EXAMINING SPILLOVER EFFECTS AND THE IMPACT OF FOREIGN DIRECT INVESTMENT IN THE TRANSPORT, STORAGE AND COMMUNICATION SECTOR

BY

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DECLARATION

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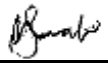
I, Nokwanda Mahori, was admitted for a Master of Management by Research degree in March 2018 at the Wits School of Governance. I hereby certify that this dissertation, which is approximately 54 688 words in length (excluding table of contents, abbreviations, glossary, acknowledgements, abstract and references), has been written by me and is a compilation of the study I undertook. This research has not been put forward for a higher degree prior to this. I declare that this dissertation contains full references of all the sources employed, quoted, or cited.

Date: 23 March 2022 Signature: 

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This is for learners who are disadvantaged, and education is inaccessible. I want to encourage you to stay focused, be persistent, and persevere.

Nokwanda Mahori kaNxumalo

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ABSTRACT

Many studies on the relationship between foreign direct investment (FDI) and indicators of development postulate that FDI leads to economic growth through capital acquisition and diffusion of knowledge. The relationship between FDI and productivity through the generation of spillovers in developing countries remains one of the contemporary issues in international trade literature and has, in recent years, received revived interest, particularly in countries challenged with (i) high unemployment levels; (ii) knowledge and skills deficit in innovation, research and development; and (iii) in the main, lagging with technological progress. FDI benefits to the host economy are not limited to capital acquisition to counter deficiencies and creating jobs in the economy; but include the attainment of intangible assets such as knowledge, skills, managerial competencies, access to international networks, branding and goodwill. FDI presents benefits that, if not taken advantage of, could be forfeited to address capital deficiencies, revive growth, generate employment, transfer skills, and drive technological progress to boost productivity, amongst other benefits.

This study examines inward FDI in the transport, storage and communication (TSC) sector. As global economic interdependence is becoming more entrenched, the relevance of this sector and FDI cannot be understated. Leveraging efficient transport and communications networks can lead to opportunities at both the microeconomic and macroeconomic levels that could be forgone if not capitalised. These opportunities include socio-economic development, multiplier effects across different sectors, facilitating market efficiency, and delivering goods and services with more efficacy.

This paper explores the relationship between FDI and gross domestic product amongst other variables in the transport, storage and communication (TSC) sector from 1985 to 2018 in South Africa (ZA). The study applies (i) the OLS method to estimate the Cobb-Douglas (CD) production function parameters, the findings are then analysed and interpreted to draw inferences; (ii) the autoregressive distributed lag (ARDL) bounds test to cointegration is applied; and (iii) Granger causality. The OLS method is employed to determine the impact of FDI spillover effects. The bounds test establishes the long-run relationship, and the error correction model (ECM) establishes the short-run dynamic relationships. The study finds that FDI has an insignificant effect on total factor productivity (TFP) in the TSC sector. The

ARDL bounds approach and Granger causality test indicate a bi-directional relationship between foreign direct investment (FDI) and gross domestic product (GDP). The findings of the long-run relationship, short-run dynamics, and bi-directional causality in this study are on par with the widely held perspective that FDI can positively impact GDP. Moreover, the results indicated that exports, fixed capital formation, and FDI all Granger cause GDP with evidence of reciprocity. At the 5% level of significance, imports, labour, and infrastructure do not Granger cause GDP.

This study recommends that attracting FDI is not a means to an end; since attracting FDI does not ensure that spillovers are absorbed by the domestic economy. The FDI policy framework should ideally strike the optimum balance between national socio-economic objectives and FDI policy objectives. South Africa must establish investment policies that: (i) stimulate FDI without threatening the competitiveness and viability of domestic firms; (ii) contribute to economic growth and development; (iii) adhere to established trade practices in multilateral trading systems; and (iv) develop an aggressive FDI strategy.

KEYWORDS: South Africa; foreign direct investment; technology spillovers; productivity; cointegration

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	Meaning
4IR	Fourth Industrial Revolution
ADF – GLS	Augmented Dickey-Fuller – General Least Squares
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ANC	African National Congress
ARDL	Autoregressive Distributed Lag
CD	Cobb-Douglas
DCMNE	Developed Country Multi-National Enterprise
ECM	Error Correction Model
ECT	Error Correction Term
ERS	Elliot, Rothenberg and Stock
FCF	Fixed Capital Formation
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution
GVC	Global Value Chain
HIPC	Heavily Indebted Poor Country
HQIC	Hannan–Quinn Information Criterion
JSE	Johannesburg Stock Exchange
LLDC	Land-locked Developing Country
M&A	Merger and Acquisition
MNC	Multi-National Corporation
MNE	Multi-National Enterprise
NEPAD	New Partnership for Africa’s Development

Abbreviation	Meaning
NGP	Ng and Perron
OECD	Organisation for Economic Co-operation and Development
OFDI	Outward Foreign Direct Investment
PP	Phillips–Perron
R & D	Research and Development
SAAR	Seasonally Adjusted Annualised Rate
SADC	Southern African Development Community
SAIIA	South African Institute of International Affairs
SARB	South African Reserve Bank
SEZ	Special Economic Zone
SIC	Schwarz Information Criterion
SIDS	Small Islands Developing States
StatsSA	Statistics South Africa
TFP	Total Factor Productivity
TNC	Transnational Corporation
TSC	Transport, Storage and Communication
TWMNE	Third World Multi-National Enterprise
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference for Trade and Development
US	United States
VECM	Vector Error Correction Model
ZA	South Africa

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This study sets out to contribute to the research and build on the knowledge repository of foreign direct investment (FDI) in South Africa (ZA).

FDI is the acquisition of a lasting interest with a minimum of 10% holding in an entity outside the home of the investor to gain effective control of the entity, or significantly influence the management of the entity (International Monetary Fund, 2018; UNCTAD, 2007b). FDI spillovers are defined as the unintended benefits to local firms that occur due to knowledge diffusion from other (foreign) firms' technological advancements without the costs being shared amongst beneficiaries (Fan & Sun, 2017).

According to Javorcik (2013) and Dunning (1993), FDI inflows can contribute to skills, training, and job creation. Capital is accepted as a driving force for economic growth and development (Gert and Campbell, 2007). On the contrary, foreign investors with their advanced technology are likely to take advantage of the economies of scale and access to funding, which may take local firms out of business (Agosin & Mayer, 2000). In the short term, spillovers are prone to be negative to the host country because of competition; however, in the long run, FDI can lead to the restructuring of an entire industry and promote better opportunities for the most efficient local participants (Farole & Winkler, 2014).

FDI is a catalyst for growth in developing countries. Many empirical studies are in consensus that FDI generates spillovers which trigger economic growth in the recipient nation, these include studies by Arisoy (2012), Dkhili (2019), Gungor and Ringim (2017), Javaid (2016), Zhao and Du (2007), and Sunde (2016). These benefits include: the creation of jobs; participation in global value chains (importing and exporting) (Farole & Winkler, 2014); the opportunity to attain explicit and implicit skills (Dunning, 1993); and knowledge acquisition (Dunning, 1993). There is also research on the adverse (Herzer, 2012; Konings, 2000; Mühlen, 2013), and ambiguous (Alfaro et al., 2004; Belloumi, 2014; Herzer et al., 2008) effects of foreign investment on economic growth. FDI has proven to be conducive to the economic development of the host nation, especially where the country has absorptive capacity (Borensztein et al., 1998; Silajdzic & Mehic, 2015).

The expansion of global value chains (GVCs) is a contributing factor to the growing role of FDI as a stimulant for improved output and trade in developing economies (Farole & Winkler, 2014). The growth of MNCs and the integration of supply and value chains for the global market for products and services have spread rapidly over the last few decades. Global value chains have increased the importance of FDI as a channel for knowledge and technology spillovers, trade, development, employment creation and foreign exchange (Farole & Winkler, 2014; Lipsey & Sjöholm, 2004). The impetus of MNCs is depicted in their contribution to world exports which are approximated to be 80% (Lipsey & Sjöholm, 2004). However, the most significant contribution is the FDI's spillover potential, which contributes to long-run growth and development (Farole & Winkler, 2014).

The genesis of the Fourth Industrial Revolution (4IR) is currently underway. This genesis is catalysed by research and development (R & D) and technology advancements that are cheaper and more efficient. Improved logistical systems, more affordable transport, and communication costs are imperative for emerging economies to be players in global value chains (GVCs) and participate optimally in the 4IR (UNCTAD, 2018). The TSC industry is a crucial component of economic and social development. An efficient TSC industry is a catalyst for improved competition leading to key export industries competing globally and domestic firms providing goods and services with greater efficiency (Human Sciences Research Council (HSRC), 2008).

Transport and communications are a crucial component of national socio-economic development (Government of Pakistan, 2014; National Planning Commission, 2012; Rodrigue, 2020). An efficient TSC industry is a catalyst for improved competition leading to key export industries competing globally and domestic firms providing goods and services with greater efficiency (Human Sciences Research Council (HSRC), 2008). Economic prospects in the global economy have become increasingly tied to the movement of people and goods, as well as the information and communication technology (Rodrigue, 2020).

Transport and communication are integral to poverty alleviation (International Monetary Fund, 2002). Efficient transport systems lead to positive multiplier effects such as improved access to markets, employment, and investments. When transport and communications networks are inefficient or unreliable, they may result in economic consequences such as missed opportunities, lower quality of life (Rodrigue, 2020), exacerbate the circumstances

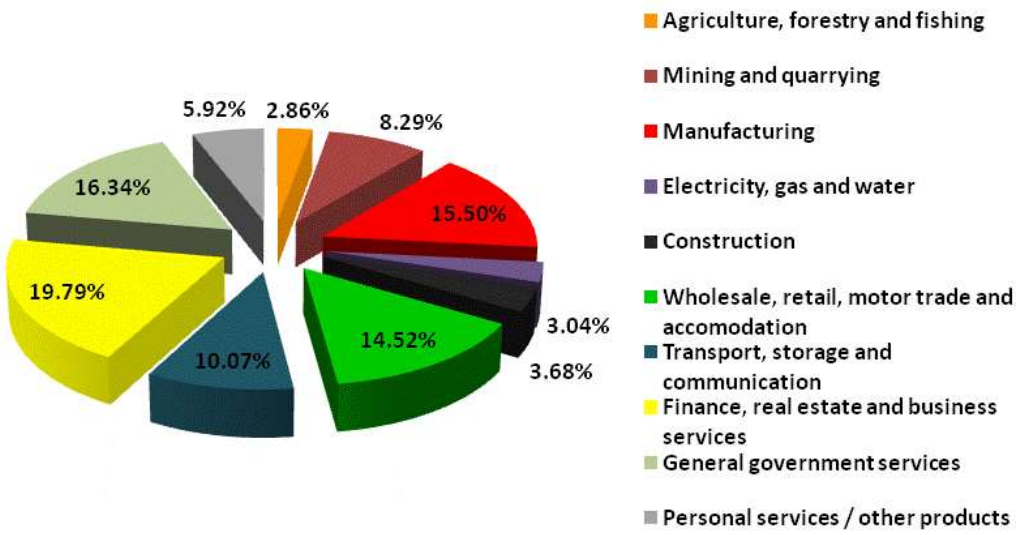
for the poor, impact adversely on the environment, and weigh heavy on the public purse (International Monetary Fund, 2002). Moreover, an inefficient transport and communication sector, makes trade harder and more expensive, leading to loss in competitiveness, and a decline in economic growth (International Monetary Fund, 2002).

At the macroeconomic level, investment in transport stimulates growth by increasing the social return to private investment (International Monetary Fund, 2002). Transportation and logistics are pervasive throughout the economy and are intrinsically tied to a country's scale of production, labour market, and gross national income (GNI). Efficient transportation lowers costs in various sectors, and deficient transport systems add to costs (Rodrigue, 2020).

At the microeconomic level, efficient transport systems reduce production costs, ameliorate market access, and this in turn stimulates growth in the non-agricultural rural economy and tourism (International Monetary Fund, 2002). Transport and communications are determinants in the location decisions of firms, individuals, and multinationals (Alfaro & Chen, 2017). Transport has an impact on both the cost of labour and the efficiency of the labour market (International Monetary Fund, 2002).

The TSC sector contribution to GDP averaged 7.92% for 34 years, dating from 1985 to 2018. The sector has been gradually increasing in performance and reached its peak in 2017 and 2018 when it contributed 9.55% to GDP (South African Reserve Bank, 2020). The pie chart below is an average of the 34 years from 1985 to 2018 of all the South African industries' sectoral contribution as detailed by StatsSA. The TSC sector is the 5th largest contributor to GDP and has, on average, contributed to 10.07% of GDP in ZA from 1985 to 2018.

Figure 1-1: Average sectoral contribution to GDP at basic prices from 1985 to 2018



Source: Author's compilation from South African Reserve Bank statistical query data

Sadly, the world is faced with the COVID-19 pandemic. This pandemic has swept across the globe and negatively impacted not only on health and endangered lives, but also on global value chains (GVCs), trade, travel and economic activity at large. South Africa is faced with not only the COVID-19 pandemic and the danger of the virus being aggressive due to prevalent tuberculosis, AIDS and HIV infections, but also the following: (i) high unemployment of 30.8% for the third quarter of 2020 (Statistics South Africa, 2020b), which is concentrated amongst the youth, and an ageing working population; and (ii) ailing state-owned entities. It has been somewhat difficult to rid the economy of the structural challenges which were created by centuries of colonialism, imperialism and apartheid. The government is also faced with alleviating persistent poverty and inequality, which as a consequence, the majority of the population is marginalised and located on the peripheries of the mainstream economy and are confined to the "second economy" shutout from that of the mainstream "first world economy" (du Toit & Neves, 2007).

The impact of COVID-19 will lead to a decline in remittances from the African diaspora and a decline in global foreign direct investment flows (African Union, 2020). According to the United Nations Conference for Trade and Development (UNCTAD), the global top 5000 companies investing abroad have adjusted their earnings projections to decline by 9% as a result of COVID-19. Globally, the most severely affected industries as a result of COVID-19 are (i) automotive, (ii) air passenger carriers, (iii) energy, and (iv) raw materials industries,

which are forecasted to decline by 44%, 42% and 13% respectively. It is estimated that in Africa, FDI inflows could contract up to 15% (African Union, 2020).This disease will depress the global economy. Post the aftermath of COVID-19, economic recovery must include concerted efforts to attract foreign investment to stimulate economic growth and create jobs. This research focuses on the impact of foreign direct investment (FDI) in South Africa (ZA) from 1985 to 2018 in the transport, storage and communication sector (TSC). The prospects for economic recovery to pre-pandemic growth levels by 2024 are promising to some extent due to the commitment of the South African National Treasury to acquire COVID-19 vaccines (Mhlanga et al., 2020), of which distribution and inoculation are already underway globally, with the European Union, India and the United States pre-purchasing over 1 billion doses by the end of 2020 (Koop, 2020).

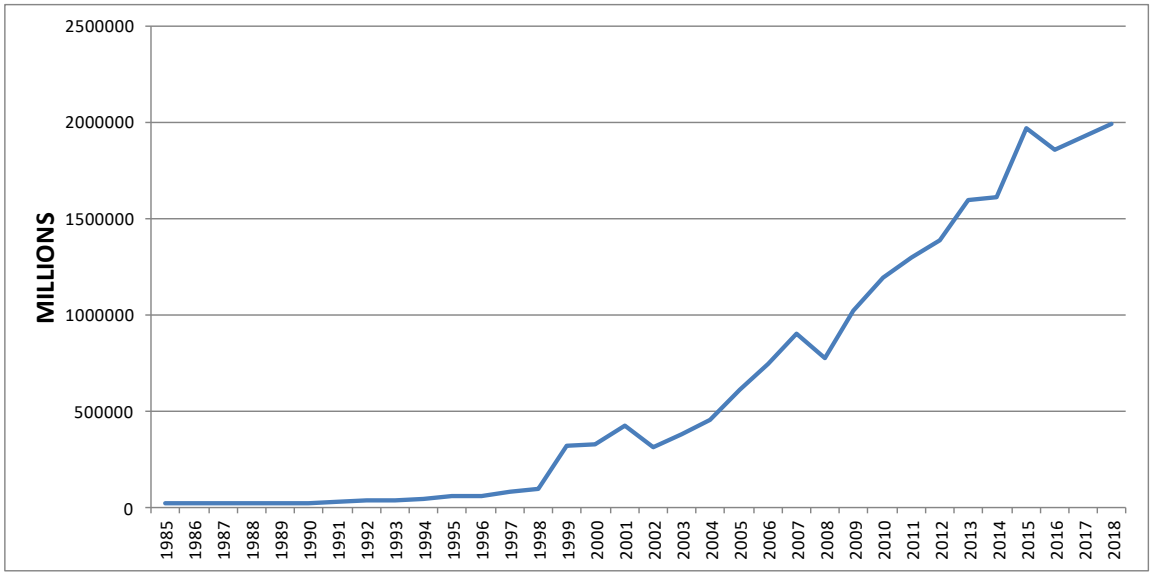
The African Continental Free Trade Area (AfCFTA) came into effect on 1 January 2021. This agreement is a key milestone towards development and will enable African countries to expand intra-continental trade, which has traditionally been low and foster an environment for African businesses to seize opportunities across the continent (African Union, 2021). Africa's growth and development has been stunted by several factors, including the vicious cycle of exporting raw materials and importing value-added manufactured goods. The involvement of foreign investors in AfCFTA could contribute to the expansion of transport and communications infrastructure, amongst other benefits on the continent. This is because foreign investors are also part and parcel of the development of transportation networks to facilitate better integration and improved networks for trade, as was the case in Southern Africa in the construction of the Maputo Corridor (UNCTAD, 2008b).

South Africa is plagued by high unemployment, and given the current backdrop of the government’s investment drive and target to attract 100 billion US dollars over five years to reignite growth and create jobs (The Presidency of South Africa, 2018), there certainly could not have been a more appropriate time to contribute to the knowledge repository in the FDI sector. Inward FDI to South Africa can mitigate capital deficiencies in the economy, as capital is generally a catalyst for economic growth and development (Nowak & Ricci, 2006). Arnold et al. (2011), Duggan et al. (2013), and Tondl & Fornero (2008) in their studies conclude that FDI in the TSC sector results in improved productivity in the manufacturing industry. Generally, improvements in the TSC sector can spill over to other sectors (Rodrigue, 2020).

Figure 1-2 on page 7 depicts FDI inflows in South Africa (ZA) from 1985 to 2018 in millions of rands. The trough of these flows was in 1985, and there is an average gradual increase across the series and a peak in 2015. Due to the political instability of apartheid from the 1980s to the early 1990s, sanctions were intensified, and investment constrained. From 1984 to 1988, foreign direct investors departed from ZA, with approximately 225 United States companies and twenty per cent of the United Kingdom corporations exiting. In 1990 there were still more than 450 foreign firms with direct liabilities in ZA (Gelb & Black, 2004). The peaceful transition to the first democratic elections in 1994 enticed FDI to invest in ZA. The part sale of the state's shares in Telkom and the takeover of De Beers by Anglo American in 1997 and 2001, respectively, saw sharp increases in foreign flows into ZA (Arvanitis, 2005). South Africa made concerted efforts to entice foreign investment through incentives such as the Growth, Employment and Redistribution (GEAR) strategy in 1996 to boost the country's global competitiveness. National Treasury's 2008 and 2011 strategic plans factored the role of tax incentives to entice domestic and foreign investment (Wentzel, 2010).

The deterioration in FDI inflows during 2007 – 2008 was partly due to the global financial crisis. The TSC industry obtained substantial greenfield (new investment/ new production facility) FDI before 2009, which took a downturn due to the dominance of the four mobile operators in the sector, making it cumbersome for new firms to penetrate the market (Makwembere, 2014). Foreign liabilities increased by 7.7% in the fourth quarter of 2015. At the end of December 2015, the market value of FDI was R5 563 billion, and by the end of March 2016 had increased to R5 694 billion due to the primary listing of a private hospital group from the Johannesburg Stock Exchange to the London Stock Exchange (South African Reserve Bank, 2016). ZA held its first annual investment conference in November 2018 to attract foreign investment to facilitate jobs and drive economic growth (The Presidency of South Africa, 2018).

Figure 1-2: Foreign direct liabilities in ZA, 1985 to 2018



Source: Author's compilation from South African Reserve Bank data

1.2 RESEARCH PROBLEM

This study argues that FDI spillovers are interesting and at the heart of the endogenous growth theory. The endogenous growth theory takes into account that benefits from inward FDI to the domestic economy are not limited to capital accumulation to stimulate productivity and create jobs in the economy; but also through the attainment of intangible assets such as explicit and tacit knowledge, skills, managerial competencies, international networks, branding and goodwill (Blomstrom et al., 1992; Borensztein et al., 1998).

According to the African National Congress' (ANC) 54th conference document of 2017, South Africa (ZA) is faced with jobless growth in the economy because even when the economy is growing, jobs are not consequently created. According to Javorcik (2013), FDI inflows can contribute to skills, training and job creation. Thus, this, in turn, could assist in addressing the growing pandemic of youth unemployment which is crippling the economy. Foreign investment in South Africa (ZA) can catalyse economic growth. Capital is accepted as a driving force for economic growth and development (Nowak & Ricci, 2006). Capital is often limited in developing nations. Developing nations, at times, request foreign loans to counteract capital deficiencies (Nowak & Ricci, 2006). Given the current backdrop of the South African government's investment drive to attract 100 billion US dollars over five years to reignite growth and create jobs (The Presidency of South Africa, 2018), there certainly could not have been a better time to contribute to the knowledge repository of FDI in South

Africa. Inward FDI to South Africa can mitigate capital deficiencies in the economy, as capital is generally a catalyst for economic growth and development (Nowak & Ricci, 2006).

South Africa is keen to draw more FDI to bridge the shortfall in domestic savings, reignite economic growth and create jobs (Magwiro et al., 2017; The Presidency of South Africa, 2018). Moreover, it is a widely held view that FDI can lead to positive spillovers for the host country through means such as skills transfer, labour migration and catalysing technological progress to drive productivity (Belloumi, 2014). FDI offers opportunities that, if not taken advantage of, could be foregone to counter capital deficiencies, reignite growth, create jobs, transfer skills, stimulate technological progress, amongst other benefits.

Moreover, studies on spillovers in South Africa (ZA) are very limited. They mostly look at manufacturing. Few studies have looked into how FDI affects the South African economy. These include studies by Asafo-Adjei (2007); Kargbo (2017); Masipa (2018); Nchoe (2016); and Strauss (2015). As elaborated on in this section, given the socio-economic benefits and multiplier effects spilling over to other sectors, catalysing improved trade, and providing goods and services with greater efficacy from an efficient transport and communications sector, at both the microeconomic and macroenomic levels, the sector provides opportunities that could be forgone if not exploited.

1.3 PURPOSE STATEMENT

This study aims to examine the spillover effects and the impact of foreign direct investment in South Africa's transport, storage and communication (TSC) sector from 1985 to 2018.

1.4 RESEARCH OBJECTIVES

The primary objectives of the study are as follows:

I. To observe the trend of FDI inflows to the South African economy and the TSC sector;
II. To examine the effect of FDI inflows on the productivity of the TSC sector in South Africa;
III. To determine the impact of FDI in the TSC sector;

The sub-objective for this study is as follows:

IV. To propose policy recommendations in accordance with the outcomes of the study.

1.5 RESEARCH QUESTIONS

Trickling from the research problem and objectives, the questions below are formulated:

I. What are the FDI inflows to the South African economy and the TSC sector from 1985 to 2018?
II. What is the effect of FDI inflows on productivity in the TSC sector in South Africa from 1985 to 2018?
III. What is the impact of FDI on the GDP contribution of the TSC sector in South Africa from 1985 to 2018?
IV. Given the outcomes of the research, what are the policy recommendations that can be drawn?

1.6 SIGNIFICANCE OF THE STUDY

This study is significant because:

I. A few studies analyse the impact of FDI on the South African economy, which include literature by: Asafo-Adjei (2007), Bakar et al. (2012), Masipa (2014), Nchoe (2016) and Strauss (2015).
II. Studies on spillovers in South Africa (ZA) are limited and focus mainly on manufacturing. To my knowledge, this is the first study on FDI spillovers in the TSC sector in ZA;
III. The impact of FDI spillovers from the TSC sector in South Africa has not been determined;
IV. Moreover, studies on FDI could guide the government on strengthening the policy on FDI to benefit the domestic economy.

1.7 RESEARCH APPROACH AND DESIGN

This study is quantitative and adopts an econometric approach. This study examines and analyses annual time series secondary data to draw inferences and make recommendations on the spillover effects and the impact of FDI in South Africa's transport, storage and communication (TSC) sector. The study employs econometric methods to investigate the relationship between foreign direct investment and macroeconomic variables.

