipalities in South Africa. The findings of this study demonstrates the evidence of no relationship between FDI and domestic investment in municipalities at local level in South Africa both in the short and long run. One possible explanation is that foreign investors do not enhance the backward and forward linkages effect in the economy. This

indicates that MNCs interaction with local firms in the purchase of their inputs and the advertisement and distribution of their final goods is not significant enough to indicate a crowding-in effect.

Based on this finding, it can be recommended that South African policymakers pay close attention to measures aimed at encouraging local investment through incentives and tax reliefs in municipalities at local level. This is because significant increase in domestic investment will result in increased returns to capital which will attract more foreign investment (Ndikumana and Verick, 2008). This will be beneficial to the economy providing that FDI complements domestic investment since both are crucial for targeting poverty and income inequality in municipalities at local level.

In addition, increased domestic investment leads to the creation of more job opportunities and enhanced overall economic performance. It is also important to note that enhanced domestic investment will encourage more innovative ideas and better strategies for business development resulting in higher productivity within the domestic industry (Ndikumana and Verick, 2008; Adams, 2009). Policymakers should also ensure that measures are put in place to protect local firms from the fierce competition of MNCs. This will further encourage more domestic investment and develop entrepreneurial skills most especially among the youths in South Africa.

Furthermore, policy makers should encourage domestic partnerships in FDI investments to further promote backward and forward linkages. This will increase productivity levels of local firms and enhance the overall growth of the nation. The findings of this study also indicates that domestic investment is mostly concentrated in local municipalities such as City of Johannesburg in Gauteng, City of Cape Town in Western Cape, Ethekwini in KwaZulu-Natal, Ekurhuleni and City of Tshwane in Gauteng. This suggests that domestic investment is mostly located in the urban regions, therefore, policymakers should implement policies that encourage domestic investment in rural areas in a bid to enhance the growth of these regions and encourage inclusive growth and development in South Africa. In addition, although this study found that the high rate of crime in South Africa does not discourage investment, however, measures to drastically reduce crime rate should be implemented. Reducing the rate of crime will further increase the inflow of foreign investment thereby resulting in an increase in both domestic and foreign investment. This is because FDI inflow is observed to be more prominent in regions where return on investment is guaranteed and not threatened by crime (Ramos and Ashby, 2017).

It is important to point out that the lack of spatial correlation across local municipalities in South Africa points to the lack of regional interactions. In other words, the Moran's I result did not show significant evidence that FDI inflow in local municipality "i" impacts domestic investment in neighbouring municipalities. This is indicative of the negligent role of FDI in addressing regional disparities in investment in South Africa. This study found that FDI is mainly natural resource-based while domestic investment is market-based which justifies the findings of no spatial correlation across regions. This result is backed up by the findings of Hamida (2013) who found that geography plays a vital role in determining spillovers between FDI and domestic investment in host economies. Spillovers only occur when foreign and domestic investment are located in the same region. Also, Girma and Wakelin (2002) found evidence that positive spillovers only exists when MNCs and local firms are located in the same sector and region. The findings of this study, therefore, underline the need for policies to attract FDI to be accompanied by regional policies to enhance more investment in local businesses most especially in the neglected regions of South Africa. One way through which FDI can help in achieving this is by intensifying the backward and forward linkage effect in these regions resulting in regional empowerment and the attainment of sustainable and inclusive growth in South Africa (Kersan-Skabic and Tijanic, 2014).

CHAPTER FIVE

Summary, Conclusions and Suggestions for Further Research

5.1 Introduction

This thesis broadly examined the distributional impact of Foreign Direct Investment (FDI) at local municipal level in South Africa using spatial analysis with data from 2000 to 2016 and 213 local municipalities. This study was particularly aimed at evaluating the impact of FDI on poverty, income inequality, and domestic investment in local municipalities. This is justified since these variables are socioeconomic indicators and contribute directly to economic growth in South Africa. It sought to answer three key research questions: 1. What is the effect of FDI on poverty at local municipal level in South Africa? 2. Does FDI contribute to tightening income gap at local municipal level in South Africa? 3. What is the impact of FDI on domestic investment at local municipal level in South Africa? In answering these questions, the study employed the use of fixed and random effects as the baseline for estimation. System GMM was also employed to account for possible endogeneity between variables. Lastly, the study used spatial models to account for spatial interaction effect across local municipalities. Based on these estimations, the study made key findings that are crucial to regional and national economic growth and development in South Africa. The thesis was structured into three main essays, each paper forms a chapter and addresses a particular research question. This chapter then summarized key findings and provides policy recommendations and suggestion for further research.

5.2 Summary, Key Findings and Conclusions

FDI is observed as a key determinant of economic growth in developing economies (Adams, 2009). The first paper (chapter two) examined the impact of FDI on poverty at local municipal level in South Africa using data from 2000 to 2016. The study employed the use of fixed and random effects estimation as the baseline for analysis and then employed spatial SAR, SLX and SDM models in a bid to account for spatial interactions across local municipalities.

Based on these estimations, it observed that FDI is concentrated in Northern Cape, KwaZulu Natal, Mpumalanga, Western Cape, and Gauteng provinces, and in local municipalities such as Tsantsabane, Kareeberg, Abaqulusi, Alfred Duma, Albert Luthuli, Bushbuckridge, City of Cape Town, Stellenbosch, City of Johannesburg, Mogale City. Poverty on the other hand is prevalent in Kwazulu-Natal and Eastern Cape provinces and in local municipalities like

Msinga, Nongoma, Maphumulo, Daanhuser, eDumbe, Nqutu, Ndwedwe Port St John, Mbizana, Ntanbankulu, Ngquza Hill, Nyandeni, Mhlontlo, Engcobo.

Furthermore, using night lights data, this study found no linkage between economic activities, employment, poverty and FDI. This is because although FDI was observed to be predominant in remote regions like Nothern Cape, KwaZulu Natal provinces, it was obviously not benefitting their regional development. As a result, there exist no linkage between FDI, economic activities and poverty reduction in those regions.

It is important to point out that while accounting for spatial interactions across local municipalities using spatial models, this study found a negative significant relationship between FDI and poverty at local municipal level in South Africa. This indicates that FDI contributes to poverty reduction in local municipalities. It also finds that an indirect negative significant relationship between FDI and poverty, suggesting that FDI inflow in local municipality "i" contributes to poverty reduction in neighbouring local municipalities. This finding suggests that spatial spillovers exist between local municipalities. In addition, FDI is not only crucial to reducing poverty in the region where it is located but it also contributes to poverty reduction in the surrounding regions. Hence, promoting regional development, inclusive growth, and sustainable development across South Africa.

Essay two (chapter three) examined the impact of FDI on income inequality at local municipal level in South Africa. This study found that income inequality is concentrated in Free State, Northern Cape, and Gauteng provinces and lower in provinces such as Limpopo, Western Cape, and Mpumalanga. The study also finds that provinces with low-income levels such as Limpopo are also associated with low-income inequality. Gauteng province is observed to experience high income gaps due to high rates of rural-urban migration in search of greener pastures leading to migrants' inability to secure affordable housing in the city thereby resulting in lower housing standards popularly knowns as shacks (Turok, 2018). This study also observed no relationship between FDI and income inequality in local municipalities.

Using fixed effects, system GMM and data from 213 local municipalities, the third essay (chapter four) evaluated the impact of FDI on domestic investment at local municipal level in South Africa. It finds domestic investment to be mostly dominated in the urban metropolitan cities in South Africa, indicating that domestic investment is market-based while FDI is natural-resource based. The findings of this study demonstrated that no relationship exist between FDI and domestic investment in both the short and long run. This study however did not employ the use of spatial models in its analysis because it did not find enough evidence to indicate spatial interactions across local municipalities. This finding is in line with that of

Hamida (2013) who found that spillovers only occurs when foreign and domestic investment are situated in the same region. Since our findings indicate that FDI is natural-resource based while domestic investment is market-based, the evidence of no spatial interaction is justified.