The research design comprises techniques for data collection and analysis. The data employed for this study is secondary annual time series data for the transport, storage and communication (TSC) sector, spanning from 1985 to 2018. The data applied in the econometric analysis is compiled from the South African Reserve Bank (SARB) statistical query, Statistics South Africa (StatsSA) and the United Nations Conference on Trade and Development (UNCTAD) statistics. Excel and EViews 10 are used to conduct the econometric analysis.

The econometric approach is as follows:

I. Descriptive statistics are utilized to determine FDI inflows to the South African economy and the TSC sector from 1985 to 2018.

II. The Cobb-Douglas (CD) production function represents the functional form of the relationship between inputs and outputs (Paul, 2011). In this study, the parameters of the Cobb-Douglas production function are estimated by employing the ordinary least squares method. The results from the ordinary least squares (OLS) regression are analysed to determine the spillover effect of FDI on productivity in the TSC sector in South Africa from 1985 to 2018.

III. The impact of FDI on TSC sector GDP contribution in South Africa from 1985 to 2018 is determined by cointegration tests. Pre-testing for unit roots is critical when conducting cointegration analysis (Wei, 2014). Unit root tests are applied to establish the order of integration. The autoregressive distributed lag (ARDL) bounds test to cointegration determines the long-run relationship, and the error correction model (ECM) establishes the short-run dynamic relationships. Granger causality tests are undertaken when a long-run relationship has been detected. Granger causality is employed to investigate the patterns of interactions between variables to deduce the direction of causation.

1.8 CHAPTERS OUTLINE

The study comprises six chapters. The first chapter introduces FDI, technology spillovers, the methodology, describes the research problem and the rationale behind it. Chapter two explores FDI and spillovers internationally and in Africa, with focus on ZA in particular. Chapter two goes on to analyse FDI in the TSC industry. The third chapter comprises the

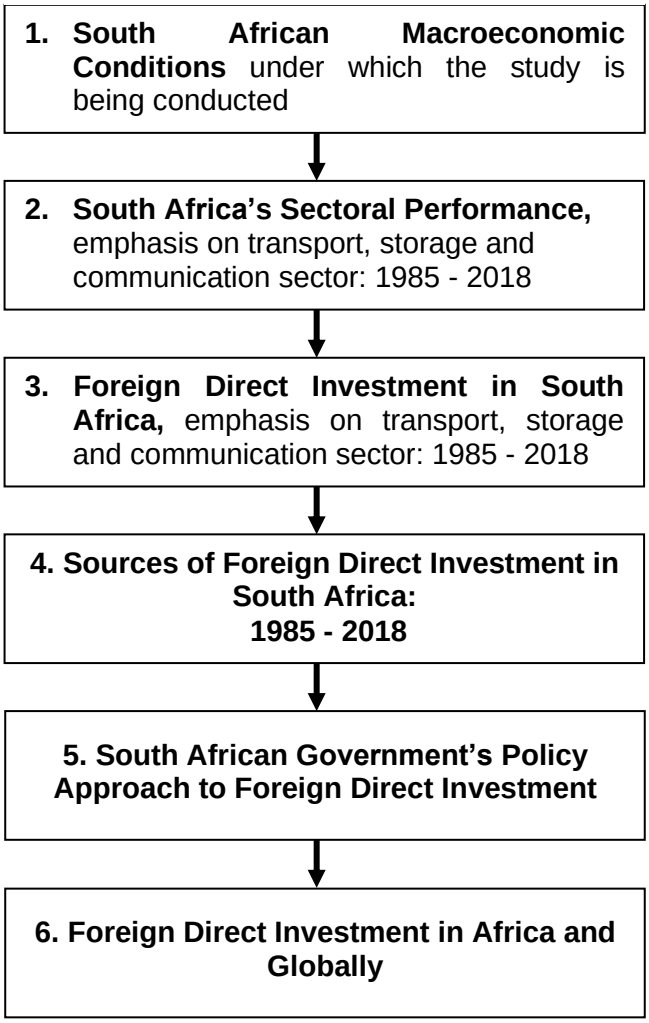
literature review and empirical studies. The fourth chapter details the descriptive statistics, methodology, econometric models, variables, and limitations. Chapter five presents the econometric results. Chapter six summarises the main findings, provides the conclusions and recommendations.

CHAPTER TWO: SOUTH AFRICAN ECONOMY AND GLOBAL FDI FLOWS

2.1 INTRODUCTION

This section focuses on the (i) South African (ZA) macroeconomic context and (ii) FDI trends and patterns globally from 1985 to 2018. As depicted in the diagram below, the areas covered in this chapter are (1) Global and South African economic context; (2) South Africa's sectoral performance with a focus on the transport, storage and communication (TSC) sector; (3) FDI in South Africa; (4) Sources of FDI; (5) South African government's policy approach to FDI; and lastly, (6) Global FDI flows.

Figure 2-1: Breakdown of chapter two



Source: Author's compilation

2.2 SOUTH AFRICAN MACROECONOMIC OUTLOOK

Econometrics and statistics rely on trends and patterns, to unpack the past, analyse the current situation and predict the future. The background and status quo in South Africa are outlined. The research recommendations take into cognisance the dynamics at play as well as the global and local balance of forces.

The South African economy has come a long way since liberation and the first democratic elections held on 27 April 1994. Prior to the 1994 elections, South Africa was under the apartheid government, this led to millions of black South Africans being deprived of opportunities and excluded in the mainstream economic and social activities. The Reconstruction and Development Programme (RDP) was established to eradicate poverty, unemployment, and inequality and create a non-racial, non-sexiest country and embrace social cohesiveness (South African Government, 1994).

Besides this, South Africa's economy has been plagued by low domestic savings and financed mainly through vulnerable portfolio flows as opposed to long-term foreign investment (Arvanitis, 2005). Economic challenges, which have been in existence since apartheid, have been difficult to conquer. These include high unemployment, high crime, lack of skills and education, to cater to the needs of the economy (National Planning Commission, 2012; South African Institute of International Affairs (SAIIA), 2018). The national official unemployment rate in South Africa in the second and third quarters of 2020 was 23.3% and 30.8%. The expanded unemployment figure in the second and third quarters of 2020 was 42% and 43.1%, respectively which included discouraged work-seekers[1] and those who have not been actively seeking employment (Statistics South Africa, 2020a, 2020b). In the third quarter of 2020, the Eastern Cape recorded the highest unemployment rate of 45.8% as per the official definition, followed by Gauteng and the Free State with 35.5% and 33.7%, respectively. The African National Congress (ANC) has been in power since 1994. It has been somewhat challenging to rid the economy of the structural challenges which were created by centuries of colonialism, imperialism, and apartheid. The government is tasked with alleviating persistent poverty and inequality, as a result, the

[1] "**Discouraged work-seeker** is a person who was not employed during the reference period, wanted to work, was available to work/start a business but did not take active steps to find work during the last four weeks, provided that the main reason given for not seeking work was any of the following: no jobs available in the area; unable to find work requiring his/her skills; lost hope of finding any kind of work". - (Statistics South Africa, 2020a)

majority has been marginalised and operating on the peripheries of the mainstream economy and are trapped in a "second economy" outside that of the mainstream "first world economy" (du Toit & Neves, 2007).

Due to COVID-19, predictions by the International Monetary Fund (IMF) indicate that global growth is likely to fall. The global economy may enter into a recession (African Union, 2020). The spread of the virus will increase global mortality, disrupt economic activities, and increase government spending to protect human health and support economic activities. This will result in the decline of (1) remittances from the African Diaspora; (2) foreign direct investment flows, and (3) domestic financial markets being constrained (African Union, 2020). COVID-19 has impacted negatively on FDI across the globe. The UNCTAD predicts that global FDI flows are likely to decline between 30% to 40% due to the impact of COVID-19 on the global economy (African Union, 2020). The decline will be concentrated in nations most affected by the virus, and effects will spread to other countries due to interlinked global value chains. Many African countries have adopted measures to support investments during the pandemic (African Union, 2020). In 2018 and 2019, FDI inflows in Africa grew by 11% to US$46 billion. UNCTAD had predicted that FDI inflows for Africa would increase, but due to the COVID-19 pandemic, the overall inflows are forecasted to contract by 15% (African Union, 2020).

Many African governments have responded with interventions aimed at mitigating the negative impact of COVID-19 on businesses, livelihoods and the economy. These measures are also in pursuit to contain the spread of the virus and protect public health. Governments have instituted interventions such as financial assistance programmes to support investments throughout the pandemic. However, measures such as company recesses, import and export control and lockdown regulations impact adversely on investments (African Union, 2020).

On 27 March 2020, Moody's Investors Service (which will be referred to as Moody's) downgraded the government of South Africa's long-term foreign and local currency issuer rating from Ba3 to Ba1. South Africa has now been relegated to speculative from investment grade. Long-term rating Ba1 shows volatility and considerable credit risk. In the short run, Ba1 is not indicative of adequate means to service debt (Moody’s Investors Service, 2020). Several rating agencies have relegated the country's credit status, adversely affecting

perceptions of the country's prospects as an investment destination (Ateba et al., 2019). According to Moody's, the primary reason for the decision to downgrade South Africa to the point of sub-investment is attributed to the persistent erosion of fiscal strength and the very low economic development, where policies are not anticipated to tackle challenges adequately. The negative outlook indicates that growth may wither into the future. The debt burden will rise faster than expected and will hamper access to finance as affordability deteriorates (Moody's Investors Service, 2020). The ambiguity of the degree to which COVID-19 has an impact on the South African economy and the likelihood that policymakers and stakeholders are at loggerheads with structural reforms that can stimulate growth and generate employment justify the pessimistic outlook.

The mounting fiscal burden due to the deterioration of state institutions triggered by graft and poor governance in state-owned enterprises continues (Moody's Investors Service, 2020). Eskom and South African Airways (SAA) have been in the spotlight for much of 2020. International financial institutions have red-flagged Eskom as the principal risk to the South African economy (BBC News, 2019; Cohen and Burkhardt, 2019). Eskom cannot service its debt and is burdened with large capital expenditure. The government has increased financial muscle to the entity (M. Cohen & Burkhardt, 2019). However, the instability of the electricity supply in South Africa is an impediment to investment (De Lange & Bloomberg, 2020). The contagion of troubled state-owned enterprises has also hit SAA. The embattled and cash strapped SAA was put under business rescue in December 2019 (Phillip, 2020; Smith, 2019). SA Express has also suffered the same fate as SAA and is under business rescue too. The South African government is the sole shareholder of SAA and SA Express (Smith, 2021). Both airlines have been struggling to stay afloat for some years now, and the COVID-19 pandemic worsened matters and dampened prospects to save the entities by leading countries to enforce travel bans and lockdowns in an attempt to curb the rapid spread of the virus (Smith, 2021). There have been numerous government bailouts and attempts to halt the cash burn and turnaround plans (Mantshantsha, 2019). Government support and financial instruments, including equity partners, other business shareholdings, ownership and management agreements, are taken into cognisance (Standing Committee on Appropriations, 2020). Thus, they offer windows of opportunity for FDI in the transport, storage and communication sector, amongst other sectors.

2.3 SOUTH AFRICA'S SECTORAL PERFORMANCE

Key economic indicators amid the covid-19 pandemic

Table 2.1 below is computed by the African Development Bank (2021) and indicates the possible impact of the COVID-19 pandemic on GDP in ZA. The 2018 and 2019 actual GDP figures factor the impact of COVID, whilst providing for a baseline and worst-case scenario. The GDP projections for 2020 and 2021 are interpolated in the table below. The default scenario interpolates that the pandemic will subside in July and that the worst-case scenario will persist into December. Data from 2018 is from StatsSA, 2019 are 2020 and 2021 are projections. The projections for 2020 and 2021 take into account the COVID pandemic; these estimations indicate declines for 2020 and 2021 to be at (i) 5.5% and 7.3%, (ii) and 7.3% and 5.5%, respectively. Interestingly, even without factoring the pandemic into the equation, GDP outlook is still negative. An increase in inflation for the period under review is estimated for all the scenarios, ranging from 3.2% to 3.8%.

In all forecasts, the current account will depreciate faster in 2020 and 2021, with a deficit varying from 6.1 to 6.5% and 6.5 and 2.7% for the baseline and worst-case scenarios. The downturn in the global export market is likely to prevail even though there is a cheaper import bill from the declining fuel prices, and the diamond and tourism sectors are set to steadily recover in 2021, but these do not adequately offset the slump. The forecasted decline in tax revenue, partly due to the adverse impact of COVID on businesses, is predicted to plunge the fiscal deficit further by 5.3% to 6.1% for the baseline and worst-case scenario in 2020, and in 2021 by 6.1% to 4% (African Development Bank, 2021).

Table 2.1: Key economic indicators amid the COVID-19 pandemic in ZA

Economic Metric	Actual indicators		Without COVID-19		With COVID-19 (baseline)		With COVID-19 (worst-case)	
	2018	2019	2020	2021	2020	2021	2020	2021
Real GDP growth (percent)	4.50	3.00	5.10	-5.50	-5.50	-7.30	-7.30	5.50
Inflation (percent)	3.20	2.80	3.80	3.80	3.40	3.60	3.60	3.30
Budget balance (% GDP +/-)	-2.50	-4.20	-1.40	-1.40	-5.30	-6.10	-6.10	-4.00
Current account balance (% GDP +/-)	1.90	-4.90	-0.40	-0.40	-6.10	-6.50	-6.50	-2.70

Source: African Development Bank (2021)

Quarterly seasonally adjusted annualised rate (SAAR) of GDP, 2018 - 2020

According to Statistics South Africa (2021), in the second quarter (Q2) of 2020, the seasonally adjusted annualised rate (SAAR) of GDP declined by 51.7%. In the third quarter (Q3) of 2020 (July–September), South African GDP grew by an annualised rate of approximately 66.1%, after a sharp decline which was partly due to the COVID-19 lockdown restrictions in the second quarter (April – June). This is the most significant recovery in GDP growth since 1993, on the eve of the first democratic elections in South Africa, which were held in 1994. The sectors which were the main drivers of growth are (i) mining and quarrying, (ii) manufacturing and (iii) wholesale, retail, motor trade and accommodation, contributing to annualised growth in the third quarter of 2020 by 288.3%, 210.2% and 137%. The economy remains 5.8% lower than it was at the end of 2019 amid the recovery. Due to recovery in domestic spending, exports and fixed investment, this resulted in a rise of 67.6% in annualised GDP expenditure in the third quarter of 2020.

The agriculture and mining contraction contributed to sluggish growth in 2019 (African Development Bank, 2021). In 2018, farming contracted and was adversely affected due to talks on land reform and land expropriation without compensation, as resolved by the African National Congress Conference in December 2017 (African Development Bank, 2021; African National Congress, 2021). Unpredictable weather aggravated the challenges faced by the agricultural sector. Mining contracted, the downturn was triggered by power shortages and protracted strikes (African Development Bank, 2021).

The agriculture, forestry and fishing sector reflected declines in GDP growth for the first (Q1) and second (Q2) quarters of 2018 and all the quarters of 2019. Thus far, for 2020, all quarters have had growth. The latest estimation of quarter 3 (Q3) indicates an annualised growth of 18.5% (Statistics South Africa, 2021).

Mining and quarrying declined in quarter 1, 2 and 3 of 2018 by 9.1%, 8.9% and 3.8%, respectively. Further declines in the annualised estimates for quarter 1 and 3 of 2019 and 2020 were reported. The sector recorded the highest jump in the seasonally-adjusted annualised rate (SAAR) in Q3 of 2020 of 288.3% (Statistics South Africa, 2021).

Manufacturing output declined only in the first quarter of 2018 and grew for the remainder of the year. The latest StatsSA data indicates that after mining, manufacturing had the biggest

SAAR of 210.2% in Q3 of 2020. The rise in production is primarily attributable to metals, petroleum, automobiles and food (Statistics South Africa, 2021).

The electricity, gas and water industry showed an increase in annualised GDP growth throughout 2018. The change in GDP throughout the quarters of 2018 compared with the same quarter of the previous year was positive. In 2019, Q1 and Q3 showed a negative change, but the second and fourth quarters showed positive SAARs. The first two quarters of 2020 indicated declines in GDP growth. Q3 of 2020 has an annualised rate of 58% growth (Statistics South Africa, 2021).

The construction sector's performance declined quarter-on-quarter for a third of the quarters in 2018 compared with the preceding year. This trend continued throughout 2019 and for Q1 and Q2 of 2020. In Q3 of 2020, there was significant growth of 71.1% (Statistics South Africa, 2021).

The wholesale, retail motor trade and accommodation in Q1, Q2, and Q4 in 2018 contracted. There was a year-on-year contraction in GDP growth at the end of 2018 and 2019 at 0.7% and 3.8%, respectively, which persisted into Q1 and Q2 of 2020. In Q3 of 2020, the SAAR grew by 137%. This growth was driven by higher consumer spending (Statistics South Africa, 2021).

The TSC sector's annualised output growth was 1.4%, -3.8%, 6.8% and 7.7% for Q1, Q2, Q3 and Q4 of 2018, respectively. Annualised growth in Q2 of 2018 contracted. In 2019, in all quarters of the TSC sector, there was a year-on-year contraction in growth. The pattern of negative growth was disrupted in Q1 of 2020 with annualised growth of 0.5%. Q2 of 2020 saw a steep slump in output with a contraction of 69.4%. But, in Q3 of 2020, GDP grew by 79.3% (Statistics South Africa, 2021).

The finance and personal services sectors economic activity had positive growth quarter-on-quarter throughout 2018 and 2019 and the first quarter of 2020. In the second quarter of 2020, the annualised economic output plummeted by 34.2% and 32.7% for finance and personal services; but both recovered in Q3 of 2020 with surges of 16.5% and 38.5%, respectively (Statistics South Africa, 2021).

Government output slumped only for the last quarter of 2018, 2019 and the second quarter of 2020. In Q3 of 2020, the sector grew by 0.9%, an improvement from a 1% decline in Q2 of 2020 (Statistics South Africa, 2021).

Table 2.2: Quarterly gross domestic product change – seasonally adjusted annualised rates (SAARs)

GDP CHANGE – SEASONALLY ADJUSTED ANNUALISED RATES (SAARs)[2] IN PERCENTAGES											
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
Agriculture, forestry & fishing	-33.7	-42.3	13.7	7.9	-16.8	-4.9	-4.5	-7.6	35.9	19.6	18.5
Mining & quarrying	-9.1	8.1	-8.9	-3.8	-10.8	17.4	-6.1	1.8	-21.5	-72	288.3
Manufacturing	-8.4	1.4	7.5	4.5	-8.8	2.1	-4.4	-1.8	-8.5	-74.9	210.2
Electricity, gas & water	1	0.7	0.8	0.2	-7.4	3.2	-4.9	4	-5.6	-36.4	58
Construction	-2.3	1.5	-1.7	-0.7	-5.3	-2.4	-6.9	-5.9	-4.7	-76.5	71.1
Wholesale, retail, motor trade & accommodation	-3	-1.2	3.4	-0.7	-3.6	3.4	2.6	-3.8	-0.7	-67.6	137
Transport, storage & communication	1.4	-3.8	6.8	7.7	-4.4	-0.3	-5.4	-7.2	0.5	-69.4	79.3
Finance, real estate & business services	1	1.7	2.1	2.7	1.1	4.1	1.6	2.7	3.7	-34.2	16.5
General Government Services	2.1	0.2	1.9	-0.6	2.5	3.3	2.4	-0.4	1.2	-1	0.9
Personal Services/ other products	1.2	0.8	0.6	1.7	1.1	0.8	0.4	0.7	0.5	-32.7	38.5
Total value added at basic prices	**-2.9**	**-0.6**	**2.5**	**1.7**	**-3.2**	**3.3**	**-0.8**	**-1.4**	**-1.7**	**-51.7**	**66.1**

I. Q1 – Quarter 1 (January to March)
II. Q2 – Quarter 2 (April – June)
III. Q3 – Quarter 3 (July – September)

[2] Definition of seasonally adjusted data: Quarterly GDP includes seasonal fluctuations, for example Easter and festive holidays, non-trading days, public holidays, and end-of-year holidays - these events impact on output, business and government operations. Seasonal fluctuations make it cumbersome to compare and compute quarter-on-quarter growth rates. Thus, seasonal patterns are excluded from the calculations (Statistics South Africa, 2021).

Definition of annualisation: The quarterly growth rate can be annualised to reflect the yearly (i.e., year-on-year) projections if the quarterly trend were to arise four times in a row. This annualised computation offers a forecast that is more reliable in a stable economic environment, but less accurate in a highly unpredictable setting (Statistics South Africa, 2021).

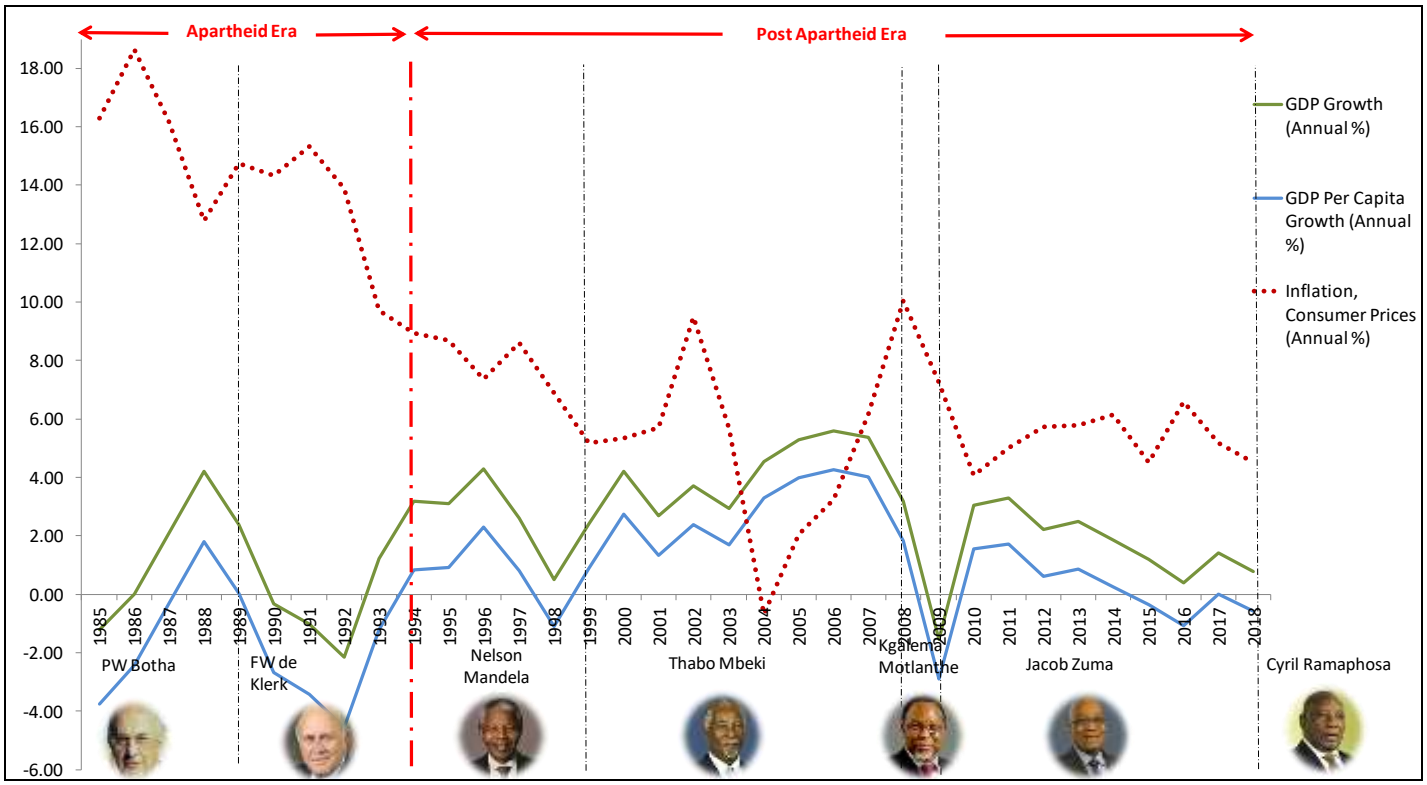
GDP CHANGE – SEASONALLY ADJUSTED ANNUALISED RATES (SAARs)[2] IN PERCENTAGES											
	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020
IV. Q4- Quarter 4 (October – December)											

Source: Statistics South Africa (2021)

GDP growth, GDP per capita and inflation in South Africa, 1985 to 2018

Figure 2-2 on page 21 illustrates GDP annual growth in South Africa during and after the apartheid era. During the period of 1989 leading up to the first democratic elections in 1994, FW de Klerk was the South African President, preceded by PW Botha. In 1993, South Africa was at the height of domestic and international pressure of regime change, achieving an average of 0.58% GDP growth rate, coupled with average inflation of 14.65%. Annual GDP growth from 1994 to 2018 averaged 2.75%, GDP growth per capita at 1.21% and average inflation at 5.90%. Inflation peaked at 10.06% in 2008, the highest level since the dawn of democracy. As expected, inflation has an inverse relationship with growth for the period under study. The biggest slump in GDP growth during the period under study occurs in 1993, as shown by the dip in the figure below, which was due to mounting international pressure for the first democratic elections to be held and apartheid to cease. Not surprisingly, from 1994 to 1996, annual GDP grew, partly due to the successful democratic elections held on 27 April 1994 and a peaceful transition into democracy, and the election of Nelson Mandela as the first president of democratic South Africa. In 2007, after the ANC Polokwane conference, Kgalema Motlanthe was interim president taking over from Thabo Mbeki, who served the country as president from 1999 – 2008. President Jacob Zuma served the people of South Africa from 2009 - 2018. In 2018 Cyril Ramaphosa was elected president of South Africa, restoring hope for a new dawn, opportunities for job creation and bringing forth new investment to reignite economic growth.

Figure 2-2: Gross domestic product (GDP) growth in South Africa, 1985 – 2018



Source: Author's compilation from World Bank Data (2020, 2021)

2.4 FDI IN SOUTH AFRICA FROM 1985 TO 2018

Literature and empirical evidence looking into the role of FDI in Africa are imperative. This section explores the past, current and prospects for FDI in South Africa to analyse the dynamics of foreign investment.

South Africa is classified as an upper-middle-income country by the World Bank and is frequently seen as the economic gateway to trade and investment in Sub-Saharan Africa (Ajayi, 2006). Post-democracy South Africa has been able to increase its FDI, but the inflows of FDI have remained persistently low and vulnerable, as shown in Figure 2-3 on page 25. The volatility of foreign inflows into South Africa can also be attributable to the global financial crisis and exchange rate fluctuations. This volatility has been mainly because of volatile commodity prices because the FDI in South Africa is dependent and concentrated on the export sector of primary raw materials such as gold, platinum and coal (Strauss, 2015).

Figure 2-3 on page 25 depicts the flows of FDI in ZA from 1985 to 2018. The trough was in 1985, and there is an average gradual increase across the series and the peak in 2015. As a result of the political instability due to apartheid in South Africa, in the 1980s, sanctions were intensified, and investment was constrained. Throughout the 1980s to the early 1990s, FDI inflows were constrained. From 1984 to 1988, foreign direct investors departed from ZA, with approximately 225 United States (US) companies and 20 per cent of United Kingdom (UK) corporations exiting (Gelb & Black, 2004).

Impacting on FDI flows in 1985 and years after that is perhaps one of the most notable events in South African history, namely, the infamous "Rubicon" speech, which was expected to be delivered by the former South African president, P.W. Botha, on 15 August 1985. The speech was expected to pronounce on reforms to combat mounting international pressure and counter the heightening political and military impasse between the apartheid government and banned liberation movements, namely, the ANC (Cloete, 2019; Page & te Velde, 2004). However, this was not to be. It was recently revealed that communication between P.W. Botha and Ministers Pik Botha and Chris Heunis; and a covert verbatim transcript of the preparatory meeting of the “Rubicon” speech on 2 August 1985 verified that the apartheid government never intended to make radical policy pronouncements (Cloete, 2019). The address had far-reaching adverse repercussions on the South African economy. The value of the rand depreciated rapidly. Due to the political unrest, capital flight became a risk to investors, both locally and abroad. To make matters worse, disinvestment intensified in the aftermath of the "Rubicon" speech (Page & te Velde, 2004).

In 1990 there were still more than 450 foreign firms with direct liabilities in ZA (Gelb & Black, 2004). The peaceful transition to the first democratic elections in 1994 enticed FDI to invest in ZA. Sentiments of social cohesion and a United Nation moving past apartheid were reinforced by the rugby world cup, which was held in 1995. The part sale of the state's shares in Telkom and the takeover of De Beers by Anglo American in 1997 and 2001, respectively, saw sharp increases in foreign flows into ZA (Arvanitis, 2005). Post-apartheid, the South African government has been making concerted efforts to persuade FDI, partly through trade liberalisation and openness. South Africa's concerted efforts to attract and entice foreign investment are reaffirmed through incentives such as the implementation of the Growth, Employment and Redistribution (GEAR) strategy in 1996, which aimed to boost the country's competitiveness in global markets. National Treasury's 2008 and 2011

strategic plans take into consideration the role of tax incentives to entice domestic and foreign investment (Wentzel, 2010). The Department of Trade and Industry in ZA has numerous incentives to encourage foreign investment inflows, namely: tax allowance incentives; Critical Infrastructure Programme (CIP); Export Marketing and Investment Assistance (EMIA); Manufacturing Investment Programme (MIP); and Special Economic Zones (SEZs) (South African Government, 2019).

Before the first democratic elections in 1994 in South Africa, FDI in the country tended towards zero. Due to the international sanctions imposed on the country during the 1960s, 1970s, 1980s and early 1990s, capital flight was common. South Africa became increasingly quarantined from international markets (Wöcke & Sing, 2013b).

South African FDI has been vulnerable and lagging compared to other upper-middle-income countries. The FDI inflows have remained low, even though the government transitioned into a new dawn in 1994. As depicted in Figure 2-3 on page 25, in the 1990s, South Africa realised its sharpest increase in foreign investment in the TSC sector from 1997 to 1999. Due to South Africa's desire to attract international capital, in 1996, the Telecommunications Act approved legislation authorising the sale of a 30% stake in Telkom South Africa. The government was to retain 70% control of Telkom (NCOP Public Enterprises and Communication, 2000). In 1997, an investment of $1.26 billion by Telekom Malaysia and SBC Communications International in Telkom South Africa resulted in a 30% interest in the parastatal, with 12% coming from Telekom Malaysia and 18% coming from SBC (Barber et al., 1999; Reuters, 1997).

Sharp increases in FDI were recorded between 2005 and 2007, primarily due to foreign interests in the financial services industry, such as Barclay's $3.1 billion purchase of the ABSA Group and the Commercial and Industrial Bank of China's acquisition of a minority share in Standard Bank. FDI inflows were also attributed to Vodafone's attainment of equity in Vodacom and Nippon's share acquisition of DiData (South African Institute of International Affairs (SAIIA), 2018).

The sectors which have received considerable FDI inflows in the main have been mining, finance and retail. Mining investments are persistently at the core of FDI flows, including investments in Anglo American and Arcelor Mittel. The bulk of the FDI inflows is from South Africa’s conventional European partners. South-to-south foreign investments continue to

rise, particularly from China and India (South African Institute of International Affairs (SAIIA), 2018).

After the apartheid regime, the new South African government focused its strategy on economic development, growth, and global market integration. This involves creating a stable macroeconomic policy and promoting FDI. Amendments in policy regimes have been factored. These amendments in policy regimes and strategy were impacted by the international transacting of the six large conglomerates, namely: Anglo-American, SA Mutual, Sanlam, Anglovaal, Standard Group (includes Liberty Life) and Volkskas (Carmody, 2002).

During the past two decades, South Africa has become an essential economic player in the world domain. In 2012 it was amongst the top countries in Africa to attract FDI with over $3 billion in US dollars invested in the country. South Africa has received the bulk of the FDI from the European Union, with the United Kingdom contributing 75.8% and Germany with 6%. Developing economies globally in 2012 had invested 4% of FDI in South Africa, of which the majority of 2.3% was from Asia (UNCTAD, 2013).

The FDI inflows in South Africa have been declining gradually in recent years due to numerous factors such as the depreciation of the rand versus the US dollar. From 2001 to 2002 saw the rand depreciation of 37% against the US dollar, which increases 'investors' risk and results in capital flight. In 2006 there was again a rise of FDI inflows in South Africa, which was a consequence of the global commodities price boom which occurred up to and including 2009 (Wöcke & Sing, 2013a). Numerous works of literature have postulated the view that FDI is mainly directed at a particular commodity, as it is in South Africa, which may have adverse consequences on economic growth because of weak linkages and externalities (Bezuidenhout, 2009). As is evident from the dips in the graph on page 25, FDI is highly responsive to international markets such as the Asian financial crisis between 1997 and 1998 and the global financial crisis between 2008 and 2009.

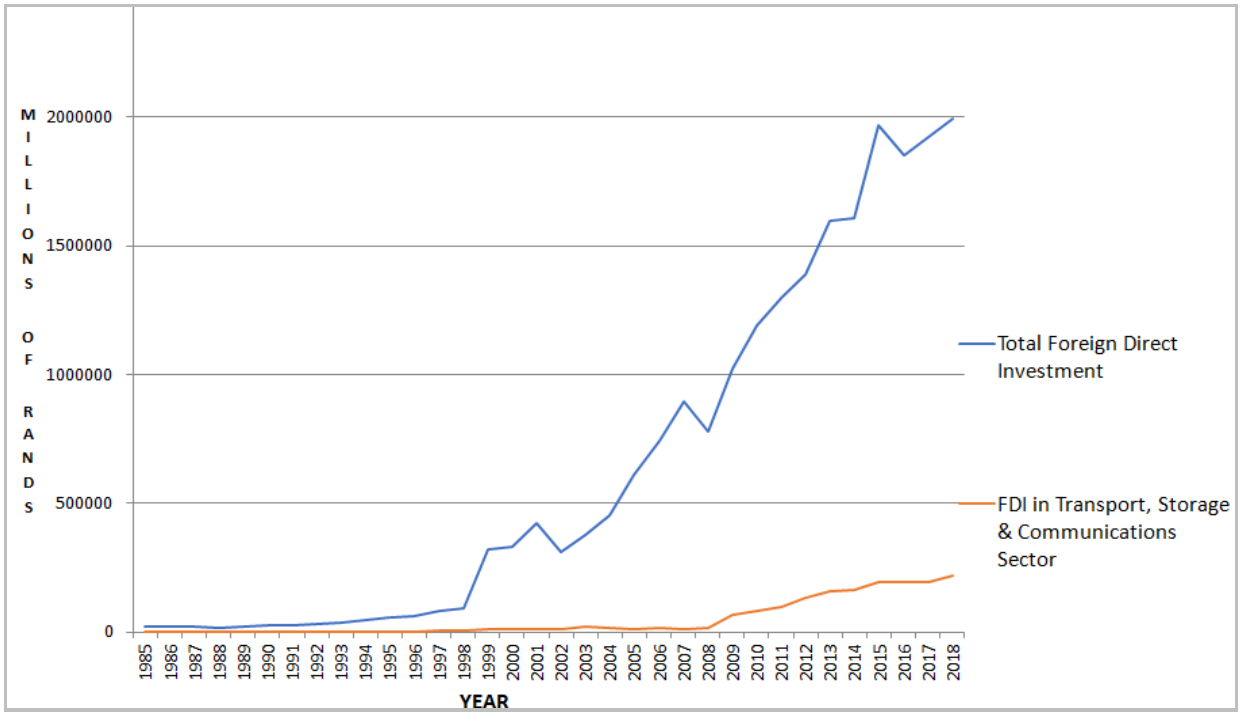
The TSC industry received considerable FDI inflows before 2009, partly attributed to the oligopoly of the mobile companies that make it difficult for new firms to penetrate the market (Makwembere, 2014). Foreign liabilities increased by 7.7% in the fourth quarter of 2015. At the end of December 2015, the market value of FDI was R5 563 billion, and by the end of March 2016 had increased to R5 694 billion. There was an increase in FDI inflows due to

the primary listing of a private hospital group from the Johannesburg Stock Exchange (JSE) to the London Stock Exchange (South African Reserve Bank, 2016). To entice foreign investment to facilitate jobs and drive economic growth, ZA held its first annual investment conference in November 2018 (The Presidency of South Africa, 2018).

As touched upon on the previous pages, FDI in South Africa has a relationship with the extraction of natural resources in South Africa and therefore compounds the country's dependency on commodity price development. Commodities are, in turn, also volatile to global economic upswings and depressions (Adams, 2009; J. Ghosh & Chandrasekhar, 2009).

The TSC sector in ZA has grown exponentially from 1985 to 2018: the contribution of the TSC sector to GDP was 5.77% in 1985, and by 2018 it reached 9.55%. The contribution of the TSC sector to GDP averaged 7.92% from 1985 to 2018. The TSC sector is the fifth-largest contributor to GDP and has on average, contributed to 10% of GDP in ZA from 1985 to 2018. Figure 2-3 below illustrates the share of FDI received from 1985 to 2018 that was directed to the TSC sector; which has gradually increased over time and averaged 4.17% and reaching its peak in 2018 at 10.95%.

Figure 2-3: FDI inflows in South Africa, and FDI inflows in the TSC sector in South Africa



Source: Author's compilation from South African Reserve Bank data

Figure 2-4: Timeline of events influencing FDI in ZA: 1985 – 2018

Infamous "Rubicon" Speech by Former President P.W. Botha	**1985**	The infamous "Rubicon" speech by the former South African President, P.W. Botha, on 15 August 1985, failed to pronounce on reforms to combat mounting international pressure and counter the heightening political and military impasse (Cloete, 2019; Page & te Velde, 2004). The speech exacerbated South Africa's economic woes, for example, the rand continued to tumble further, and disinvestment increased (Page & te Velde, 2004).
1984 - 1988 FDI departed from ZA, with approximately 225 United States (US) companies and 20 % of United Kingdom corporations exiting (Gelb & Black, 2004). In 1990 there were still in excess of 450 foreign firms with direct liabilities in ZA (Gelb and Black, 2004). As illustrated in Figure 2-3 above, from the 1980s through to the early 1990s, FDI inflows were constrained.	**1986- 1990**	**Before the Release of Former President Nelson Mandela**
Period building up to first democratic elections	**1991 -1993**	The peaceful transition to the first democratic elections in 1994 enticed FDI to invest in ZA.
The first democratic elections in ZA were held on 27 April 1994.	**1994**	**First Democratic Elections**
Rugby World Cup	**1995 – 1996**	Concerted efforts to attract FDI were reaffirmed through incentives such as the implementation of GEAR strategy in 1996, which aimed to boost the country's competitiveness in global markets. Rugby World Cup was held in ZA in 1995.
The part sale of the state's shares in Telkom and the takeover of De Beers by Anglo American in 1997 and 2001, respectively saw sharp increases in foreign flows into ZA (Arvanitis, 2005). In 1997, there was an investment of $1.26 billion by Telekom Malaysia and SBC Communications International in Telkom South Africa (South African Institute of International Affairs (SAIIA), 2018).	**1997 – 2001**	**Private Sector Transactions**

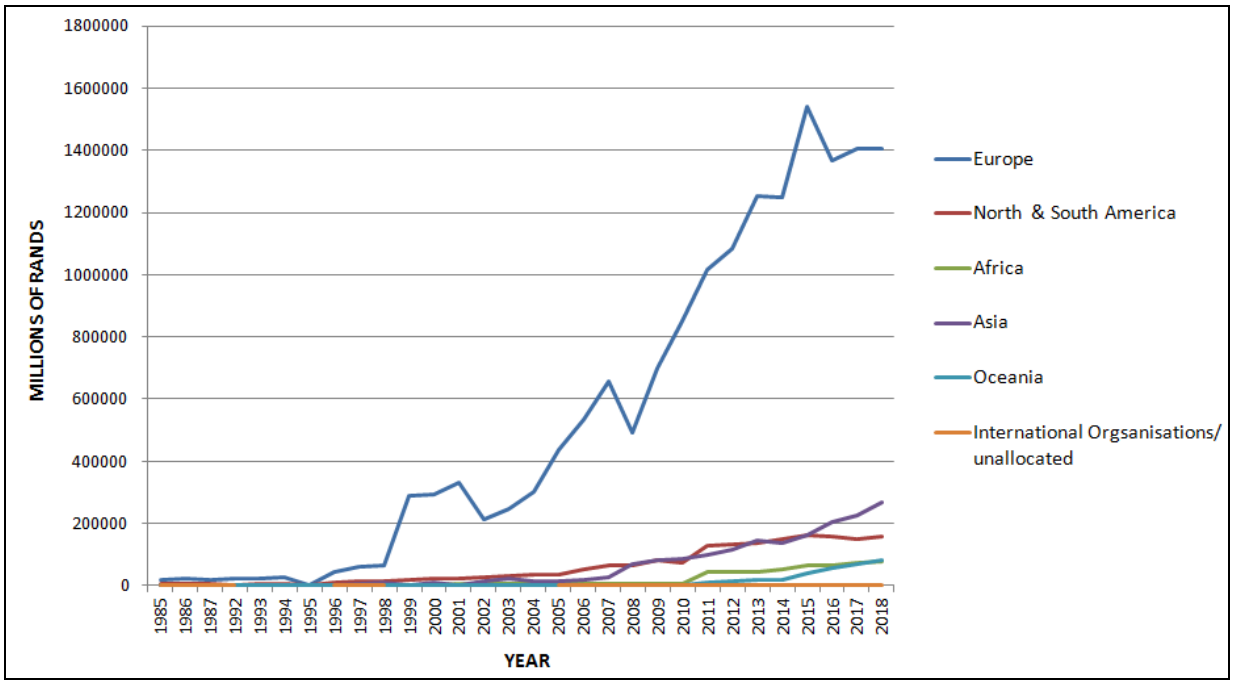
Global Financial Crisis	**2007 – 2008**	National Treasury's 2008 and 2011 strategic plans, the role of tax incentives to entice investment (Wentzel, 2010
TSC industry received considerable FDI inflows prior to 2009, and this can partly be attributed to the oligopoly of the mobile companies that make it difficult for new firms to penetrate the market. (Makwembere, 2014).	**2009 – 2010**	**Soccer World Cup**
National Treasury Tax Incentives	**2011**	National Treasury's 2008 and 2011 strategic plans, the role of tax incentives to entice investment (Wentzel, 2010
March in 2016, there was an increase in FDI inflows as a consequence of the primary listing of a private hospital group from the JSE to the London Stock Exchange (South African Reserve Bank, 2016).	**2016**	**Private Sector Transactions**
First Investment Conference	**2018**	ZA held its first annual investment conference in November 2018. The main objective of the conference is to entice foreign investment in ZA to create jobs and drive economic growth.

Source: Author's compilation

2.5 SOURCES OF FDI IN SOUTH AFRICA: 1985 - 2018

The graph below shows the sources of the FDI inflows in South Africa from 1985 to 2018. Europe has contributed 78.56%, which is the most of all the continents in terms of FDI to South Africa. In particular, the United Kingdom has been without fail from 1985 to 2018 and accounted for the most FDI inflows to South Africa.

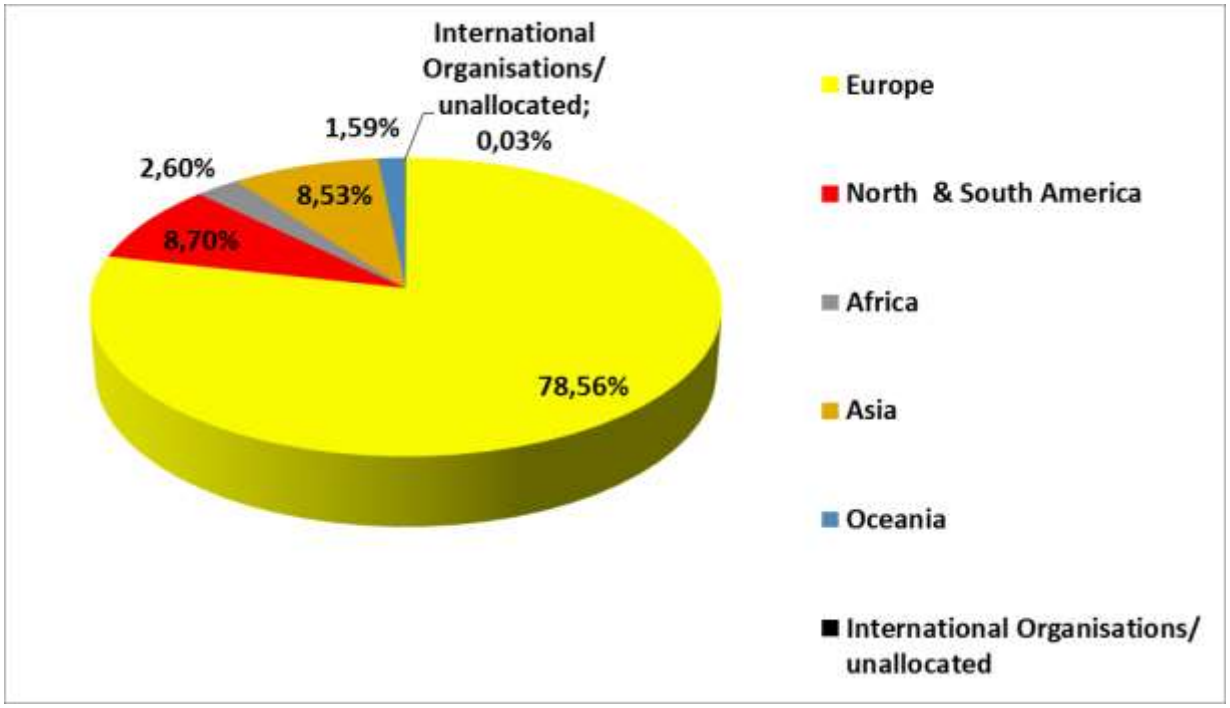
Figure 2-5: Sources of South African foreign liabilities, 1985 - 2018



Source: Author's compilation from SARB data.

The European Union (EU) is South Africa's largest trading partner and foreign investor. From 1985 to 2018, Europe, as shown in Figure 2-6, accounted for the most FDI into South Africa, followed by North and South America, Asia, Africa, and Oceania at 78.56%, 8,7%, 8.53%, 2.6%, and 1.59% respectively. Over 2000 companies from the European Union are operating in South Africa and contribute to skills development and create over 350 000 jobs (Hierro & Masters, 2016). International organisations and unallocated funds accounted for 0.03% of FDI inflows. The United Kingdom (UK), Germany and the Netherlands continue to be the most committed countries to South Africa as the three largest investors over decades in terms of trade and FDI.

Figure 2-6: Allocation of contribution to South African foreign liabilities, 1985 – 2018



Source: Author's own compilation from SARB data

2.6 SOUTH AFRICA'S POLICY APPROACH TO FDI

Since the early 1990s, the process of encouraging FDI inflows has influenced South Africa's stance towards deeper global integration and advanced regional integration, which has led to participation in numerous bilateral free trade agreements (BITs) (South African Institute of International Affairs (SAIIA), 2018).

Since 1994 the South African government has employed a macroeconomic strategy that focuses on Growth, Employment and Redistribution (GEAR). GEAR was adopted in June 1996 by the Department of Finance. It was a five-year plan to improve economic development, broaden employment and redistribution of income which was biased towards the previously disadvantaged, the marginalised and created socioeconomic opportunities for the poor (South African National Treasury Department, 1996). The Growth, Employment and Redistribution (GEAR) strategy also has the objective to conquer the triple challenges of poverty, unemployment and inequality and encourage economic growth through increased trade openness, strengthening the exchange rate, deregulating capital control and narrowing the country's deficit (Barbour, 2005).

The New Growth Path (NGP), launched in December 2010, originates from the National Development Plan (NDP) and is built on the fundamentals to eradicate the triple challenges of poverty, unemployment and inequality. The plan is to stimulate the economy through infrastructure investment and skills development. Improved relations between public-private partnerships and labour is instrumental in realising the NDP (National Planning Commission, 2012). The South African government's economic posture is indicated in the New Growth Path (NGP) and also encompassed in the Industrial Policy Action Plan (IPAP). The main aim of IPAP is to promote inward FDI and manage the relationship with foreign investors to mitigate negative externalities of foreign investment. Essentially, South African policy makers have taken into cognisance the potential and opportunities presented by inward FDI, which can lead to increased growth through job creations and the spillovers of FDI (South African Institute of International Affairs (SAIIA), 2018).

Attracting inward FDI into South Africa has been imperative to post-apartheid economic policy (Strauss, 2015). The sanctions imposed during the apartheid era negatively impacted on the country's economy. The government has implemented programmes and policies which have fostered a conducive environment for foreign investors to operate in South Africa. These policies have often promoted liberal and open trade policies. The South African government on 29 October 2013 published the Promotion and Protection of Investment Bill, which will lay the foundation for domestic legislation (South African Institute of International Affairs (SAIIA), 2018). South Africa has entered into bilateral investment agreements, trade agreements and is a participating member in BRICS, the Commonwealth and the United Nations member States. The table below presents some of the trade agreements South Africa has entered into.

Table 2.3: South African trade agreements

NAME OF AGREEMENT	DESCRIPTION OF AGREEMENT
Southern African Customs Union (SACU)	This is a customs union agreement to ensure duty-free movement of products from the SACU. The countries involved are South Africa, Swaziland, Lesotho, Botswana and Namibia.
Southern African Development Community (SADC)	This is a free trade agreement between 12 member countries to promote trade within the region through duty-free trade.