5.3 Policy Implications and Recommendations of the Study

The findings of the study have vital policy implications to regional development and promoting inclusive and sustainable growth in South Africa. This study unearthed that FDI plays a crucial role in contributing to poverty reduction in local municipalities in South Africa. Therefore, to further reduce poverty in the local municipalities, equal distribution of foreign investment across regions should be encouraged. This is because each local municipality has a local advantage over others which can enhance their attraction of foreign investment thereby resulting in regional development across South Africa. This study found that although FDI is natural resource based and concentrated in provinces such as KwaZulu-Natal and Northern Cape, however, poverty is prevalent in these provinces. In other words, this study found no linkage between night light data which depicted economic activities, FDI and poverty in regions such as KwaZulu-Natal and Northern Cape. Local municipalities that showed higher foreign investment inflow however did not reveal corresponding light luminosity. This finding suggests that although FDI is going to remote South African regions, it is not benefitting the regional development in these locations. One possible explanation might be based on the fact that indigenes of these regions do not possess the necessary skills required to work in these MNCs since FDI is mostly associated with the employment of skilled workers. Policy makers should therefore focus on empowering the citizens of these regions in seeking the required skills mainly through further education or vocational training to enable them to enjoy the benefits attributed to the presence of FDI in their region.

Furthermore, this study did not find a relationship between FDI and income inequality in municipalities at local level in South Africa. This suggests that FDI did not contribute to tightening income gap in South Africa. Based on this finding, this study suggested that measures such as equal distribution of FDI across local municipalities be implemented. Foreign investment that develops every region in South Africa should be encouraged. One prominent way through which this can be achieved is to determine the natural advantage that each region possess and seek foreign investment that are specialized in utilizing these resources for the development of the regions.

Also, it is worth noting that high levels of income disparity were observed in large cities such as City of Johannesburg in Gauteng due to in-migration across cities in search of better living

standards. Policymakers should therefore ensure that affordable housing and better living standards be encouraged and provided (Turok, 2018). This is achievable by encouraging attainment of higher levels of education to better increase individual income to afford housing in cities and eradicate substandard housing known as shacks.

This study also found no relationship between FDI and domestic investment in municipalities at local level in South Africa in the short and long run. This is because foreign investors do not promote backward and forward linkage effect of FDI in the South African economy. This study therefore recommended that policy makers should implement policies targeted at encouraging local investment using means such as incentives and tax reliefs systems. Increase levels of domestic investment is crucial to the development of South Africa as a whole. This is because since there exists a bi-directional relationship between foreign and domestic investment (Ndikumana and Verick, 2008), increased investment will lead to increased productivity and returns to capital which will further increase foreign investment inflow into the country. Also, a rise in domestic investment implies the creation of more employment opportunities, significant poverty reduction and enhanced economic performance. In addition, more innovative ideas and better strategies for business development will be observed (Adams, 2009).

It is important to point out that measures to protect small and medium enterprises against the fiery competitions of foreign industries are implemented (Jude, 2019; Szkorupova, 2014). Effecting such policies will further develop more interests in local investment and create security for existing ones. In addition, policies that facilitate partnership between domestic and foreign investment through the forward and backward linkage effect should be encouraged. Policymakers should ensure that measures targeted at enhancing domestic investment through forward and backward linkages are encouraged. Foreign investors should be advised to partner with local investors by sourcing their production inputs from local investors and employing local advertising and distribution companies in the distribution of their finished products. Domestic investment is observed to be concentrated in urban regions such as Johannesburg in Gauteng and City of Cape Town in Western Cape suggesting that domestic investment is market-based.

Finally, no evidence of spatial correlation across local municipalities was found when examining the impact of FDI on domestic investment in municipalities at local level in South Africa. Our findings also showed that FDI is natural resource-based while domestic investment is market-based. Our finding of no spatial correlation is backed up by the findings of Hamida (2013) who revealed that geography plays a crucial role in determining spillovers between FDI

and domestic investment. Policy makers should therefore ensure that policies that attract foreign as well as enhancing local investment in various regions in South Africa are encouraged. This will therefore aid spatial correlation between foreign and local investment.

5.4 Study Limitations and Suggestions for Further Research

It is important to note that although this study contributes to existing literature, it however leaves areas for further research to build on. This study did not take into consideration the sectoral analysis of FDI. Further studies should therefore evaluate the impact of sectoral FDI on socio economic indicators in South Africa. Also, this study only included greenfield FDI in its estimations and analysis. Future research can include a comparative analysis on the impact of brown and greenfield FDI on poverty at the sub-national level in South Africa.

In addition, this study did not consider the purpose of FDI inflow into South Africa. Further studies can therefore dig deeper into analysing the impact of FDI inflow in Research and Development, marketing, and production within a sector. Also, future research should explore the impact of FDI on various FDI types such as resource seeking, domestic market seeking as well as export oriented FDI.

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