NAME OF AGREEMENT	DESCRIPTION OF AGREEMENT
Trade Development and Cooperation Agreement (TDCA)	TDCA is a free trade agreement with the intent of liberalising duties in goods between the European Union and South Africa.
EFTA-SACU Free trade Agreement (FTA)	FTA is a free trade agreement with the primary purpose to reduce tariffs on selected goods. This agreement is between SACU, Iceland, Liechtenstein, Norway and Switzerland.
SACU-Southern Common Market (Mercosur) PTA	This is a preferential trade agreement between SACU and Argentina, Brazil, Paraguay and Uruguay. This agreement aims to reduce tariffs on predetermined product lines.
Africa Growth and Opportunity Act (AGOA)	AGOA is a unilateral measure of assistance by the USA to 39 Sub Saharan Countries. This facilitates preferential access to the markets in the USA. Duty-free access is currently at 7 000 product lines.
Trade, Investment Framework Agreement (TIFA)	TIFA is a bilateral agreement between South Africa and the USA and facilitates a forum between the two countries to address trade matters of common interest.
SACU-India PTA	This is a preferential trade agreement between South Africa and India that facilitates tariff reductions on selected goods.
African Continental Free Trade Area (AfCFTA)	This is a free trade agreement that has 55 participating African countries. The primary objectives of AfCFTA are to create a single market for products and services and advance economic integration in Africa as per the prescriptions of Agenda 2063 through liberalisation of markets and elimination of tariffs forming part of the mechanisms.

Source: Author's compilation from the website of the Department of Trade and Industry (DTI) of South Africa.

Careful consideration has to be taken in the analysis and interrogation of the trajectory of the policies because many of these tend to favour the elite; and transnational corporations (TNCs) and are not necessarily for the greater good of society (Taylor & Nel, 2002). Increasing FDI has presented South Africa with the opportunity to contribute to growth and the creation of 400 000 jobs yearly. To bridge the low domestic savings rate in South Africa, FDI is at the core of increasing funding in the economy and increasing foreign currency reserves (Kransdorff, 2010). South Africa has high unemployment and promoting investment in the manufacturing sector, will undoubtedly be of value to the economy. To improve FDI in the manufacturing industry, numerous programmes and incentives have been implemented by the government, which include Industrial Policy Action Plan (IPAP),

Motor Industry Development Programme (MIDP) and the Strategic Investment Programme (SIP).

FDI inflows have remained stubbornly low despite the implementation of incentives to attract investment from abroad (Carmody, 2002). Foreign investors have raised concern about the red tape in doing business, the cost of doing business, the high crime rate, and an inadequately skilled labour force (Barbour, 2005). The government highly supports prospects for increases in FDI, which can lead to spillovers. The insignificant impact FDI has had in imparting knowledge and improvements in productivity through spillover effects allude to the common problem cited in many studies about the inability for some developing countries to receive spillovers because of inadequate absorptive capacity (Adams, 2009; Naidu, 2020; Spencer, 2008). Previous research has noted that improvements in South Africa's absorptive capacity is necessary as spillover effects remain trivial (Naidu, 2020). Spillover benefits are not transferred automatically. The lack of spillovers could result from inadequate absorptive capacity. The government should focus on formulating policy centred on building human capital to improve domestic absorptive capacity (Naidu, 2020).

Protecting domestic business through managing trade liberalisation is imperative. Currently, single domestic policy regimes are being implemented, which will ensure that adequate protection is intact whilst still optimising investment. Wood and Wentworth (2014, as cited in SAIIA, 2018) further report that there is work being done on the Investment Bill. This will foster an environment to create new FDI policies which focus on optimising the impact of foreign investment participation in the country.

The South African government's overarching strategy advocates for increased local participation and content in FDI through the implementation of the Black Economic Empowerment (BEE) Act of 2003. The government has increased its emphasis to ensure that FDI yields positive benefits in the local economy, this is evident through policies that promote local and black economic empowerment partnerships and local content agreements whilst simultaneously cogitating the configuration of FDI transactions (South African Institute of International Affairs (SAIIA), 2018). Traditionally, most FDI inflows into South Africa were through mergers and acquisitions. Greenfield inflows of FDI are unlikely to find the country an attractive investment destination, considering the shortages in skills in the labour market (South African Institute of International Affairs (SAIIA), 2018). This

strategy makes it compulsory for businesses to have a predetermined percentage (26%) ownership, management shares and procurement of goods and services locally to black persons, categorised as previously disadvantaged South Africans (Wöcke & Sing, 2013a). BEE requirements for foreign investment may disincentivise potential investors as they may view these requirements as costly (Wöcke & Sing, 2013a). Tax incentives for foreign investors in South Africa are lacking when compared to other developing countries. South Africa's income corporate tax is at the higher end at 29.58% with some developing countries reporting rates almost half that of South Africa, for example, Bulgaria at 10%. China, Mexico and Brazil's tax rates are comparable to that of South Africa's at 25%, 30% and 34% respectively (Deloitte, 2019). To improve the foreign investor sentiment and foster an environment that promotes investment, the South African government has interrogated the implementation of Special Economic Zones (SEZs). SEZs will enable eligible firms operating in these areas to qualify for corporate tax incentives and exemptions. It is thus imperative to consider the impact of granting tax incentives to foreign investors on local businesses and the domestic economy, by creating a competitive advantage to MNCs only (Asiedu, 2004; Bond, 2006).

South Africa’s absorptive capacity is more advanced juxtaposed to its African counterparts. However, because of the disjuncture of sectors receiving FDI, the benefits of FDI are restricted (Adams, 2009). The impact of FDI on the economy of the country may be unnoticeable due to the inequality and jobless economic growth the country has been experiencing (Strauss, 2015; Trading Economics, 2019).

2.7 FOREIGN DIRECT INVESTMENT GLOBALLY

In the 1970s and 80s, many developing nations implemented trade barriers and capital market controls. These initiatives skewed social and private capital returns, decreased FDI and hindered economic development into their particular countries. Faced with a lack of domestic capital required to fund development, many Latin American countries tackled the economic growth problems they met in the late 1980s and early 1990s by changes that eliminated trade barriers and FDI constraints (Asongu et al., 2018).

Figure 2-7 on page 35 depicts the pattern of global FDI inflows from 1985 to 2018, it is quite evident that this mimics the world FDI inflows to those of Europe and exhibits some

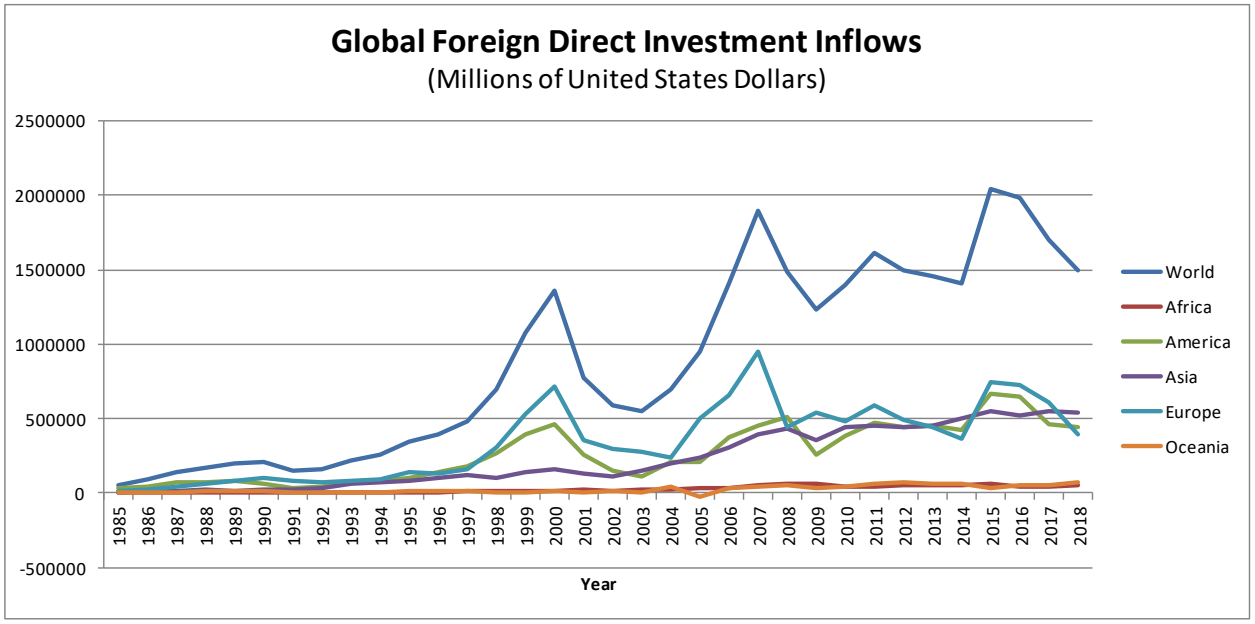
explanatory power to that of the American inward flows. Compared to the rest of the world, FDI flows to Africa and Oceania have increased (UNCTAD, 2019).

In 2017 and 2018, the share of the world's outward FDI to developing economies declined. This was mainly attributed to a dramatic decrease in FDI from developing countries. The relative value of the developed world as a host nation grew on the receiving side. Asia and Oceania have improved their place in the world, contributing 40% of the FDI population in 2018 (UNCTAD, 2019). Since 2004, FDI flows to developed economies have been at the lower end, dropping by 27%. Inflows to Europe halved to under $200 billion, owing to negative inflows from repatriation funds in several big host countries. FDI flows to Africa increased by 11% to $46 billion in 2018. This rise was engendered by continued resource-seeking foreign projects and diversification of portfolios, and a rebound after several years of low inflows to South Africa (UNCTAD, 2019).

Developing Asia, the prevalent host region, had inflows of FDI that grew by 4%, which is an indication of renewed dynamism; and regional greenfield ventures had grown twofold, returning from their 2017 low. In Latin America and the Caribbean, FDI was 6 % lower and did not sustain traction after a substantial decline stopped in 2017 (UNCTAD, 2019).

Global FDI inflows declined by 13% to 1,3 trillion US dollars in 2018. This is the third successive fall in FDI flows, primarily attributed to large-scale repatriation by US multinationals of surplus foreign earnings as a consequence of fiscal reforms enacted in America by late 2017. Industrialised economies' FDI has declined to US$ 557 billion and flows to developing countries remain steady at about US$ 700 billion. Thus more FDI was directed to developing countries, compared to prior periods (UNCTAD, 2019).

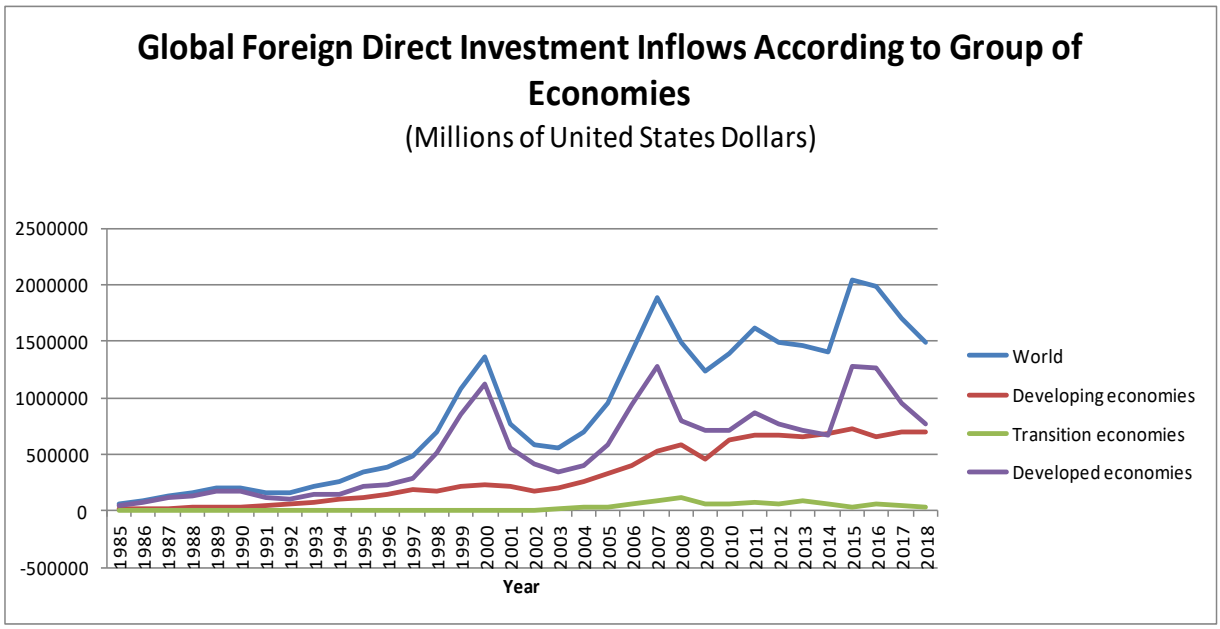
Figure 2-7: Global foreign direct investment inflows, 1985 – 2018



Source: Author's compilation from UNCTAD Statistics (2020)

The graph below reinforces the top graph on global FDI inflow patterns, mimicking that of European countries or developed countries. Europe is the most industrialised continent, with the European Union as the world's greatest economically and politically integrated region (7 Continents of the World and Their Countries, 2008). Inflows in developed countries have been on the rise for the period under study.

Figure 2-8: Global foreign direct investment inflows according to group of economies



Source: Author's compilation from UNCTAD Statistics (2020)

The United Nations Conference on Trade and Development's (UNCTAD) World Investment Report from 2016 to 2017 reported decreases in international FDI flows from $1.87 trillion to $1.43 trillion (23% decrease). The UNCTAD said decreases in cross-border mergers and acquisitions impacted negatively on global foreign investment.

According to the UNCTAD (2018), inward FDI in Africa accounted for 2.9% of global FDI in 2017. FDI inflows to Africa decreased from 2016 to 2017 by 21.5%. This decline of FDI inflows in Africa was also reported in 2015 and 2016; FDI declined by 3%, which was mainly because of low commodity prices. Developed countries accounted for 49.8% of FDI inflows. Asia reported 33.3% of FDI inflows, and the Caribbean and Latin America registered 10.6% inward FDI. FDI forecasts are expected to be positive for most of the world in 2017 and 2018, except for Latin America and the Caribbean, which are marred by macroeconomic uncertainty and policy regimes prone to amendments. This has negatively impacted on investor confidence and led to an expected loss of appetite in the region for foreign investment (UNCTAD, 2018).

Overall, developing countries are expected to have an increase of approximately 10% in FDI inflows in 2018. Asia is expected to receive significant increases in FDI inflows. South Africa is still lagging in terms of its ability to attract FDI in comparison to other Upper Middle-Income countries. The world average of FDI influxes in 2018, as shown in Table 2.4 on page 38, as a percentage of GDP is 1.5%. Developing economies rank above the world average, with transition and developed economies on par and below the average, respectively (UNCTAD, 2018).

$706 billion was devoted to developing economies, which accounted for over half of the global FDI influxes at 54.43%. The outflows from developing countries are almost 25% less than the amount received. Developing economy FDI influxes totalled 706 US billion dollars, 75% greater than its FDI outflows. The bulk went to developing economies in Asia and Oceania at $513 billion, which is 72.66% of the total allocation to the developing world, followed by developing economies in America and Africa at $147 and $47 billion, accounting for 20.82% and 6.52% of global inflows, respectively. Developed countries are responsible for $507 billion, i.e., 42.95% of global FDI inflows (UNCTAD, 2018).

As shown in Table 2.4 on page 38, in 2018, the Least Developed Countries (LDCs), Land-locked Developing Countries (LLDCs), Small Islands Developing States (SIDS)[3], Heavily Indebted Poor Countries (HIPCs) accounted for 1.85%, 1.77%, 15% and 2.08% of the FDI inflows respectively, these figures are relatively low. It is somewhat disappointing as these countries could benefit from the widely held view that FDI can lead to positive spillovers for the host country through means such as skills transfer, migration of labour and catalysing technological progress, which in turn increase productivity (Belloumi, 2014). The G20[4] (the Group 20) countries accounted for 76.87% of inward FDI; these countries are primarily members of the European Union and are largely developed nations. The BRICS countries account for 20.12% ($US261 billions) of the global inflows in 2018. Nonetheless, to support and encourage FDI inflows, BRICS governments must make sure that their countries are appealing to investors by putting forth a fair footing and political stability. Their governments must also spend more on human resources so that their economies are prepared to absorb technological spillovers whilst enabling ongoing long-term economic development (Asongu et al., 2018).

2.7.1 Global FDI flows in 2018

The investments from developing countries are quite substantial, a phenomenon which is gaining traction in trade literature, as more third world MNEs are investing abroad. As depicted in Table 2.4 on page 38, the developing countries' FDI outflows account for 41.23% of the global total. The transition economies, i.e., economies shifting from centrally planned (social) to a free market economy (Krelle, 2000), account for 3.75% of the world total and the balance accrued to developed economies at 55.03% of the outflows. Not surprisingly, first world MNEs emanating from developed countries are the prevalent investors abroad. The LDCs, LLDCs, HIPCs account for approximately 0.10% of the FDI outflows, which is expected because these countries are not financially well off. The G20 (the Group 20) countries accounted for 76.33% of investments abroad. This is in line with

[3] *"14 countries – American Samoa, Anguilla, Aruba, British Virgin Islands, Commonwealth of Northern Marianas, Cook Islands, French Polynesia, Guam, Montserrat, Netherlands Antilles, New Caledonia, Niue, Puerto Rico, and U.S. Virgin Islands" (United Nations, 2011).*

[4] "*The G20 comprises 19 countries and the European Union. The 19 countries are Argentina, Australia, Brazil, Canada, China, Germany, France, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom and the United States* " *(Government of Canada, 2019).*

expectations as predominantly the member countries are from the European Union and are in the most, developed nations.

Table 2.4: Global foreign direct investment inflows and outflows according to group of economies in 2018

Group of economies	Inflows		Outflows	
	Value	Ratio to GDP	Value	Ratio to GDP
	(Billions of US$)	(Percentage)	(Billions of US$)	(Percentage)
	2018	2018	2018	2018
World	**1 297**	**1.5**	**1 014**	**1.2**
Developing economies	706	2.1	418	1.3
Developing economies: Africa	46	2	10	0.5
Developing economies: America	147	2.8	7	0.1
Developing economies: Asia and Oceania	513	2	401	1.6
Transition economies	34	1.5	38	1.7
Developed economies	557	1.1	558	1.1
Selected groups				
Developing economies excluding China	567	2.8	288	1.5
Developing economies excluding LDCs	682	2.1	417	1.3
LDCs	24	2.2	1	0.1
LLDCs	23	2.9	1	0.2
SIDS (UNCTAD)	2	2.6	0	0.4
HIPCs (IMF)	27	4	1	0.3
BRICS	261	1.3	169	0.8
G20	997	1.4	774	1.1

Source: Author's compilation from UNCTAD (2019)

Table 2.5 on page 41 indicates the global FDI inflows for the top 20 recipient countries. The cells coloured in green represent developed economies, and those in yellow are developing and transition economies. The countries are ordered in descending sequence according to FDI inflows received in billions of US dollars for 2018.

As indicated by the graphs in this chapter, much of the inward FDI accrues from both the industrialised and developing/ transition economies. USA, UK, Australia, Spain, Canada, France, Germany, Italy and Israel are the industrialised economies comprising the top 20 countries globally that received FDI in 2018. China, Singapore, Brazil, India, Mexico, Indonesia, Vietnam, Republic of Korea and Russia are the developing and transition nations, classified by the World Bank as recipients of FDI amongst the top 20 globally for 2018.

Hong Kong and Singapore rope in the most substantive FDI flows in terms of GDP ratios. In terms of monetary value, in descending order, the USA, China and Hong Kong have the most substantial amount at $252 billion (bn), $139 bn and $116 bn, respectively.

Upper-middle-income countries receiving FDI inflows in the top 20 globally, including Brazil, China, Mexico and Russia (World Bank, 2018). South Africa is also classified as an upper-middle-income economy but does not feature in the top 20 global FDI recipient countries. India, Indonesia and Vietnam are lower-middle-income countries (World Bank, 2018). They are featured in the top recipient FDI countries globally, accounting for FDI inflows representative of 1.5%, 2.1% and 6.3% ratio to GDP, respectively.

Aside from South Africa, the other BRICS countries, namely Brazil, Russia, India and China, are amongst the global top 20 FDI recipients. Comparator countries/middle-income countries like South Africa, namely, Mexico, are also in the top 20 to receive FDI (UNCTAD, 2019).

China is proving itself to be an attractive investment destination, accounting for substantial FDI inflows in the world at 10,72%, and amongst developing countries for almost one-fifth (19,69%). China continues to be the most desirable investment destination in the world because of its strong infrastructure, support for manufacturing projects, improving the corporate climate and increasing customer demand (Xinhua, 2019).

FDI into structurally poor and unstable economies accounts for less than 3% of global flows. Fluxes back to the least developed nations, totalling $24 billion on average over the decade, have stabilised from 2017. FDI flows to transition economies accelerated downwards in 2018 by 28% to $34 billion (UNCTAD, 2019).

Table 2.6 on page 41 shows the 20 countries at the forefront of global FDI outflows abroad in 2018. The countries highlighted in green are developed economies, and those in yellow are developing economies.

Not surprisingly, the countries that invest abroad are in the main the most industrialised nations. These are based in Europe, namely, Germany, Netherlands, UK, Spain, Switzerland, Italy, Sweden and Ireland.

Japan, followed by China and France are leading the way with investments abroad for the year ended in 2018. China has undergone rapid economic growth over the last four decades and is the world's largest developing nation, as indicated by the National Statistical Society of China (NSSC). China bears numerous third world multinational corporations that seek investment opportunities globally (UNCTAD, 2019).

As indicated in Table 2.6 on page 41, most investors are located in Europe and Asia (UNCTAD, 2019). However, in the recent past, there is a growing trend and phenomenal of third world MNEs investing abroad. Asia is leading the pack of such investments abroad, with China, Hong Kong, Republic of Korea, Singapore, Saudi Arabia, Taiwan, Thailand, and UAE categorised in the top 20 contributors globally.

Table 2.5: FDI inflows for 2018 for top 20 recipient countries

Economy (Ranked by inflow value)	Inflows	
	Value	Ratio to GDP
	Billions of US$	%
	2018	2018
United States of America	252	1.2
China	139	1
China, Hong Kong SAR	116	31.9
Singapore	78	22.4
Netherlands	70	7.6
United Kingdom	64	2.3
Brazil	61	3.3
Australia	60	4.2
Spain	44	3.1
India	42	1.5
Canada	40	2.3
France	37	1.3
Mexico	32	2.6
Germany	26	0.6
Italy	24	1.2
Indonesia	22	2.1
Israel	22	5.9
Vietnam	16	6.3
Korea, Republic of	14	0.9
Russian Federation	13	0.8

Table 2.6: FDI outflows for 2018 for top 20 investing countries

Economy (Ranked by outflow value)	Outflows	
	Value	Ratio to GDP
	Billions of US$	(%)
	2018	2018
Japan	143	2.9
China	130	1
France	102	3.7
China, Hong Kong SAR	85	23.5
Germany	77	1.9
Netherlands	59	6.5
Canada	50	3
United Kingdom	50	1.8
Republic of Korea	39	2.4
Singapore	37	10.7
Russian Federation	36	2.2
Spain	32	2.2
Switzerland, Liechtenstein	27	3.8
Saudi Arabia	21	2.7
Italy	21	1
Sweden	20	3.6
China, Taiwan Province of	18	3.1
Thailand	18	3.5
United Arab Emirates (UAE)	15	3.6
Ireland	13	3.6

LARGEST VALUE

LOWEST VALUE

Source: Author's compilation from UNCTAD (2019)

Developed/ Industrialised Economies

Developing and Transition Economies

2.7.2 FDI Flows in Africa in 2018

FDI flows to Africa in 2018 overcame the global decreasing pattern and grew to $46 billion, a rise of 11% after consecutive decreases in 2016 and 2017. Reduced FDI flows in some big countries, including Nigeria, Egypt and Ethiopia, have been compensated by substantial rises in others, viz., South Africa (UNCTAD, 2019). Expanding markets for some consumer goods and increased non-resource seeking investments in certain countries have been primarily accountable for the higher FDI flows to Africa. The rise of trade conflict and suboptimal economic performance in Sub-Saharan Africa restricted the magnitude of investment (UNCTAD, 2019).

There has been a worldwide phenomenon of TWMNEs spiralling and gaining momentum in recent years. South Africa is leading the way with its companies growing their footprints and investing in other developing countries in Africa. The African Continental Free Trade Agreement (AfCFTA) came into effect on 30 May 2019. Trading in compliance with the AfCFTA accord was expected to take effect on 1 July 2020 but was delayed owing to the COVID-19 pandemic. It was announced that 1 January 2021 is the new date for commencement (Trade Law Centre (TRALAC), 2020).

Multilateral agreements and initiatives such as AfCFTA will increase FDI between African nations. Lowered barriers to trade and facilitating the free movement of goods and people will offer prospects for economic transformation in the region (Boateng & Dankyi, 2020). Among other benefits, competitive advantages will be created for trade within African countries in the bloc, and increased investment, including FDI, is anticipated as a result (Chidede, 2020). African FDI outflows have plunged to 10 billion dollars, primarily due to the decline of global investments in Angola and South Africa (UNCTAD, 2019).

The diagram on page 43 depicts the FDI received by African countries. The UNCTAD categorises the levels of inward FDI. The categories are listed below, ranging in ascending order, allocated to countries by receipt of FDI in 2018.

Category 1: Below half a billion US dollars - Namibia, Botswana, Madagascar, Angola, Swaziland, Lesotho, Somalia, South Sudan, Niger, Libya, Mali, Burkina Faso, Mauritania, Central African Republic, Eritrea, Togo, and Benin.

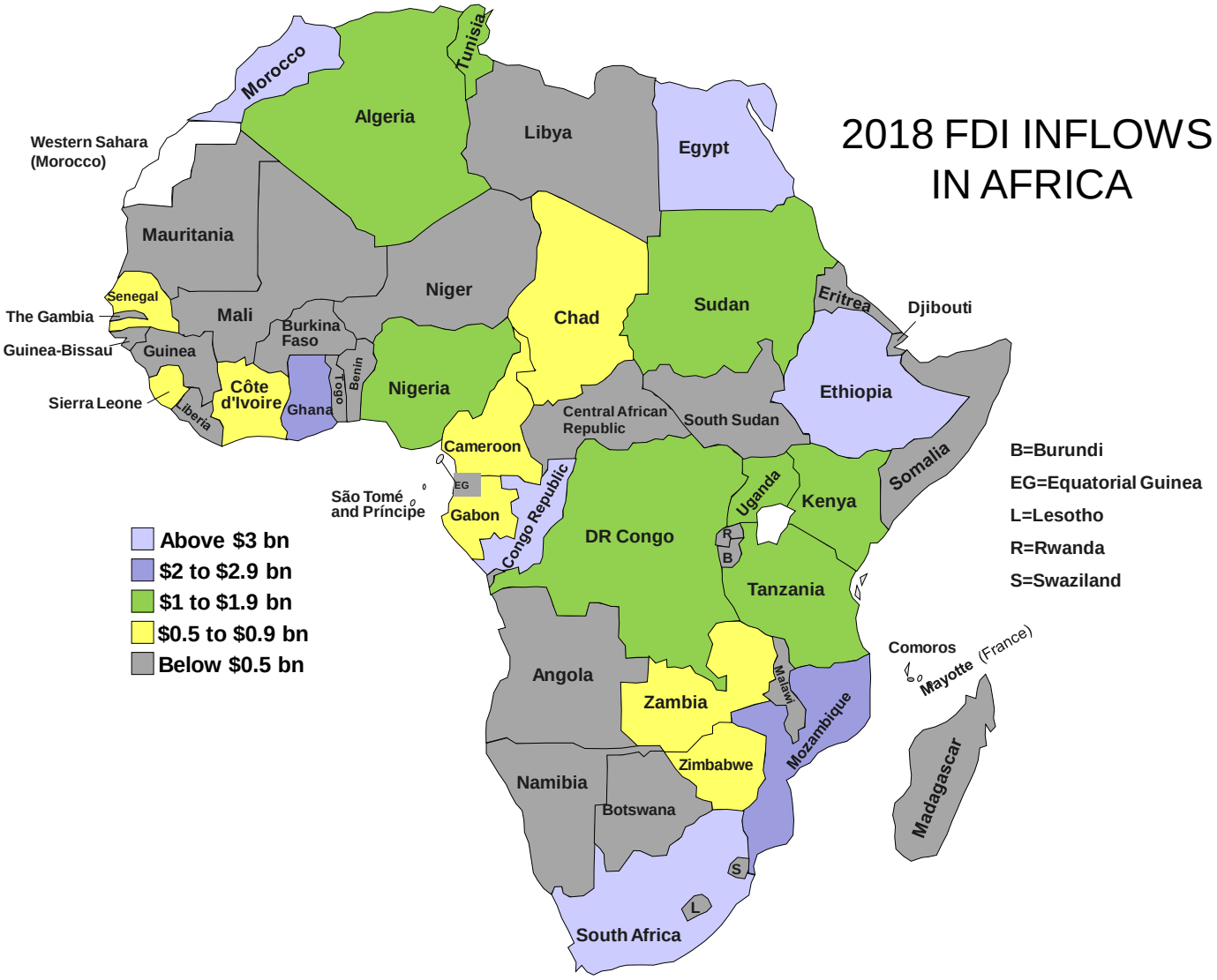
Category 2: $0.5 to $0.9 billion - Zimbabwe, Zambia, Gabon, Cameroon, Chad, Côte d'Ivoire, and Senegal.

Category 3: $1 to $1.9 billion - Tanzania, Kenya, Uganda, Democratic Republic of Congo (DRC), Nigeria, Sudan, Algeria, and Tunisia.

Category 4: $2 - $2.9 billion - Mozambique and Ghana.

Category 5: Above $3 billion - South Africa, Ethiopia, Egypt, Morocco, and the Congo Republic.

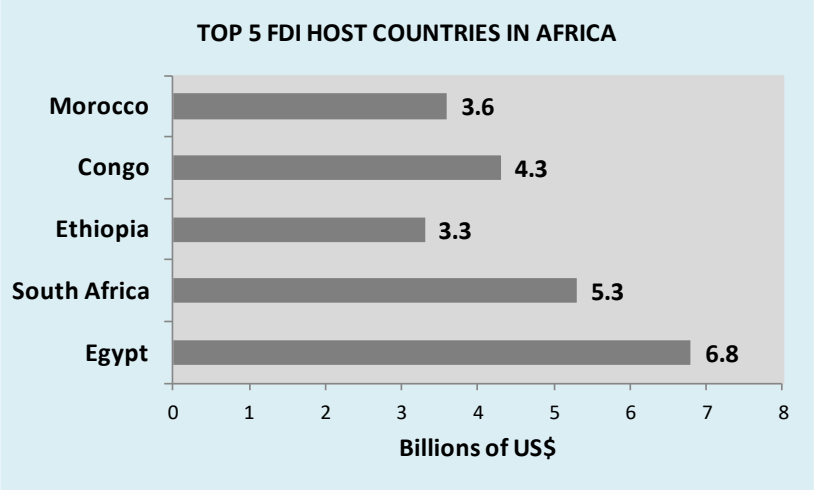
Figure 2-9: 2018 FDI inflows in Africa



Source: Diagram from Lewis (2015) and has been adapted to depict the data on FDI in Africa as illustrated by UNCTAD (2019).

Figure 2-10 below illustrates the top 5 FDI destinations in Africa for 2018 as indicated by the UNCTAD (2019) World Investment Report. Egypt raked in the most FDI in Africa in 2018, followed by South Africa, Congo, Morocco, and Ethiopia at $6.8; $5.3; $4.3; $3.6 and $3.3 billion, respectively.

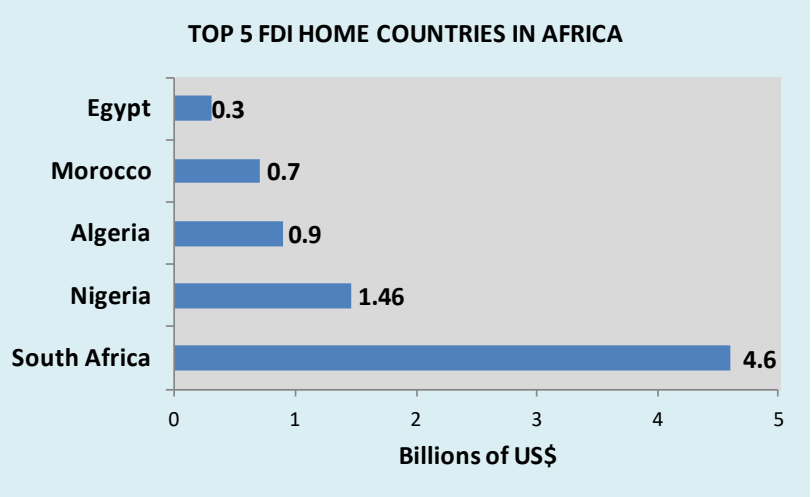
Figure 2-10: Top 5 FDI host countries in Africa



Source: UNCTAD (2019)

As depicted in Figure 2-11, the top 5 FDI home countries in Africa are South Africa, Nigeria, Algeria, Morocco and Egypt, accounting for $4.6; $1.46; $0.9; $0.7 and $0.3 billion, respectively (UNCTAD, 2019). Third World Multinational Enterprises (TWMNEs) have become more involved in Africa, although Developed Country MNEs (DCMNEs) remain the key stakeholders.

Figure 2-11: Top 5 FDI home countries in Africa



Source: UNCTAD (2019)

2.8 CONCLUSION

This chapter draws on some indicators of economic performance to generate trends and give insight into the South African economy from 1985 to 2018. Numerous factors have impacted the macroeconomic conditions and the performance of the economy. This study goes back to 1985 when South Africa was still under the apartheid regime and under sanctions, with the world putting pressure on the government to end the regime and move to a democratic system. In 1994, on 27 April, the country held its first democratic elections. The chapter then goes onto sectoral performance, with focus on the TSC sector. It then analyses global FDI inflows. The analysis of FDI inflows in ZA indicate that from 1985 to 2018, these were sporadic, but ultimately an upward trend is detected. Europe is South Africa's leading investor with the United Kingdom (UK), Germany and the Netherlands with the most numbers of MNEs in the country. The chapter also looks at investment incentives to attract companies abroad.

CHAPTER THREE: LITERATURE REVIEW

3.1 INTRODUCTION

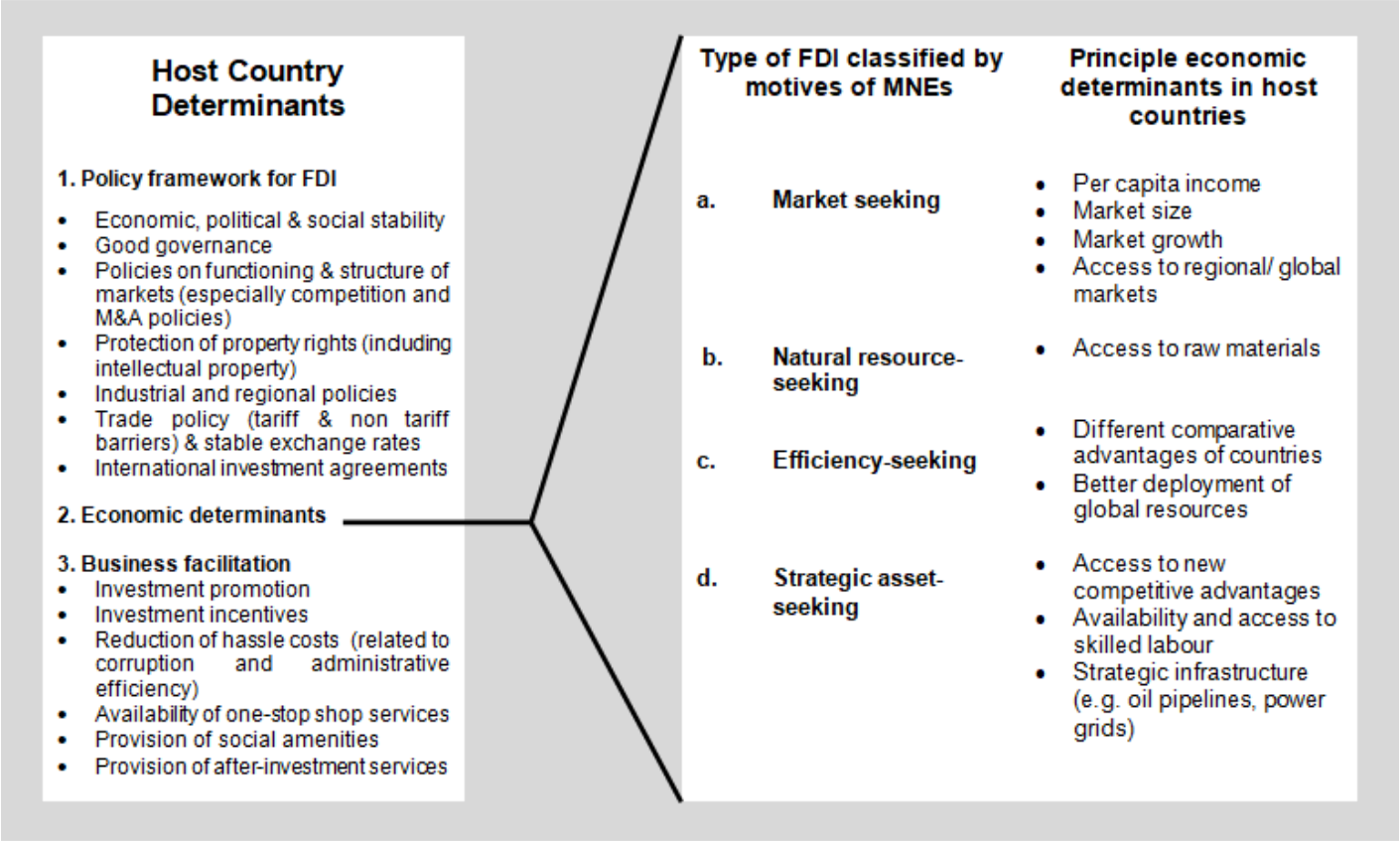
This chapter analyses FDI spillovers in-depth and draws on existing literature and theories. This chapter explores the theoretical and empirical literature reviews. The theoretical literature review commences by looking into the determinants of FDI. It then proceeds to explore the following FDI theories of growth, international trade, and firm internationalisation: (1) neoclassical growth theory, (2) endogenous growth theory, (3) Barro model, (4) Dunning's eclectic theory, (5) industrial organisation theory, (6) factor mobility theory, (7) product life cycle theory, (8) capital dependency theory, and lastly, (9) investments from third world multinational enterprises. The empirical literature analyses spillovers and economic growth arising from FDI. Selected evidence-based studies from across countries, developed and developing countries, Africa, South Africa, and sectors are reviewed.

3.2 THEORETICAL LITERATURE REVIEW

3.2.1 Determinants of FDI

Numerous studies and paradigms have provided insight into the importance of FDI for host countries putting forth the narrative that spillovers can lead to improved productivity and efficiency (Aiello & Cardamone, 2005; Fernandes & Paunov, 2008; Pietrucha & Żelazny, 2020). It is relevant in the context of this study to explain the determinants of FDI. The United Nations (UN) (1998) provides a framework for "host country FDI determinants", these are broadly classified according to (i) policy framework, (ii) economic determinants, and (iii) business facilitation. The policy framework, as shown in Figure 3-1, entails the following factors: economic, political, social stability, governance, policies on markets (especially competition and M&A policies), property rights (including intellectual property), industrial and regional policies, trade policy (tariff and non-tariff barriers), stable exchange rates and international investment agreements. Economic determinants are made up of the following: market-seeking motives, resource/ asset seeking motives, efficiency-seeking motives, and strategic asset seeking. Business facilitation entails investment promotion, investment incentives, reduction of hassle costs (related to administrative efficiency and corruption), availability of one-stop-shop services, social amenities, and aftercare services.

Figure 3-1: Determinants of FDI



Source: UNCTAD (1998)

3.2.1.1 Economic Determinants

Economic determinants are classified by motives of MNEs in a four-prong approach, namely: (i) market-seeking; (ii) natural resource-seeking; (iii) efficiency-seeking; and (iv) strategic asset-seeking.

Market seekers

Market seekers are businesses that invest in the delivery of products and services in their countries, or neighbouring countries, to customers in a single nation or area. Typically, exports have served partial or entire markets and are no longer best exploited by the particular route, either because of the tariffs or other cost-related restrictions levied by the developing countries, or because consumer sizes now support local development (Dunning & Lundan, 2008).

Market-seeking determinants comprise economic indicators portraying the potential purchasing power of consumers and markets through indicators such as per capita income, market size, market growth, and access to regional or global markets. Numerous empirical studies support the finding that market size is a key determinant for FDI inflows. The widely held views are that the larger the market of the host country, the more FDI inflows it is probable to attract. In a study by Petrović-Ranđelović et al., (2017) in the Western Balkans from 2007 – 2015, the findings are that market size is an essential contributor to entice FDI inflows in the region. Research carried out by Azam (2010), Khan & Nawaz (2010), Mottaleb (2007) and Schneider & Frey (1985) employs GDP as a proxy for market size and the expectation that a positive relationship exists is fulfilled.

Natural resource seekers

According to Dunning and Lundan (2008), natural resource seekers are businesses that are motivated to access investments in exclusive and high-quality facilities at a lower actual cost in international countries. The foreign investor aims to increase profitability and competitiveness. The bulk of resource seeker affiliates' production is primarily exported to developed nations. Natural resource seeking determinants include the following: production costs, natural resources, low labour rates and adequately qualified workers.

Numerous studies postulate the viewpoint that the more expensive the cost of labour, the less incentivised FDI is to participate in a particular market (Saunders, 1982; Flamm, 1984; Schneider and Frey, 1985; Culem, 1988; Tsai, 1994; Shamsuddi, 1994, as cited in Calhoun et al., 2002). Wheeler and Mody (1992), in their research of the electronics industry across 42 countries, concluded that the wage rates were negligible in determining FDI flows to developed countries but were a considerable driving force of FDI flows to third world countries (Calhoun et al., 2002). Furthermore, Pfeffermann & Madarassy (1992, as cited in Noorbakhsh et al., 1999) in their analysis, have shown that the FDI flows have gravitated away from labour-intensive, low-skilled and cheap labour to those that are more capital based, educated and knowledge orientated. This is because technological advancements have shrunk the labour component of production and advanced the knowledge and skills components. Ramasamy & Yeung (2010) found that cheap labour has incentivised FDI inflows in the short run. Still, in the long run, a workforce that is suitably educated and has more R & D investment has led to higher productivity, which has in effect driven inward FDI. Gauselmann et al. (2011), in their study on motives of foreign investors in Central-Eastern

Europe, found that the combination of low-cost labour with a skilled and educated workforce, scalable market demand and consumer buying power were the driving factors for investment.

Strategic asset seekers

Strategic asset seekers include MNEs that participate in FDI, typically by acquiring foreign assets to support their long-term strategic goals, in particular the support or promotion of their worldwide competitiveness. The investors include established MNEs following an integrated global or regional strategy for exposure or leverage in a new sector (Dunning & Lundan, 2008). The motivation for strategic asset-seekers is less to leverage cost or marketing advantages over rivals; but to expand the global inventory of physical assets and human resources, which it sees as sustaining or consolidating its specific ownership benefits (Dunning & Lundan, 2008).

Efficiency seekers

Efficiency seekers aim to rationalise the constitution of existing resource-based or market-based investment to profit from the traditional management of geographically distributed operations. The advantages of efficiency-seekers are mainly that of diversifying their portfolios to mitigate risk and gain from economies of scale and scope (Dunning & Lundan, 2008). They benefit from: (i) cross-border expertise in the handling of goods, (ii) the information acquired from manufacturing experience, and (iii) the potential to capitalise on price and cost differentials. The MNE aims to optimise productivity by concentrating its outputs in a small number of locations to serve different customers, utilising factor endowments, societies, administrative configurations, demand patterns, economic policies and business structures (Dunning & Lundan, 2008).

3.2.1.1 Business Facilitation

The competitiveness and attractiveness of a nation to entice FDI is explored in this section through the lens of business facilitation. In this context, the section focuses on investment promotion and incentives, hassle costs, one-stop-shop services, social amenities, and aftercare services.

Investment promotion and facilitation

Investment promotion is often described as “activities that disseminate information about, or attempt to create an image of the investment site and provide investment services for the prospective investors” (Wells & Wint, 1990, as cited in Rajan, 2004). Investment promotion and facilitation leads to an improved investment climate and generates an appetite for domestic and foreign investment. Cultivating a fertile investment climate requires a strategy that effectively employs assets so that economic development through investment can be the vanguard of policymaking. Institutions for monitoring and evaluating the investment climate, and adapting to the current global conditions and relevant developments that warrant such change will ascertain that strategies pursued are optimal (OECD, 2020). Optimal investment promotion presents opportunities to local and international investors. Investment promotion and business facilitation cannot be used as a means to an end in the absence of not addressing inadequacies and reforming policy and regulatory framework (OECD, 2020). In pursuit of initiatives to promote investment, fiscal and financial incentives put forward to entice FDI may lead to costly “bidding wars” (Nunnenkamp, 2001).

Reducing hassle costs and one-stop-shop services

Hassle costs are those related to corruption and administrative efficiency. Corruption is the misuse of public power for gain (Hopkin and Rodríguez-Pose, 2007). Research conducted on the correlation between corruption and capital flows lacks unanimity. There is the view that corruption is a disincentive and is a “grabbing hand” because paying bribes leads to higher costs incurred by foreign businesses operating in the recipient country at the expense of social welfare (Hopkin and Rodríguez-Pose, 2007), and adversely impacts on FDI inflows (Demirbag et al., 2007; Doh et al., 2006; and Wei, 1997, as cited in Petrou & Thanos, 2014). The contrary argument is that corruption acts as a “helping hand” because paying a bribe may fast track bureaucratic processes and ease red tape (Egger and Winner, 2005; Lui, 1985; Wheeler and Mody, 1992). According to Maysami & Lim (2004), the quality of administration can be measured with respect to efficiency and integrity. The quality and integrity of administrative processes are determinants of a country’s attractiveness to FDI (Velde, 2001, as cited in Maysami & Lim, 2004). Administrative processes pertaining to FDI comprise: investment and incentive approval; company and tax registrations; work permits, and operating licences. Too much bureaucratic red tape leading to lengthy processes deters

inward FDI. Therefore, to capitalise on administrative efficiencies, the host country must possess expeditious processing capacity (Maysami & Lim, 2004).

Provision of social amenities and after-investment services

Young and Wood define aftercare (after-investment services) as: *"comprising all potential services offered at the company level by Governments and their agencies, designed to facilitate both the successful start-up and the continuing development of a foreign affiliate in a host country or region with a view towards maximizing its contribution to local economic development".* The UNCTAD (2008) likens aftercare services to the equivalence of after-sales services, with the intent to make the customer experience more fulfilling and encourage *"repeat purchase".*

According to the UNCTAD, aftercare services are broken down into the following services: (i) administrative; (ii) operational; and (iii) strategic (UNCTAD, 2007a). Administrative services facilitate operations and are inclusive of operating and work permits and other relevant permissions, relocation services for staff such as finding homes, and aid with financial, legal, real estate services, and other administrative services deemed necessary. Operational services include factors concerned with the improvement of efficiency and effectiveness. These include support with training, export promotion; premises for operations, help build the transnational corporation's (TNC's) reputation to aid regional expansion in the host country; local suppliers; developing linkages and developing agglomeration economies. Strategic services focus on the future trajectory of the firm and scalability into the host's region. These are intended to facilitate higher value-added operations and regional expansion whilst also linking the TNC to national policy.

As per the UNCTAD, aftercare is categorised in the matrix below by services provided by Investment Promotion Agencies (IPAs) through short, medium and long-term intervals. In the short term, the objective of aftercare is to assist the MNE in starting up with administrative and logistics such as permits and office space. These are required immediately so that the business can be operational. In the medium term, the MNE focuses on penetrating the domestic markets and growing the business, relevant permissions for expansion, local legislation, R & D and integration into regional value chains. In the long run, the MNE will have its eyes set on good stakeholders, namely, union and local

authorities, and collaborate with local universities. The MNE may also consider regional penetration of host country markets (UNCTAD, 2007a).

Table 3.1: Aftercare services space by type of service and timeframe

	The aftercare service space			
Type of Service	**Strategic**	*Establish firm so that it operates successfully and performs its mandate*	*Competition legislation, product development, R&D capabilities*	*Services that support firms in becoming strategic leaders, centres of excellence*
	Operational	*Find office space, factory, recruit staff, help install ICT equipment, power, etc.*	*Staff training, new premises, improved connectivity, local supply chains*	*Local R&D, university collaboration, strong relationships with unions*
	Adminis-trative	*Obtain visas, import permits, work permits for spouses, operate in free trade zone*	*International school, obtain food, drugs and administration approvals*	*Agreement with tax authorities, collaborate with public sector on planning and transport*
		Short term	**Medium term**	**Long term**
		Time		

Source: UNCTAD (2007a)

Social amenities, or public amenities, are defined by the Malaysian Ministry of Rural Development as: “places, buildings or infrastructural facilities which are to be shared and to become convergence spots for the local and surrounding communities”. Obiechina Jnr (2015) states that basic social amenities (also referred to as basic amenities and social infrastructure by Jena (2017) and New Zealand Social Infrastructure Fund (2009), respectively) are essential to social and economic development. These include, but are not limited to the following infrastructure: decent highways, bridges, human settlements, safe drinking water and sanitation, electricity, security healthcare, and recreational facilities. Basic amenities are the base for decent livelihood, facilitate economic growth, and impact the quality of life (Jena, 2017). Social basic amenities are provided by government through taxes (Obiechina Jnr, 2015).

Chen (2018), in his study: "Mapping Amenity and Urban Competitiveness to Attract FDI," cites factors such as the quality of life and amenities in cities to attract tourists, residents, businesses, and capital as gaining traction. Cities can invest in public amenities to improve the 'look and feel' of their city, which can portray a positive image of the city and its lifestyle. Chen (2018) found that the spatial distribution of FDI is akin to that of amenities; thus, it is

observed that businesses are attracted to industrial clusters and adequate amenities to support operations and worker retention. Foreign direct investment that branches into subsidiaries abroad is likely to yield labour mobility, this may necessitate that expatriates make use of amenities such as housing and schools for their children (UNCTAD, 2007a). Empirical evidence makes inferences that quality economic and social infrastructure may draw FDI inflows. Wheeler & Mody (1992) cited that nations with good infrastructure (transport, communications and energy) have attained greater productivity and return on investments, which consequently promotes inward FDI flows.

Generally, MNEs are progressively able to optimise on cost differentials, have competitive and comparative advantages arising from host country institutions, economic and business facilitation factors. The advantages that give rise to conditions that make the investment generate (greater) returns are taken into consideration by the MNE in determining the investment location abroad (UNCTAD, 1998). Stimulants of FDI remain multi-dimensional, with many facets likely to influence the investment decision. FDI is likely to flow to countries with strong institutions, with policies geared towards economic, political and social stability, which are clear on the rules and regulations on foreign investors, investment incentives such as tax breaks, red tape in setting up and operating a business, investment promotions and trade agreements (UNCTAD, 1998).

Existence of spillovers

Globally, numerous case studies have been conducted to determine the spillover effects of FDI. The evidence has been weak and ambiguous, with some studies citing FDI effects as positive (Cardona et al., 2013; Marcin, 2008; Rincon et al., 2012; van Leeuwen & van der Wiel, 2003; Venturini, 2015), others as insignificant (Görg & Greenaway, 2003) while other studies report spillover effects as negative (Konings, 2000; Mühlen, 2013) or nonexistent (Konings, 2000; Stiroh, 2001). Despite extensive empirical studies conducted over the past decade on spillovers and their dynamics, the findings on the effects are inconclusive, partly because, merely attracting FDI does not guarantee that a country will benefit from the spillovers (Farole & Winkler, 2014). In reality, spillover effects may be insignificant, regardless of extensive research conducted on their existence.

In practice, MNCs may be successful in making sure that firm-specific assets and benefits do not result in spillovers (Görg & Greenaway, 2003). Most of the research that is

unsuccessful in establishing positive ICT spillovers is founded on the macroeconomic level. Therefore, it is possible that the lack of spillovers from ICT is partly because of an aggregation factor (Rincon et al., 2012).

It is important to consider alternative measures and methodologies. The results are sensitive to the methodology employed. Many studies fail to consider the absorptive capacity. A firm's ability to absorb ICT spillovers is also dependent on its own investments in research and development, skills, human resources and technologies employed (Farole & Winkler, 2014). The results of ICT spillovers are not instantaneous, but will be reaped at a later stage because the technology has to be encompassed and adapted efficiently within the production process. Thus, the impact of the spillovers is likely to lag (Basu et al., 2003; Stancik, 2007).

Measurement of spillovers

Research and Development (R & D) spillovers have been studied intensely over the last decades in economics and econometrics. Qualitative methods have been employed to ascertain their impact on firms. Studies using both quantitative and qualitative methodology to determine spillover effects are referenced. According to Bloom et al. (1997), spillovers generated from inward FDI are categorised as R & D spillovers and are inclusive of the first type of spillover, which comprises technology spillovers and knowledge spillovers beneficial to firms. R & D spillovers also include a component of product market rivalry, which has an adverse impact on firms. Product market rivalry is categorised as the second type of spillover (Bloom et al., 2013). The research conducted on spillovers has been challenged due to the problematic nature of distinguishing between the technology, knowledge, and market rivalry components of spillovers. It is not as imperative to determine the technology spillover from knowledge spillover as the market rivalry. Market rivalry outcomes are contrary to technology, and knowledge spillover and thus must be distinguished from these effects. If no proper consideration is given to the contrast in these spillovers, it is possible for empirical research to wrongly conclude that no spillover effects are present because the product rivalry impact has cancelled the technology and knowledge spillovers.

R & D spillovers are the unintended technological benefits to firms that emanate from new knowledge generated from the research and development advancements of other firms

without the cost of distribution amongst them (Fan & Sun, 2017). Firms in developed countries tend to be more technologically advanced than those in developing countries. The ability of firms to be able to absorb R & D spillovers depends on the technological gap between sending and receiving firms (Fan & Sun, 2017). Governments in host countries can be deliberate in terms of particular policies employed to encourage potential spillovers, both in terms of encouraging MNCs to transfer technologies and improving the absorptive ability of local firms (Görg & Greenaway, 2003).

The presence and impact of spillovers is an empirical matter. Determining the extent to which inward FDI leads to R & D spillovers is imperative in econometric studies. A related factor in the determination of spillovers encompasses the channels of diffusion of new technologies, which are inclusive of knowledge spillovers (Acemoglu, 2013). Business market transactions and externalities influence the diffusion of technology. Numerous academics are of the view that international technology diffusion is a consequence of both spillovers and market transactions (Keller, 2004). In reality, measuring externalities is difficult. Methodology partially captures spillover effects, but these methods are flawed as they do not incorporate the cost of obtaining knowledge (Keller, 2004).

The timing of spillovers has to be considered as it could affect the measurement of the impact. Difficulties in measuring externalities also include determining when these spillovers will be in existence. Moreover, their effect is lagged (Buettner, 2004; De Loo & Verspagen, 1998; Griliches, 1990).

There is both inadequate research and data on the timing of R & D spillovers, which impact economic variables such as productivity. Research has been unable to recommend on the timing of spillovers. However, it is possible for research to find insignificant spillover effects because the timing of the impact is unknown. R & D spillovers may also not be limited to a single period, but may spread over numerous periods (De Loo & Verspagen, 1998).

Studies determining the impact and estimated timing of spillovers were conducted by Buettner (2004), De Loo & Verspagen (1998), and Griliches (1990). These studies take into consideration the lagged impact of externalities, which include patents and the productivity ameliorations, as well as the timing for when these increases to productivity would be realised.

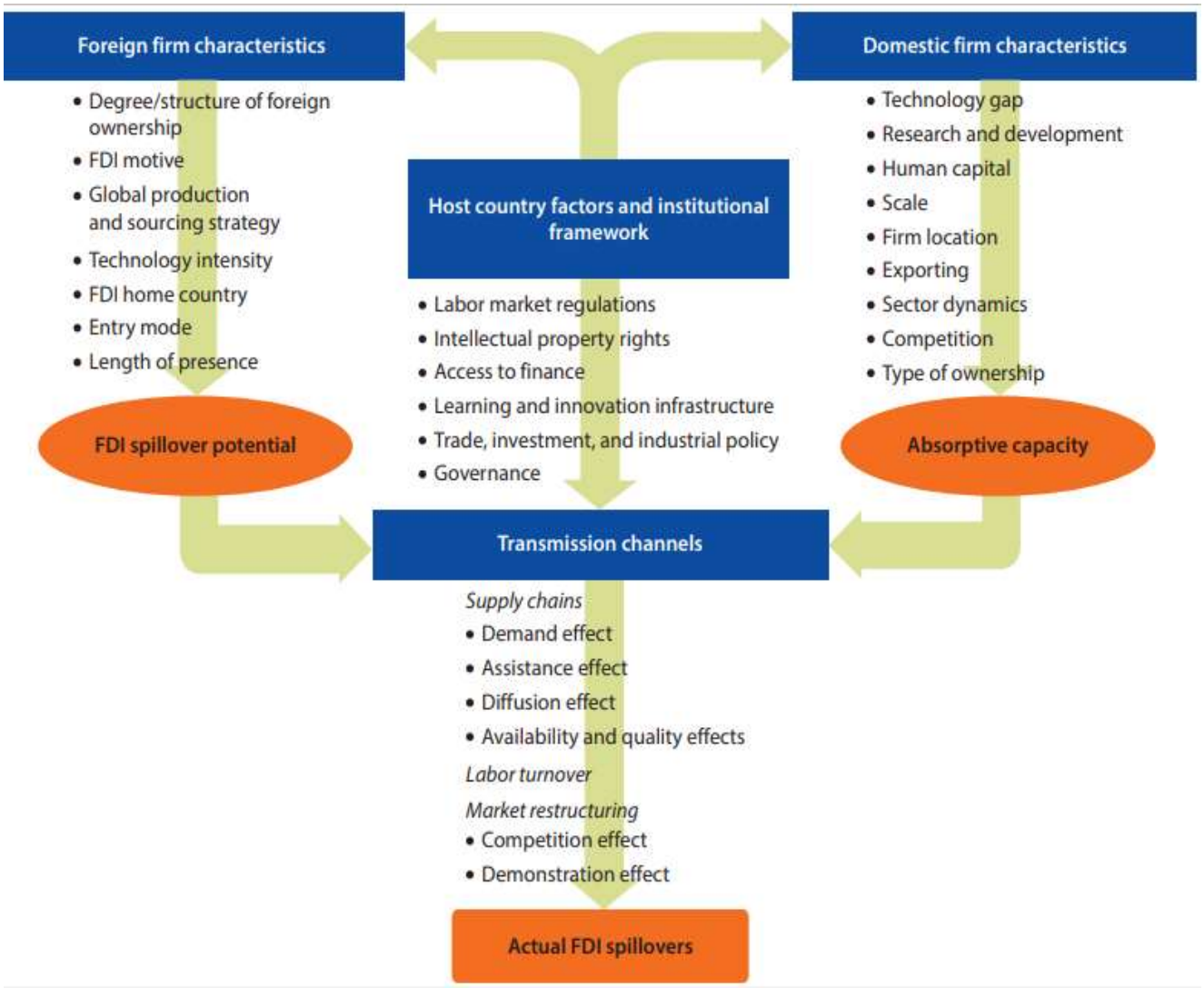
Measurement problems

There are several intrinsic properties in the measurement of spillovers that may lead to inaccurate inferences. Firstly, the type of data collected for the analysis has a significant bearing on the outcomes. Firm panel data is likely to yield more accurate estimates (Görg and Strobl, 2001, as cited in Halpern & Muraközy, 2007). Cross-sectional data may lead to biased outcomes because this type of data does not account for time variances on productivity across industries. This can be attributed to foreign presence even though the causation may not be such. The biased estimates arising from time variances on productivity are more prevalent with data aggregated at the sectoral level (Halpern & Muraközy, 2007). Secondly, the sample selection carries significance. MNEs select local firms to acquire based on productivity, and therefore they invest in shares of enterprises that are the most productive juxtaposed to other local firms (Halpern & Muraközy, 2007). Thus, inferences may be drawn that foreign ownership yields more productive firms, when in fact, the most productive firms were acquired by the MNEs. To conquer this bias, testing for the causal relationship is factored into this study (Halpern & Muraközy, 2007). Thirdly, endogeneity problems can occur, where total factor productivity (TFP) is not a consequence of the specified explanatory variables (i.e., is not explained endogenously), but rather because of a factor(s) outside (exogenous) those included in the specified model. Methods such as the generalised method of moments (GMM) and IV are also recommended to counter the problem of endogeneity (Damijan et al., 2003, as cited in Halpern & Muraközy, 2007).

3.2.1.1 Spillover Effects Mediating Factors

This section is broken down as follows: (1) Foreign firm characteristics; (2) Host country institutions; (3) Domestic firm absorptive capacity; and (4) Transmission channels. The spillover mediating factors are shown in Figure 3-2 on page 57.

Figure 3-2: Spillover mediating factors



Source: Farole & Winkler (2014) *in the book titled: "Making Foreign Direct Investment Work for Sub-Saharan Africa"*

Foreign firm characteristics

Foreign firm characteristics look into the driving forces, i.e., the motives likely to drive which mode of entry is the most appropriate.

FDI motives and spillovers

The driving forces for firms to invest abroad have captivated academia for centuries. Dunning (1998) distinguishes four categories of FDI motives as: resource seeking, market seeking, efficiency-seeking, and strategic asset seeking. There is scant evidence that a

particular type of FDI motive is inherently more or less likely to result in spillovers (Farole & Winkler, 2014).

Resource seeking

Resource seeking are foreign investors with the intent to: (i) acquire physical resources such as raw materials or intermediary inputs; (ii) exploit supply of skilled and cheap labour; (iii) expand on the potential local market, and adjacent regional markets, (iv) take advantage of agglomeration economies; and (v) optimise on technological capacity, management, branding or organisational know-how (Dunning, 1993).

Market seeking

Market seeking investors seek to compete in a particular country or area to exploit consumer demand. Reasons for MNC investments that are informed by market-seeking motives are: (i) expansion of operations; (ii) adaption of products or services to fulfil the demands of the local market and thus necessitating that the firm is present in the foreign market; (iii) operating costs of the local market may be lower than supplying the market from abroad; and (iv) to grow its brand globally, it may be worthwhile for MNCs to have footprints in leading markets occupied by competitors (Dunning, 1993).

Efficiency seeking

Efficiency seeking firms are mainly concerned with cost-saving benefits from production costs which stem from: (i) factor endowments between nations; (ii) economies of scale and scope; (iii) agglomeration economies; and (iv) investment incentives such as tax holidays (Dunning, 1993).

Strategic asset seekers

Strategic asset seekers are motivated by the following factors: access to different cultures, institutions and systems to satisfy local consumer demands; and optimising on local presence to advance local knowledge and understanding of the local market (Dunning, 1993).

Traditionally, resource seeking FDI is considered to have limited potential for spillover transmission due to, amongst other factors, its intrinsic advanced technology and capital intensity. The more labour intensive investment is, the likelier it is that efficiency-seeking spillovers will be realised through domestic firms imitating and learning the best practices of MNEs (Farole & Winkler, 2014). The market seeking spillover potential can be actualised through domestic firms providing intermediary inputs for MNEs. This is likely to boost the domestic market for inputs because MNEs are likely to impart knowledge on the provision of sophisticated intermediary inputs (Grossman and Helpman, 1991, as cited in Farole & Winkler, 2014). The asset seeking spillover potential may be higher because of the interactions of MNEs with domestic suppliers and clients (Farole & Winkler, 2014).

Entry strategies for FDI and FDI spillovers

Expeditious increases in international trade catalysed by ameliorations in distribution channels (transportation), as well as information and communications technology emanating from foreign developed nations, are imperative for developing nations to increase economic growth and productivity ameliorations (Papaioannou, 2005). International trade theory and studies propose that the presence of foreign companies presents opportunities for the diffusion of knowledge and technology for the host country (Lashaki & Ahmed, 2017; Teece, 1977). Teece (1977) highlighted how multi-national corporations could provide positive externalities to local companies through equity joint ventures in non-equity structured pacts or through transactions in external markets.

According to Stan (2009), the degree to which spillovers are transferred also relies on the type of foreign investment entering the local economy. There are several entry strategies available to MNEs, which include: takeovers of best-performing companies; predatory pricing (products and services at priced at low levels so that other firms are unable to compete and are priced out of the market), or they can select an industry whereby they can have a competitive advantage over local companies and set up a greenfield investment. Negative horizontal externalities (spillovers) are likely in all three instances. If the MNEs decide to focus on exporting and thus are not competing with local companies, it may lead to positive horizontal and backward spillovers (Stan, 2009). A “greenfield investment” occurs when a foreign entity builds new capacity, and thus forms a new company, or injects funds into an existing domestic entity. This will likely result in improved efficiency in the production

process (Javorcik, 2004). Increased productivity could be as a result of imitation, reverse engineering and labour migration from MNEs to local firms. Local firms that cannot keep up with competition may be crowded out (Javorcik, 2004). Sarialioğlu Hayali (2014) references research by Milberg where a "brownfield investment" is a result of an acquisition of an existing asset or a merger with an entity in the host country. When a "brownfield investment" is not established through the addition of capital stock; but rather by a change in the ownership of an existing asset which does not necessitate improvements to productive capacity, its penetration into the domestic economy will not carry the comparable impetus to that of a "greenfield investment;" which results to an addition to the capital stock. Thus the spillover potential of the "greenfield investment" is more likely than that of the "brownfield investment" (Sarialioğlu Hayali, 2014). Numerous researchers, namely, Singh (2005), Globerman and Shapiro (2004), UNCTAD (2000), and London Economics (2010), are in consensus that cross-border Mergers and Acquisitions (M&As) are used as a proxy for brownfield investment (Sarialioğlu Hayali, 2014). Therefore, like "brownfield investments," the spillover potential of M&As is less probable than that of a "greenfield investment." Tang (2008), in his research, looks at the role of ownership and the spillover potential from FDI in China. In China, domestic equity ownership, together with MNEs, are often enforced by policymakers to facilitate superior knowledge transfer to domestic firms through joint ventures, which benefits will spill over to the entire economy. The MNE is likely to prefer to have sole ownership so that it can restrict the transfer of knowledge and technical know-how and possess an advantage over other local firms (Tang, 2008). Tang (2008) concludes that in China, jointly owned foreign entities account for the transfer of more knowledge externalities than wholly-owned foreign entities. Wholly owned foreign affiliates are more associated with a larger portion of adverse horizontal spillovers than joint ventures.

The table below defines the four types of entry strategies that MNEs can utilise to penetrate domestic markets.

Table 3.2: Types of Foreign Direct Investment

TYPE OF FDI	DESCRIPTION/ DISTINGUISHING FEATURES
Brownfield investment	Brownfield investment is an investment into an established investment facility to ameliorate or expand capacity to impact swiftly on technology and knowledge spillovers.

Greenfield investment	Greenfield investment is: • New investment to contribute with significant FDI inflows; • New manufacturing plant/ production facility which will create employment.
Joint Ventures (JVs)	A Joint Venture is a strategic coalition comprising a foreign firm and a local firm to engage in business operations for profit.
Mergers and Acquisitions (M&As)	Mergers and Acquisitions realise the inflow of FDI but do not necessarily contribute through a new manufacturing plant/ productive capacity. Mergers and Acquisitions can contribute to improved technology and increased productivity and efficiency.

Source: Author's computation from South African Institute of International Affairs (2018)

Host country institutions

The institutions of the host country, namely, policy and regulatory framework, are explored in this section.

Policy and regulatory framework

A multinational enterprise has its head office /and parent company in one country (seldom more than one), the **home country**, whilst having branches/ subsidiaries in other countries, which are known as the **host countries** (Eurostat Statistics Explained, 2019). Mengistu & Adhikary (2011) reveal that host country institutions can stimulate or hinder FDI because weak institutions increase the cost of doing business, and conversely, sound institutions decrease the cost of doing business (Sabir et al., 2019). Host country institutions are part and parcel in the definition by North (1990), who explains that institutions are defined as constraints established by humans that comprise organisational, socio-economic and political factors. Institutions can be broken down into formal and informal components and how they interact to influence the economic behaviour of firms' impact on revenues and profits (Sabir et al., 2019). Formal institutions consist of, but are not limited to: constitutions; rules and regulations, e.g. tax laws and red tape; contracts; and type of government (e.g. democracy, monarchy, authoritarianism etc.) (Kaufmann et al., 2018). Informal institutions, are factors such as tradition, culture, religion, ideology, values and behavioural norms (including corruption) (Pejovich, 1999, as cited in Kaufmann et al., 2018). Pande & Udry (2005) reach inferences that: "These findings are of fundamental importance for

development economists and policy practitioners in that they suggest that institutional quality may cause poor countries and people to stay poor".

Developing countries have over the last couple of years moved towards the direction of liberalising national policies (Mallampally & Sauvant, 1999), in what is referred to as "location tournaments" to be more competitive over other countries in efforts to entice FDI and create a conducive regulatory environment (Wheeler & Mody, 1992).

A secure macroeconomic environment in a nation is demonstrated by price stability (Azam, 2010). High inflation in a country typically deters investment and reflects macroeconomic uncertainty and is seen as a symbol of domestic economic strain and a lack of commitment of the government to balance its finances and put into effect suitable monetary policy (Schneider & Frey, 1985, as cited in Azam, 2010). Conversely, low and sustainable inflation is favoured by FDI (Azam, 2010).

Due to globalisation and economic integration, nations advancing human and democratic freedoms attract more FDI than autocratic states (Harms & Ursprung, 2002). The nexus between FDI and democracy is such that democratic freedoms promote and strengthen property rights, which in turn fuel FDI inflows (Li and Resnick, 2003, as cited in Derbali et al., 2015). A democratic regime is marked by constant transition, while dictatorships, on the contrary, enable stability of practices in the same legal and political climate. Multinationals may favour investing in autocratic countries where autocratic regimes may provide lucrative benefits: protection from labour and fiscal incentives (Derbali et al., 2015).

Domestic firm absorptive capacity

Domestic firm characteristics explore which attributes of the host country firm(s) determine the extent and magnitude of the spillover. These include: (i) diffusion of technology and absorptive capacity; and (ii) technology gap and human capital.

Cohen & Levinthal (1990) define absorptive capacity as: the "ability to identify, assimilate, and exploit knowledge from the environment". The World Bank (2017) distinguishes between absorptive capacity at firm and country level. At firm-level, absorptive capacity depends on how an organisation can optimally employ knowledge assets. Measures to improve absorptive capacity at the company level may include training, more R & D

investment and information management tools. At country-level, absorptive capacity is a function of systems in place to help firms employ knowledge assets to build vertical and horizontal linkages between firms and facilitate learning. Measures to improve absorptive capacity at country level include: institutional partnerships, knowledge and information dissemination, developing linkages, and generating relevant content through learning institutions to support the economy (World Bank, 2017).

Generally, sectors with high levels of foreign investment have higher growth and productivity. However, of concern to developing nations is that technology may not spillover to domestic firms from MNEs. This is because spillover transfer is not automatic (Huang et al., 2012), and in some instances, studies have found that the effect is negative on the host country (Miroudot, 2006). The inconclusiveness on the impact of FDI on the host country is partly due to country-specific dynamics, such as the existence of local capacity to absorb the technology from MNEs (Miroudot, 2006).

The absorptive capacity of the host country is also a function of the technological gap between the developed and developing country (Manca, 2010; Saia et al., 2015). Cohen & Levinthal (1990) put forward the view that a firm's or country's ability to absorb FDI optimally and obtain benefits from spillover effects is path dependent. They argue that inadequate historical innovation impedes the advancement and absorption of technology in the future. The conceptualisation of the technology gap can be attributed to Gerschenkron, who suggests that the potential for technological emulation has widened the gap between the developing and developed countries (Fan, 2002; Manca, 2010; Phelps & Nelson, 1966). The improvements in the business operations of local firms in the presence of MNCs can also be due to increased competition to compete in the market efficiently and effectively; local firms are coerced to improve (Blomstöm & Kokko, 2001).

The rate at which technology is transferred is also a product of the foreign company and recipient countries' investment decisions and trade agreements (Blomstrom, 1991; Dhar & Joseph, 2012). Channels to transfer technological knowledge can be categorised into two mainstreams. The first channel for technology transfer is through the holding company to the subsidiary abroad, and the second is through spillovers from the MNCs to the domestic firm (Belitz & Mölders, 2013; Blomstrom et al., 1992; Braconier et al., 2001). These models are formulated on the basis that a country's productivity is positively correlated to the

amount of foreign capital. The international technology diffusion hypothesis described by Barro & Sala-i-Martin (2004) advocates that countries lagging behind technologically can access advanced technology through the leader-follower catch-up trajectory, which encompasses new technology and innovation in developed countries and learning-by-doing (i.e. imitation) by developing countries. Liu (2008) also supports that developing countries are more open to improvements in innovation through the presence of MNCs in the local economy, thus concluding that FDI is positively correlated to advances in innovations and technology.

Studies by Caniëls & Verspagen (2003), Cheng (1984), and Chitambara & Malikane (2017) contradict the assumption that the wider the technology gap, the larger the potential for the spillover impact. Multiple studies have juxtaposed the view that the wider the technology gap, the greater the opportunity presented to the developing nation to catch up to the developed nation. Caniëls and Verspagen (2003) conclude that general convergence rather than divergence is more probable with nations that comprise comparatively homogenous attributes in terms of knowledge, R & D progression, technology, infrastructure, and educational structures. This perspective is also postulated by Cheng (1984), that technological leadership is more likely to prevail in instances where the technology gap between nations is minimal.

Gerschenkron's catch-up hypothesis further evolved with the literature that introduced the notion of absorptive capacity, which accounts for the follower's ability to receive, implement and utilise new technology closely related to the rate at which the technology disparity gap is reduced (Abramovitz, 1986; Farole & Winkler, 2014; Görg & Greenaway, 2003; Phelps & Nelson, 1966).

Models of technology spillovers of FDI to domestic firms imply that the transfer of technology comes at a cost. MNCs have an opportunity to avoid information transfer to local rivals by utilising intellectual property protection and trade confidentiality and paying higher wages to skilled staff (Masiyandima, 2015). Local competitors would then be unable to access technology from the MNC subsidiary without incurring costs (Fosfuri et al., 2001). Advanced technologies which MNC bring to the host economy coerce local firms to incur costs to prevent the loss of customers. Thus, these costs are evidence of the expenses incurred by local firms because of foreign competition (Fosfuri et al., 2001).

In their study, Keller and Yeaple (2003, as cited in Crespo & Fontoura, 2007), take into account that the behaviour and scale of the spillover effects vary with the intensity of the industry's technology. Furthermore, the degree to which domestic firms can potentially gain from FDI spillovers rests with the minimum absorptive capacity of domestic firms (Crespo & Fontoura, 2007). Barrios et al. (2010), in their analysis of the impact of FDI employing panel data of Irish manufacturing firms from 1990 to 1998, corroborate with research supporting the significance of adequate absorptive capacity to yield positive spillovers. Marcin (2008) finds that magnitude of the spillover is the result of the absorptive capacity.

The argument often put forward is that the larger the technology and human capital gap between domestic firms and MNEs, the less likely domestic firms would be able to absorb the spillovers (Gorodnichenko et al., 2007). The potential for positive spillovers to be realised is enabled when firms, industries and countries are more technologically advanced (Gorodnichenko et al., 2007). Some observational research finds the spillover effects are more apparent in low-tech sectors where the technological differences between local and international companies are negligible. This is consistent with the theory of absorption capacity, which advises that the extent of the spillover depends on the technological gap between domestic and foreign firms. The wider the technological difference, the less pronounced the spillovers are (Kokko et al., 1996, as cited in Crespo & Fontoura, 2007). The intricacies of investing abroad have driven most researchers to investigate the nexus between FDI and explanatory variables (Babatunde, 2011; Belloumi, 2014; Roghieh Gholami et al., 2003; Sean Joss Gossel, 2018; J. Khadaroo & Seetanah, 2007; Ramasamy & Yeung, 2010). However, research on FDI and its effects (spillovers) also warrants further interrogation.

Diffusion channels

Over and above the host firm’s attributes (i.e., domestic firm characteristics) which determine the extent and magnitude of the spillover, the diffusion channel is an integral part of the process because this is a medium through which spillovers occur. The diffusion channels are broken down into horizontal and vertical spillovers. In addition, vertical spillovers are diffused through backward and forward linkages.

Horizontal and vertical spillovers

MNCs are an essential mechanism through which skills and technology can be transferred across countries. MNCs are usually dominant in technology-intensive industries (Baldwin et al., 1999). Technology which is a consequence of MNCs, can spill over to local firms through on the job training, labour migration or linkages with consumers and suppliers (Blomström & Sjöholm, 1998).

Horizontal spillovers (also referred to as intra-industry spillovers) take place between firms in the same industry (Marcin, 2008). Horizontal spillovers are channelled through demonstration effects, worker mobility, competition and geographical proximity (Magwiro et al., 2017).

Demonstration effects can result from emulation, inventions and reverse engineering (Magwiro et al., 2017). Emulation is defined as the replication of products or services used by MNEs to match or improve products or services. Demonstration effects may occur as a result of technology spillovers from MNEs through emulation of production techniques, new technologies and improved knowledge to enhance productivity (Blomström et al., 1998, as cited in Spencer, 2008). Imitation occurs when local firms replicate or advance the technology utilised by MNEs in executing their business activities to improve their output, e.g., through reverse engineering to unpack the technologies behind production (Magwiro et al., 2017).

The movement of workers from MNEs to local firms in the host country or infant firms can lead to spillovers that improve output through complementary workers that possess knowledge of advanced technology and management skills (Görg & Greenaway, 2003). MNEs may discourage the movement of labour to local firms by paying higher wages relative to those offered in the market (Glass & Saggi, 2002). Higher wages are likely to push the industry wage rate to increase and thus lead to diminished profits for local firms (Demena & van Bergeijk, 2019). It is rather difficult to measure this type of spillover firstly, because it is a potential spillover and not an actual spillover, and secondly, because the transfer to knowledge and skills is attached to individual workers (Demena & van Bergeijk, 2019).

Regional dynamics, geographic and spatial proximity play a role in the transmission of spillovers from MNEs to local firms. The transmission requires intensive interaction between MNEs and local firms. Thus, local firms that are geographically located close to MNCs are better positioned to benefit from technology spillovers because it is less costly to copycat technologies from MNEs, to communicate, and collaborate (Glass & Saggi, 2002). Geographic proximity provides the platform for the flow of knowledge and transfer of new technologies; and rationalises their spread across networks located within the same vicinity (Padmore & Gibson, 1998).

Competition effects are a channel for horizontal spillover transmission (Dunning & Lundan, 2008). Competition from MNEs in the domestic market can improve output because domestic firms can be stimulated to adopt new technologies or employ their existing resources and techniques more efficiently (Blomstöm & Kokko, 2001; Demena & van Bergeijk, 2019; Glass & Saggi, 2002). Competition may have adverse effects on local firms, which is coined as “market stealing” (Aitken & Harrison, 1999). The impact of increased competition on local firms can also be harmful; they can be crowded out of the market by more productive firms, and thus only the most efficient firms will remain in the market (Aitken & Harrison, 1999; Demena & van Bergeijk, 2019; Halpern & Muraközy, 2007). Furthermore, it is also possible that domestic firms will produce at their efficient level but become unable to exploit economies of scale and scope to the extent that MNEs can (Aitken & Harrison, 1999; Halpern & Muraközy, 2007).

Vertical spillovers occur through backward and forward linkages (Mühlen, 2013). Backward spillovers occur in downstream industries, and forward spillovers take place in upstream industries (Magwiro et al., 2017; Marcin, 2008; UNCTAD, 2001). Backward spillovers (upstream industries) are present when there is an interface between MNE suppliers and domestic suppliers of goods and services. Forward spillovers occur when there is an interaction between customers in upstream industries and MNE suppliers of intermediate inputs (Magwiro et al., 2017; Marcin, 2008; UNCTAD, 2001).

Backward linkage spillovers

MNEs manufacture advanced products that require sophisticated inputs, and thus, their demand will stimulate local production and create opportunities for local firms and job opportunities. MNEs may find it necessary to facilitate increases in the quality of the

intermediate inputs they buy from local suppliers. MNCs may facilitate the transfer of technology to numerous domestic suppliers and not an individual supplier because this could lead to monopoly power to optimise on the gains from increased productivity (Blalock & Gertler, 2005, as cited in Marcin, 2008). Besides, the argument put forth is that strong backward spillovers are more probable from local firms that are composed of partial ownership, i.e., when MNCs penetrate the local market through joint ventures or mergers and acquisitions (Magwiro et al., 2017).

Forward linkage spillovers

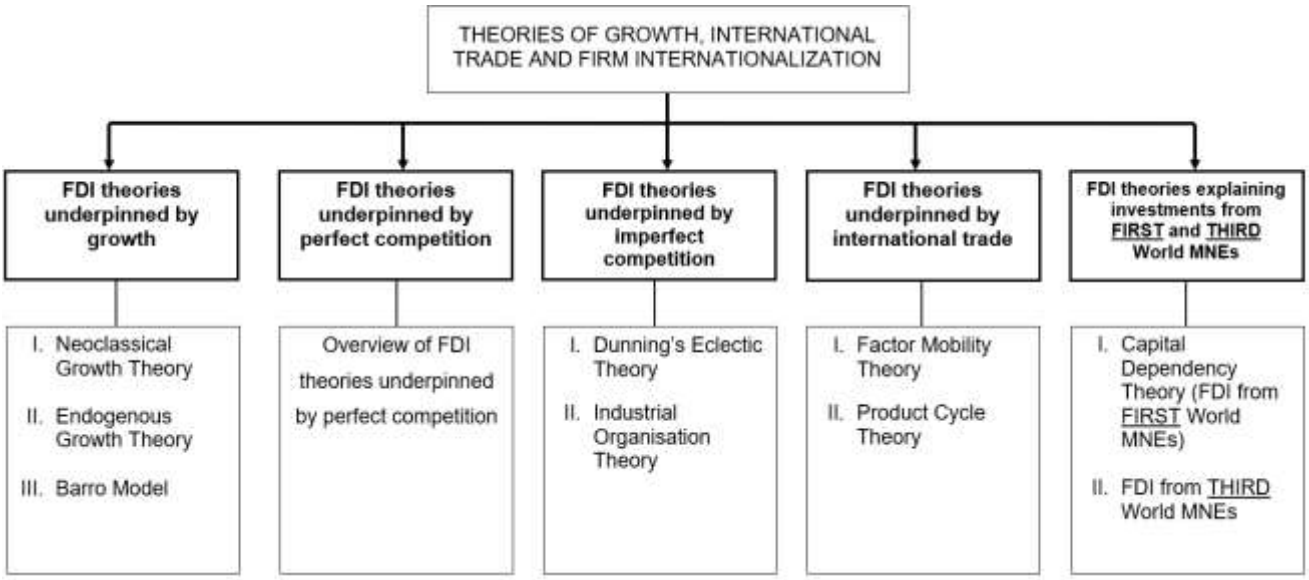
Forward linkage spillovers are from local companies purchasing intermediate goods from upstream MNEs. Provision of intermediate inputs for MNEs may contain new technologies that could potentially lead to gains from linkages. Simultaneously, local firms could gain from the spillovers if they imitate the intermediate goods from MNEs (Grossman & Helpman, 1991, as cited in Mei, 2018). Most empirical studies have been unsuccessful in finding forward linkages, but there is a wealth of evidence corroborating backward linkages (Sánchez-Martín et al., 2015).

3.2.2 Theories of growth, international trade, and firm internationalization

The perceived importance of FDI worldwide has been on the rise and cannot be overstated. As indicated throughout the document, FDI brings not only capital to the host country but also knowledge, technological know-how and management skills, amongst other capabilities. No single theory can fully explain the phenomenon of FDI. As illustrated in Figure 3-3 on page 69, the theories unpacked in this section are grouped as follows: FDI theories underpinned by growth; FDI theories based on perfect competition; FDI theories underpinned by imperfect competition; FDI theories founded on international trade; and FDI theories explaining investment from first and third world MNEs. The theoretical review starts by looking at the neoclassical and endogenous trade theories, which are underpinned by growth theory. The Barro model combines the neoclassical and endogenous growth theories to counteract drawbacks in both theories. However, the endogenous, neoclassical and Barro theories have been unable to adequately unpack the motivations behind the establishment of MNCs. Numerous paradigms have been employed to describe the motives behind the investment decision(s) by multinational enterprises, with the pioneering

framework provided by Hymer (1976). Dunning's eclectic theory and the industrial organisation theory are explained within the framework of imperfect competition. Factor mobility theory and product life cycle theory are employed to explain investments within the construct of global trade. Capital dependency theory is construed to conceptualise investments from first world MNEs. Then lastly, investments from third world MNEs are explained.

Figure 3-3: Breakdown of theories of growth, international trade and firm internationalization



Source: Author's compilation

3.2.2.1 FDI Theories Underpinned by Growth

I. Neoclassical Growth Theory

The neoclassical model of long-run economic growth by Robert Solow (1924) and Trevor Swan (1918 – 1989) in 1956, estimates the convergence of the growth rate of an economy, which is the result of population increase and technical change. The neoclassical growth theory identifies the factors required for growth to occur, namely: capital, labour and technology. In the neoclassical growth theory, technological progress and population growth are exogenous (BusinessDictionary, 2019). The notion that the development of knowledge is critical to longer-term economic growth and is the dominant argument that arises from Solow (1956) and Swan (1956) neoclassical theory (Dowrick et al., 2008).

The standard neoclassical growth model assumes that variations in per capita income between nations are attributed to differences between capital accumulation, which arise because of varying saving levels (Solow, 1956, as cited in Sabir et al., 2019). Developing nations are often plagued with low average income per person, poverty, joblessness, rapid population growth rate and low savings. Low savings and low investment rates adversely impact economic development. FDI bridges the disparities between savings and the investment level that is needed (Sabir et al., 2019).

The neoclassical growth model by Solow (1956) and Swan (1956) is denoted as follows (Dowrick et al., 2008):

$$Y = F(K, AL),$$

where, (1) K is current capital; (2) A is productivity and measures the current knowledge; (3) L is the size of the labour force; and (4) F is production technology. F has diminishing returns as capital increases (Dowrick et al., 2008).

An economy cannot develop indefinitely at an increasing rate without population growth (i.e., labour is constant) and technological development. Due to diminishing capital returns, domestic income does not expand as rapidly as capital, which means that savings cannot grow as rapidly as the pace of depreciation. Depreciation ultimately equates to savings, and the capital stops rising, and at that point, the economy stops growing. Assumptions of diminishing capital returns must be upheld for the properties of neoclassical model production function by Solow and Swan (Barro & Sala-i-Martin, 2004) to be valid. These properties are as follows:

1. Constant returns to scale: The production function has constant returns to scale.
   For all inputs of K>0 and L>0, the production function will have positive and diminishing marginal returns per unit of input. Neoclassical techniques then presume that each new unit of capital produces positive changes in output, holding levels of technology and labour constant. These additional components decline as the number of machines increases. Likewise, the same assumption holds for labour.
2. Inanda Condition: The marginal product of capital approaches infinity as capital tends towards zero. The marginal product of capital tends towards zero as capital approaches infinity. Likewise, the same applies to the marginal product of labour. Thus, when the

marginal product of labour approaches infinity when labour tends to zero and when labour approaches infinity. This last property is called the Inanda property.

3. Essentiality: Input is essential if a strictly positive amount is required to produce a positive amount of output.

The first limitation of the neoclassical growth model: When considering the relative contribution of production factors to the growth of the economy, technological progress is unexplained (Department for Business, Innovation and Skills, 2012). The other limitation of the neoclassical is that investment is treated as a purely intangible asset.

Numerous studies have attempted to mitigate the shortfalls of the exogenous treatment of technical progress, such as Kaldor's and Mirrlees's technical progress function, Arrow's, "learning by doing," where the total factor productivity (TFP) is based on accumulated past investment (Dimand, 2019; Long & Wong, 1997). Unlike the neoclassical growth theory, the endogenous model proposes that FDI can yield more benefits for domestic investment than anticipated because foreign investors bring with them new technologies to the production function of the host country (Romer, 1989).

II. Endogenous Growth Theory

Numerous studies and papers have interrogated economic growth based on the new endogenous growth model. Evidence supporting growth has been common in developing nations. Unlike the neoclassical growth theory, the endogenous model proposes that FDI can yield more benefits for domestic investment than anticipated because foreign investors bring with them new technologies to the production function of the host country (Romer, 1989). Endogenous growth models take into account that benefits from FDI are not only through capital accumulation to stimulate economic productivity and jobs in the economy but also through the attainment of intangible assets such as skills and knowledge transfer to the domestic economy (Blomstrom et al., 1992; Borensztein et al., 1998).

The endogenous growth theory presents the imperative role of FDI to economic growth and improved productivity of domestic firms through improvements in labour, training, skills, and better employment of technology and capital. This theory postulates the view that domestic firms can emulate foreign businesses to improve the management of operations (Barro, 1991; Mankiw et al., 1992; Romer, 1989). Endogenous growth theories reveal how FDI

plays an essential role in economic growth through labour training and skill acquisition and the effect on capital accrual and technology diffusion. According to endogenous growth theory, technology transfer, improvements in knowledge are channelled through training and skills of labour (Barro, 1991; Mankiw et al., 1992; Romer, 1989). FDI may result in externalities that increase productivity and output (Javorcik, 2004). Transnational corporations (TNCs) possess superior technology and management skills, some of which will be absorbed by firms in the host country. Transnational corporations have tangible and intangible assets, knowledge, superior technology, managerial competencies, capital, better marketing, and greater access to global value chains and networks (Blomström & Sjöholm, 1998; Dunning, 1993; Papaioannou, 2005). Endogenous growth models further look at factors that are conducive for FDI and growth in the host economy, such as absorptive capacity and trade policies.

Endogenous growth theory is long-run economic growth that is determined through an endogenous process that takes into account only variables that are specified within an economic model and no external contributors. In the long-run, economic growth is a function of the growth rate of total factor productivity (TFP). Neoclassical theory assumes that growth is determined exogenously, and thus that growth can be determined and influenced by variables outside of the economic model (Howitt, 2008).

The AK theory was the initial version of the endogenous theory, which did not distinguish between capital accumulation and technological progress. An earlier formulation of the AK theory was by Frankel in 1962, who asserted that the aggregate production function could have constant or increasing returns on the marginal product of capital. In the scenario that marginal productivity is constant, then aggregate output (Y) will be proportional to aggregate capital (K) (Howitt, 2008). The AK theory assumes that an economy's long-run rate of growth is a function of its savings rate. The AK theory was further modified according to advancements in endogenous growth theory and coined the "innovation-based" growth theory, which distinguishes technological progress from capital and labour. "Innovation-based" growth theory is founded on the basis that technological progress is an outcome from innovation experience and R & D undertaken to create new: products, services, processes, technologies and markets (Howitt, 2008; Ross, 2020).

The second variant of the endogenous growth theory is the Schumpeterian approach, which identifies innovation as a significant source of technological advancement. Firms, business people and researchers, in pursuit of monopoly rents, can innovate (Dowrick et al., 2008). The notion of "creative destruction" by Schumpeter infers that monopoly rents are ultimately dissolved by new processes or products, rendering previous innovations obsolete. In contrast to its predecessor theories, the AK paradigm and the Schumpeterian approach differentiate between R & D and other physical or human capital investments (Dowrick et al., 2008).

Endogenous growth theory has been contested on empirical evidence, but in defence of the theory, adherents have counter-argued that the modifications of the theory address the shortfalls raised by critics. Criticism of the endogenous theory puts forth the view that since various countries have different policies and institutions, it will result in varied long-run growth levels (Barro & Sala-i-Martin, 1992; Howitt, 2008). Barro & Sala-i-Martin (1995, 1992), argue that countries may imitate as a pose to innovate, which leads to conditional convergence within the endogenous growth model. Howitt's Schumpeterian model predicts that innovation, R & D, and technological progress can spillover into other countries. The prospects that R & D-investing countries at a positive rate, will converge into a similar long-term growth trajectories are likely (Howitt, 2008).

Gerschenkron purports that the wider the technology gap (variance in technology methods) between two countries, the greater the prospects for technology imitation (Fan, 2002; Manca, 2010; Phelps & Nelson, 1966). This is what Gerschekron explained as convergence as a result of the “advantage of backwardness”. The larger the technology gap between countries, i.e. the further a country lags behind the technology frontier, then the larger the average technological progress until such a time that the gap from the frontier reaches a steady-state (Howitt, 2008). Critics of Gerschekron contend that the wider the technology gap, the more difficult for the laggard country to catch up to the advanced. Divergence, as opposed to convergence, is induced in countries that contain heterogeneous characteristics such as policies, institutions, knowledge, technology, R & D, infrastructure and education (Barro & Sala-i-Martin, 1992; Caniëls & Verspagen, 2003; Howitt, 2008).

In 1995, Jones proposed that the endogenous growth rates are the product of growing population size, which in turn increase the workforce and increase the probability for

successful innovators, and thereby catalyse a higher pace of innovation that contributes to growth (Howitt, 2008).

Critics of the theory indicate that, however, at a period when individuals, in particular the number of workers in research and development, have risen significantly, productivity growth has remained stationary. Young (1998) unpacks the reasoning behind stationary productivity growth. Young (1998) made findings that, when there is economic growth, the mushrooming of a range of products reduces the benefits achieved by R & D investment as these are widely dispersed across markets (Howitt, 2008). When adjustments for product proliferation are factored in, the hypothesis fits with the observed coexistence of stationary growth of TFP and the growing population since the effect of product proliferation is counterbalanced in a stable state (Howitt, 2008).

Early iterations of the innovation-based theory of growth indicated that stricter competition regulations would have a negative impact and disincentivise innovation by reducing income generated by imperfectly competitive companies (Howitt, 2008). Aghion et al. (2001) indicate that increased competition is likely to cause the profits of an innovator to decline, but it is likely that non-innovators' profits will decrease further. An extension of the Schumpeterian theory states that more competition would push firms to innovate in order to gain an advantage over competitors (Howitt, 2008).

Endogenous growth theory takes into consideration the effect of intangible benefits such as knowledge, skills, R & D, innovation and experience, which leads to improved efficiency, amongst other factors, to determine total factor productivity (Blomstrom et al., 1992; Borensztein et al., 1998; Howitt, 2008; Ross, 2020). Spillovers emanate from new knowledge generated from R & D, which has led to improvements in productivity (Fan & Sun, 2017; Harris & Robinson, 2004). Spillovers are factored for in the endogenous growth theory. This study draws on the endogenous growth theory, and estimate the parameters of a Cobb-Douglas (CD) production function applying the OLS method to determine total factor productivity, and then the spillover impact is computed.

III. Barro Model

Barro & Sala-i-Martin (1995, 1992) merge the neoclassical growth theory and endogenous growth theory to combat the weaknesses of both approaches. The neoclassical growth theory anticipates the convergence of the economic growth rate as a consequence of the population increase and technical change. According to Jiang (2009), the prediction of conditional convergence is a core feature of neoclassical growth models. The theoretical framework of neoclassical models has been used in presenting several important empirical research results on growth and convergence, including those of Barro & Sala-i-Martin (1995), Mankiw et al. (1992), as well as Pesaran et al. (2001). The neoclassical models, both of which are Solow-Swan and Ramsey-Cass-Koopmans, predict conditional convergence, i.e., that each economy will converge to its stable state, and the nexus of this convergence will be inverse to distance from the steady-state. Yet the Solow-Swan model's apparent drawback is that long-term per capita development is primarily dictated by exogenous technological change (Jiang, 2009).

The endogenous growth hypothesis determines long-term growth within the paradigm of technological advancement, but does not explai50711C3cn convergence. According to Barro & Sala-i-Martin (1995, 1992), certain economies could mimic and not innovate, which facilitates conditional convergence that can be realised within the endogenous growth model.

Romer (1989) highlighted that FDI could be an essential channel for technology diffusion to host countries. The main underlying principle of the endogenous theory is that technological progress leads to spillover generation and capital accumulation. The generation of technology resulting in the accumulation of tacit and tangible knowledge underpins the Barro model. Rebelo’s model is also an extension of the Capital Accumulation (CA) model, which supports the notion that all types of capital lead to economic growth.

Sala-i-Martin (1997) motivates that developing countries would benefit from imitating technology from advanced nations because the cost of imitation is less than the cost of inventing. Grossman and Helpman (1991) note that over and above imitation, technology transfer has a significant impact on R & D and innovation, allowing for improved productivity and growth (Sur & Nandy, 2018).

Literature on neoclassical growth theory distinguishes between absolute/unconditional convergence and conditional convergence. Absolute or unconditional convergence of growth forecasts that developing economies expand more rapidly than wealthier economies because they are both in the same stable state (Magrini, 2004). However, the more practical assumption is conditional convergence, where there are disparities in technological and behavioural parameters such as saving patterns across economies. The following attributes distinguish these economies: steady states, the negative association between the per capita growth rate of GDP, and its initial point does not hold in a cross-sectional sample (Magrini, 2004). Thus, developing economies will grow faster if disparities in parameters are managed (Sala-i-Martin, 1996, as cited in Cole & Neumayer, 2003).

According to Barro and Sala-i-Martin, the log-linearisation representing the econometric relationship of the traditional neoclassical model that depicts an economic system and its steady-state predicting conditional as a pose to absolute convergence, is as follows (Magrini, 2004):

$$(1/T)\ln[y(T)/y(0)] = g + [(1 - e^{-\beta T})/T]\ln[\hat{y}^*/\hat{y}(0)]$$

Where: (1) average growth rate per capita output is y; (2) T is duration of time from commencement of zero (0) to any future time, T ≥ 0; (3) g is steady-state growth rate; (4) β is the rate of convergence; (5) $\hat{y}(0)$ is initial output per unit of labour; (6) $\hat{y}^*$ is steady-state output per labour unit. Ceteris paribus (holding constant g, β and T), on average, the growth rate of per capita income is contingent on the negative ratio $\hat{y}(0)$ is to $\hat{y}^*$, conditioned on the steady-state output level per effective worker, also taking into account the technology growth rate determined exogenously and on the initial value of technology.

3.2.2.2 FDI Theories Underpinned by Perfect Competition

MacDougall (1958) and Kemp (1964) conceptualised the initial FDI theories based on the premise of perfect competition. These theories indicated that in a dual-country model, assuming that capital is equivalent to marginal productivity and that the movement of capital is unfettered, then the marginal productivity of capital is prone to equalise from the home country to the recipient country (Nayak & Choudhury, 2014). Ultimately, the MNE's home nation reaps more significant benefits from its foreign investments. Ironically, perfect

competition would nullify FDI (Kindleberger, 1969; Nayak & Choudhury, 2014). Consequently, imperfect market conditions are necessary for FDI to arise (Hymer, 1976; Nayak & Choudhury, 2014). The section below unpacks FDI theories which are founded on the premise of imperfect markets.

3.2.2.3 FDI Theories Underpinned by Imperfect Market Conditions

I. Industrial Organisation Theories

Hymer (1976), in his exploration into MNCs, looked at the role of these institutions as international industrial organisations. Hymer's works comprised the initial conceptualisation for explaining international trade within imperfect markets. Hymer's input was different from that of neoclassical financial theory (Nayak & Choudhury, 2014). Neoclassical financial theory of portfolio flows advises that MNCs arbitrage capital as a buffer against interest rate differentials. Capital tended to flow where it would gain the highest return on investment (Nayak & Choudhury, 2014). Hymer considered FDI to encompass international trading in assets and global production (Caves, 1971). Hymer (1976) and de Mello Jr (1997) describe FDI as a "package or bundle" of capital, management and technological know-how. The extent of the FDI spillover productivity in the domestic economy is a function of competence, creating capabilities of local firms (de Mello Jr, 1997).

The industrial organisation theory and its application to FDI are further elaborated on by Caves (1971, 1974) and Buckley and Casson (1998). They postulate the view that MNCs are subjected to unfavourable conditions due to the cultural and geographic differences between various nations compared to domestic firms. Multinational firms, therefore, have to consider the differences between nations when conceptualising and establishing their international strategies in foreign countries. Thus, the CAGE framework is relevant for MNCs to consider when operating in foreign nations.

The CAGE Difference Framework is a country-level analysis that is employed to analyse the cultural, administrative, geographic and economic factors juxtaposed to other countries. International trade literature uses the framework to contrast differences across countries utilising the four dimensions. It is an imperfect approximation and proxy for the dynamics constituted in international trade (Campbell et al., 2012). Notwithstanding the inherent limitations, the **CAGE** framework is widely employed by multinationals to gain better

knowledge and understanding of the dynamics, opportunities and threats in the host country juxtaposed to its own country. The table below elaborates on the factors attributing to the CAGE differences and weighs in on the characteristics of the industries impacted by the differences.

Table 3.3: CAGE difference framework

	CULTURAL DISTANCE	ADMINISTRATIVE DISTANCE	GEOGRAPHIC DISTANCE	ECONOMIC DISTANCE
FACTORS CREATING DISTANCE	• Language • Ethnicity • Religion • Social norms • National work systems • Values, norms and dispositions	• Lack of colonial ties • Absence of shared values in monetary and political association • Government policy • Weak institutions • Political hostility	• Physical remoteness • Absence of a common border • Size of a country • Inefficient transportation or communication networks • Variations in climate • Absence of river or sea (landlocked)	• Differences in costs and quality of natural resources, human resources, infrastructure and information • Disparities in per capita income • Size of the economy
CHARACTERISTICS OF INDUSTRIES AFFECTED BY DISTANCE	• Substantial linguistic content (TV, radio, broadcasting) • Local traditional/ identity (food) • Considerable preference difference • Entrenched tastes • Home bias (local preference) • Strong country of origin effects • Products have country-specific quality associations (wines)	Substantial government participation in procurement/ funding: • National security interests (telecommunications) • Exploiters of natural resources • Staple products (food, fuel, energy) • Profit cap for foreign competitors • Likely to incur substantial sunk costs (infrastructure)	• Low value to weight/ bulk (cement) • Hazards/ differences in transport • Products are fragile/ perishable (glass, fruits) • Importance of connectivity (financial inclusion) • Stringent local supervision requirements (restaurants) • Strict local operational requirements	• Demand is correlated with income (cars) • Economies of scale are essential (mobile phones) • Labour and other factor cost differences are salient (garments) • Distribution channels or business systems are different (insurance) • Necessity for variety/ agility/ responsiveness (home appliances)

Source: Ghemawat (2001)

Each dimension on the **CAGE** distance framework is elaborated on below:

Cultural Distances

Culture has a subliminal and deep-rooted influence on an individual's social norms, values, disposition and behaviour. Therefore culture is a notable influence on the products and services that consumers from different countries purchase (Kapil, 2018).
As illustrated in the section on the CAGE Distance Framework, cultural nuances are critical to achieving a deeper understanding of foreign markets. Numerous papers have been written, looking at the nexus between FDI and cultural distance (e.g. Bergendahl, 2015; Hofstede, 2001; Kirkman et al., 2006). Bergendahl (2015) assessed the correlation between Swedish outward FDI and cultural factors for a sample of 75 countries, from 1998 to 2012. The results are such that the wider the cultural differences, the less likely Swedish companies will invest in the international market. Iraq's Kurdistan region is more politically stable and has drawn most foreign investors from Iraq's surrounding countries and Arab nations with the same language and culture. Cultural variables must be taken into cognisance alongside other FDI determinants, including economic factors, to explain FDI (Hofstede, 2001; Kirkman et al., 2006).

Administrative Distances

Administrative distances result from historical, current political and legal associations between countries and trading partners, including colonial ties between trading countries and participation in common trade agreements. Laws and regulations enacted nationally or globally can stimulate or impede trading operations (Kapil, 2018).

Geographic Distance

Geographic distance is the physical distance between trading partners. This also refers to the remoteness of a country, the presence of a river or sea (landlock status), the size and efficiency of the transport and communication networks. The advancements in transportation, information systems and technology have shrunk the distance between countries. Efficient transportation networks and ICT have reduced the geographic distance as a constraint of doing business across countries.

Economic Distance

Economic distance constitutes fundamental differences, namely, the income generated by individuals which determines the relative purchasing power in the geographic region. MNCs selling products and services in emerging markets are tasked with adapting the products are services to accommodate the consumers, e.g. a product designed to satisfy the needs of the very impoverished is a shampoo that works best with cold water (Kapil, 2018).

II. Dunning's Eclectic Theory

The Eclectic theory of FDI by John Dunning in 1977, also known as the **OLI** paradigm, comprises the following advantages: **O**wnership, **L**ocation and **I**nternalisation. Dunning stated that location advantages are a combination of country location of assets, resources, minerals, labour, technology, technical knowledge and marketing capacity (Dunning, 2000; Dunning & Buckley, 1977; Dunning & McQueen, 1981; Dunning, 1998). According to Dunning, MNEs capitalise on their competitive advantage through the employment of resource endowments of the host country and their firm-specific strengths. For example, Apple established its plant in China to exploit low-cost labour.

Therefore, according to Dunning (1977), MNEs will invest in foreign markets when three advantages are present: **O**wnership, **L**ocation and **I**nternalisation (Dunning, 2000; Dunning & Buckley, 1977; Dunning & McQueen, 1981; Dunning, 1998).

The ownership theory stipulates that companies with a competitive advantage from domestically obtained assets, such as brands and economies of scale, expand to markets abroad through FDI. According to the ownership theory, multi-national corporations have a competitive advantage in their countries of origin in technology and brand names. They then establish subsidiaries in foreign countries to exploit their competitive advantage. For example, Samsung electronics originates from South Korea and is the world's leader in information technology, consumer electronics and chip-making, as indicated by its 2017 financial statements (Russell, 2018). Samsung Electronics has expanded its operations to South Africa, Vietnam, China, India, Brazil, Indonesia and Korea (Eun-jin, 2018; Vermeulen, 2018).

The ownership advantage theory puts forward the argument that companies with a domestic competitive advantage penetrate markets abroad (locate abroad) to capitalise on their assets. The ownership theory fails to explain the motivation behind MNEs entering to capitalise on ownership advantages. A firm requires some extent of a competitive advantage (knowledge asset) to invest abroad (locate abroad) and operate as an MNC. To exploit its completive advantage abroad, the firm transfers some knowledge to its foreign subsidiary (Smeets & de Vaal, 2006). Factors that influence the location decisions of an MNE are those that the foreign investor considers as a profit maximiser (Liu, 2009). Dunning listed the following location-specific factors that influence the geographic positioning of an MNE (Dunning, 1993, as cited in Liu, 2009): (i) spatial distribution of factor endowments; (ii) raw material prices, intermediary products, labour and productivity; (iii) transport and communication costs; (iv) investment incentives and disincentives; (v) host country infrastructure; (vi) host country institutions and administrative differences; (vii) firm-specific competencies such as R & D, manufacturing, branding and marketing; (viii) cultural differences; and (ix) the political economy.

Internalisation theory explains the motivations of companies investing in foreign markets. Companies penetrate markets abroad through contracts and instruments such as buying a company, licensing, franchising, exports, joint ventures, partnering, and greenfield and brownfield investments (Tradestart.ca, 2019). The contracts contain transaction costs. Internalisation theory was initially developed by Coase (1937), taking into consideration a national framework. Hymer (1976) expanded on the theory and established that the two predominant determinants of FDI are: the elimination of competition[5] and a comparative advantage. Buckley & Casson (1998) put forward the notion that MNCs organise business operations to gain a comparative advantage[6] that can be exploited.

In summary, the ownership advantage posits that companies with a domestic competitive advantage locate abroad to capitalise on their knowledge assets. Internalisation reduces the *ex-ante* threat of spillover potential to local firms, but ironically, as the firm operates abroad

[5] In this context the elimination of competition refers to increases in market share in the provision of services or goods sold (Economics Online, 2019)).

[6] A comparative advantage refers to the productivity or cost efficiency of one nation in comparison to another in the production of goods and services provided (Economics Online, 2019)).

and transfers knowledge, technological know-how, and managerial competencies amongst other advantages to its affiliate, the imminent threat of the knowledge appropriation to competitors and domestic firms is inevitable (Smeets & de Vaal, 2006).

3.2.2.4 FDI Theories underpinned by International Trade

I. Factor Mobility Theory

Factor mobility refers to the movement of labour, capital and other assets intra-industry or inter-industry, within a county and across countries. The general assumption is that factors are freely movable without hindrance and are freely moveable within a country but immobile between nations (Suranovic, 1999). The reasoning behind the assumption is that factors are freely mobile within an industry, which comes about because the skills attained by workers and capital productivity will probably be harmonious across firms manufacturing identical products or substitutes. Even though transition costs will be incurred, for example, transport and transacting costs, it is appropriate to make the assumption for simplicity that transfer is costless (Suranovic, 1999). The assumption that factors are seamlessly moveable inter-industry in a country is unlikely. This assumption has received much criticism (Suranovic, 1999). The Ricardian and Heckscher-Ohlin models assume that factors are freely and moveable without cost across industries. This assumption is flawed and implies that there are no search, transport or transaction costs inter-industry. It further assumes that resources are employed to capacity. It assumes that factors are homogenous and that when transferred to another industry, they are immediately used as if these are of the same industry (Suranovic, 1999). International trade theories have embarked on unpacking factor mobility between countries. In most international trade theories, the assumption is that factors are immobile between nations (Suranovic, 1999).

Mobility theory assumes that factors of production can shift due to income differentials from one country to another; each factor is thus more likely to be shifted to the country with the most return. Moreover, the theory assumes full employment, and therefore motivations that may apply differently are disregarded. They indicate that factors of production may shift and include: unemployment in the home country; political, economic and social situation in the home country; better opportunities; and the brain drain (Gandolfo, 2014).

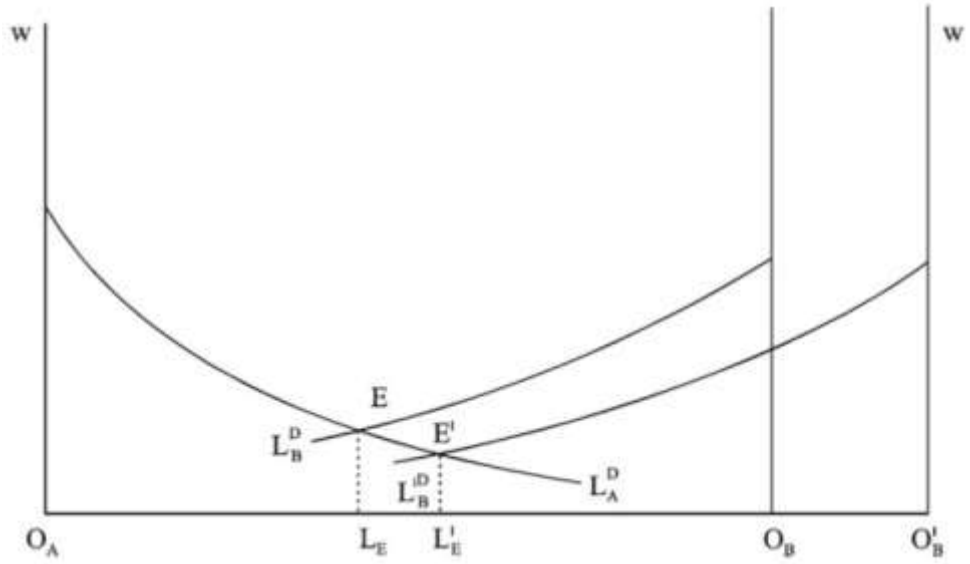
As previously indicated, factor mobility refers to the movement of labour, capital and other assets. In the context of FDI, capital mobility across nations is an easy and seamless process where money can be moved. Capital mobility encourages FDI inflows (Suranovic, 1999). Capital mobility occurs partly because factor endowments are different across countries. Countries have varying levels of endowments, with some countries lacking and others with abundant capital. The flow of capital would be from those countries abundant to other countries. Capital circulates from countries with low returns to those that MNCs can earn higher returns (Dunning & Rugman, 1985). Capital mobility as a result of FDI often fuels trade because of factors such as inputs, complementary products, joint ventures, partnerships and subsidiaries. Capital mobility and the probability of generating economic development occurs through three networks, namely, trade, FDI, and worker mobility (Ansah, 2019). Literature indicates that capital mobility facilitates FDI, thereby playing a part in the investment decision to move abroad. Capital mobility through trade, FDI and staff turnover unleashes spillover potential, which is realised through knowledge diffusion (Ansah, 2019). Moreover, FDI theory acknowledges that labour mobility is a channel for spillover transmission. Thus, in line with the theory, which states that training and experience acquired from foreign firms, intra and inter-industry from MNEs improve worker productivity which spills over into the domestic economy through labour mobility (Willem te Velde, 2019)**.**

As depicted in Figure 3-4, an increase in labour triggers the ripple effects, which are as follows: the omnipresent element pushes O_B to O'_B. The demand for labour (denoted $L\frac{D}{B}$) in Sector B shifts to $L\frac{D}{B'}$. The equilibrium shifts from E to E_0. The new equilibrium E' has a lower wage. The labour in both sectors A and B, depicted as O_A L_E and O_B L_E in the diagram, shifts to O_A L'_E and O'_B L'_E, respectively, indicating more work done. There are more workers in both sectors, but the factor levels have remained constant, and wages have declined due to diminishing marginal productivity of labour. The shift due to the migration of labour from the home country to abroad is captured in the diagram below, depicted as the shift from L_E to L'_E. The decrease in the wage rate is displayed on the y-axis. The shift leads to an equilibrium further down on the y-axis. The implications of the model are such that the country where the workers migrate will experience reduced wages, and output will increase

in both sectors (Gandolfo, 2014). Profits will increase as a consequence of labour mobility, and a reduction in the wage rate will occur.

The presumption is made that the factors of production will move through income differentials between nations; each factor is likely to shift to the nation with the highest return.

Figure 3-4: The specific factors model and Rybczynski's theorem



Source: Gandolfo (2014)

II. Product Cycle Theory

Vernon (1979) sought to explain international trade and direct investment of firms within the framework of the product cycle. The framework expanded because many firms that are innovators of new products established operations abroad. Also, the domestic markets of advanced industrialised countries mitigated the differences that existed within the market. The constant development of new products, then maturity and ultimately extinction, has always been encapsulated into international trade and international investment theories. Over the past century, researchers have looked at unpacking the product cycle beyond the framework of trade, and included innovation and FDI (Vernon, 1979). According to Vernon, the product cycle theory states that firms establish foreign subsidiaries because they have a perceived or actual monopolistic advantage. In the absence of such an advantage, enterprises are not keen to take on the risk of investing in a subsidiary abroad. Innovation also renders a competitive advantage to firms.

The long-term trend of FDI is explained through the product life cycle theory by Vernon. Vernon's theory states that companies create products with the view to extend manufacturing operations in markets abroad. Moreover, his theory states that when the product has reached maturity in the home country, companies create manufacturing operations. When the costs are a competitive advantage, the firms will invest in countries with low manufacturing costs. The product cycle theory has three stages: introduction (innovation), maturity, and standardisation.

Stage One of the Product Cycle Theory: Introduction

The first phase of the product life cycle is the introduction phase, which entails the location of new products. The assumption of the product cycle and specifically relevant to this phase is that first-world MNEs do not differ markedly in their access and ability to understand scientific concepts (Vernon, 1966). But it is a fallacy to conclude that equivalent access, and comprehension of scientific knowledge is proportional to the likelihood of the implementation of such values in the production of innovative technologies in all developed countries (Vernon, 1966).

This phase begins with a developed country firm exploiting innovation in its domestic market. The production of the invention starts in the developed nation because there is higher purchasing power parity and low price elasticity of demand (customers are willing to test new products) (Proven Models, 2020; Vernon, 1966). There is more access to funding for new product development. To minimise risk and uncertainty, the production is initially only local. The location enables fast and easy direct communication on the new product between the market and executives (Proven Models, 2020; Vernon, 1966).

Stage Two of the Product Cycle Theory: Maturity

As the demand for a product grows, there is usually some standardisation. This does not necessarily cease efforts to differentiate products. Product differentiation may intensify to counter price rivalry and therefore "avoid the full brunt of price competition" (Vernon, 1966).

The first world firm gradually increases exports and allows local production in advanced markets. Production stabilises. Production abroad serves domestic clientele and replaces

exports. Competition from local firms is rife in the advanced markets. Exports to developing countries begin.

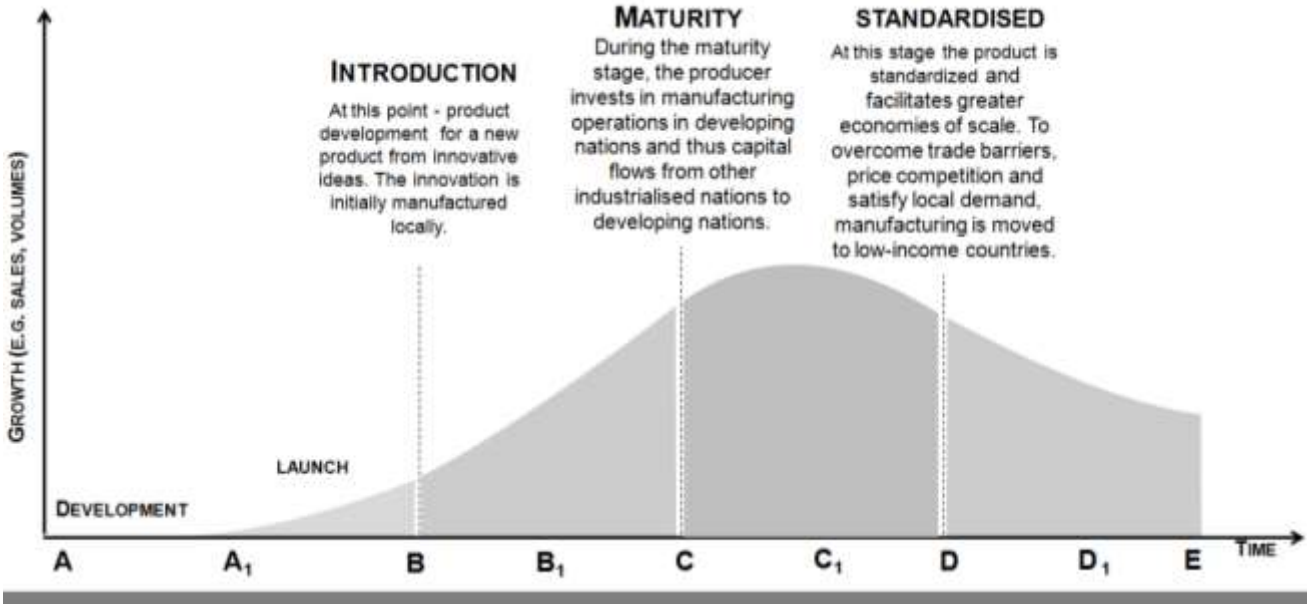
The standardisation of the production process at this point has not occurred. It will happen when production output warrants investment in fixed assets and the degree of uncertainty is low enough to rationalise the investment (Vernon, 1966).

Stage Three of the Product Cycle Theory: Standardisation

Standardisation occurs as markets become saturated and the competitive advantage of the innovator has diminished. The business concentrates on decreasing production costs rather than introducing innovative product functionality (Proven Models, 2020). Thus, the product is now standardised and facilitates more significant economies of scale. The main difference between any two locations will likely be the cost of labour when economies of scale are fully exploited (Vernon, 1966). To overcome trade barriers, price competition and to satisfy local demand, manufacturing is moved to low-income countries. As with the case of developed nations, local rivals will have access to first-hand information and may imitate and sell the product (Proven Models, 2020; Vernon, 1966). As innovations penetrate the market, the demand for the original product in the domestic country will decrease. The MNE will exploit the opportunity to locate manufacturing facilities in low-wage countries (Proven Models, 2020).

In the diagram below, the curve segment from a to c shows the market response of innovators and consumers to gradual improvements and amendments to products. The segments A_1 – B, B_1 – C, C_1 – D, and D_1 – E, represent significant market increases created by product ameliorations and fine-tuning. The segments A – A_1, B- B_1, C – C_1, and D – D_1, reflect the decline in the growth of demand for a specific product variant. Points B, C, and D represent the introduction, maturity and standardised phases of the product cycle model, respectively (M. Taylor, 1986).

Figure 3-5: Product cycle model



Source of content: Author'scompilation from Taylor (1986) and Vernon (1966).

Diagram layout from Showeet – Creative and Free PowerPoint Templates (2020)

The theory explains that production occurs in industrialised nations during the introduction phase. Then production moves to other industrial nations during the growth stage. During the maturity stage, the producer moves to developing nations as a result of accumulated technological advantage and a competitive edge. The producer then invests in manufacturing operations in developing nations, and thus capital flows from industrialised nations to developing nations. Vernon's product life-cycle theory assumes that FDI spillover potential is centred on an accumulated technological advantage or a competitive advantage that the innovating firm exploits from markets abroad. Studies on technological accumulation posit that the prospect of local firms to generate spillover effects from MNEs depends on local competencies to improve efficiency (Jindra, 2011).

Critics of the product cycle model indicate that the way invention and innovation processes are dealt with is a fundamental weakness. The model suggests that innovations are brought to the market as finished goods and that production is constrained only by market information. This dispute is almost entirely contrary to the broad range of research suggesting that the invention is gradual and that products are gradually changed and improved once they have been made (M. Taylor, 1986).

3.2.2.5 FDI Theories Explaining Investments from First World Countries

I. Capital Dependency Theory

Expanding on international theory, the motivations of MNEs are further entrenched in Neo-Marxism and dependency theory, which advances the narrative that developed nations become prominent at the expense of poorer countries and exploit resources and labour in those countries (Dos Santos, 1970; Kuhnen, 2010).

Karl Marx and Andre Gunder Frank give insight on the effect of FDI on development and underdevelopment (Fan, 2002; Ghosh, 2001; Kuhnen, 2010). Neo-Marxism purports that inward FDI benefits foreign countries to the detriment of local economies. Dependency theories do not advocate for FDI. These theories argue that FDI from developed countries into developing countries has adverse long-run effects (Javaid, 2016; Kentor, 1998). Kuhnen posits that external dependencies result in internal structural malfunctions, which exacerbate the external dependency. Dependency has its roots in political and military dependency of colonies that have been exploited through the dismantling of native culture and religion, mineral extractions and coerced integration into the international labour markets underpinned by capitalism (Findlay, 1978; Kuhnen, 2010). This has led to economic structures of developing countries exporting raw materials and importing finished goods from developed countries. The ripple effects of dependency have further led to large income disparities and the creation of an elite and bourgeoisie, which has accepted the values and principles of capitalism and maintained the status quo (Bornschier & Chase-Dunn, 1985; Kuhnen, 2010).

The current South–to–South international relations have raised concern globally, with many development economists expressing the opinion that Chinese investment in Africa will have dire consequences in the long run; and that it presents new dimensions of imperialism in a new world order. China is seen as a hegemonic centre in the world because it is the second-largest economy, and its investment in Africa is a form of colonialism and a new manifestation of imperialism (Amadi, 2012). Theories of development and underdevelopment are adamant that capitalism does not foster growth and development for third-world countries.

Numerous studies postulate that in the long run, FDI negatively affects the host country and that countries with high amounts of inward FDI present slower economic growth than those with lower levels of FDI (Javaid, 2016; Kentor, 1998). In their analysis, Dixon & Boswell (1996) and Firebaugh (1992) concluded that developing countries with significant inward FDI had faster rates of economic growth.

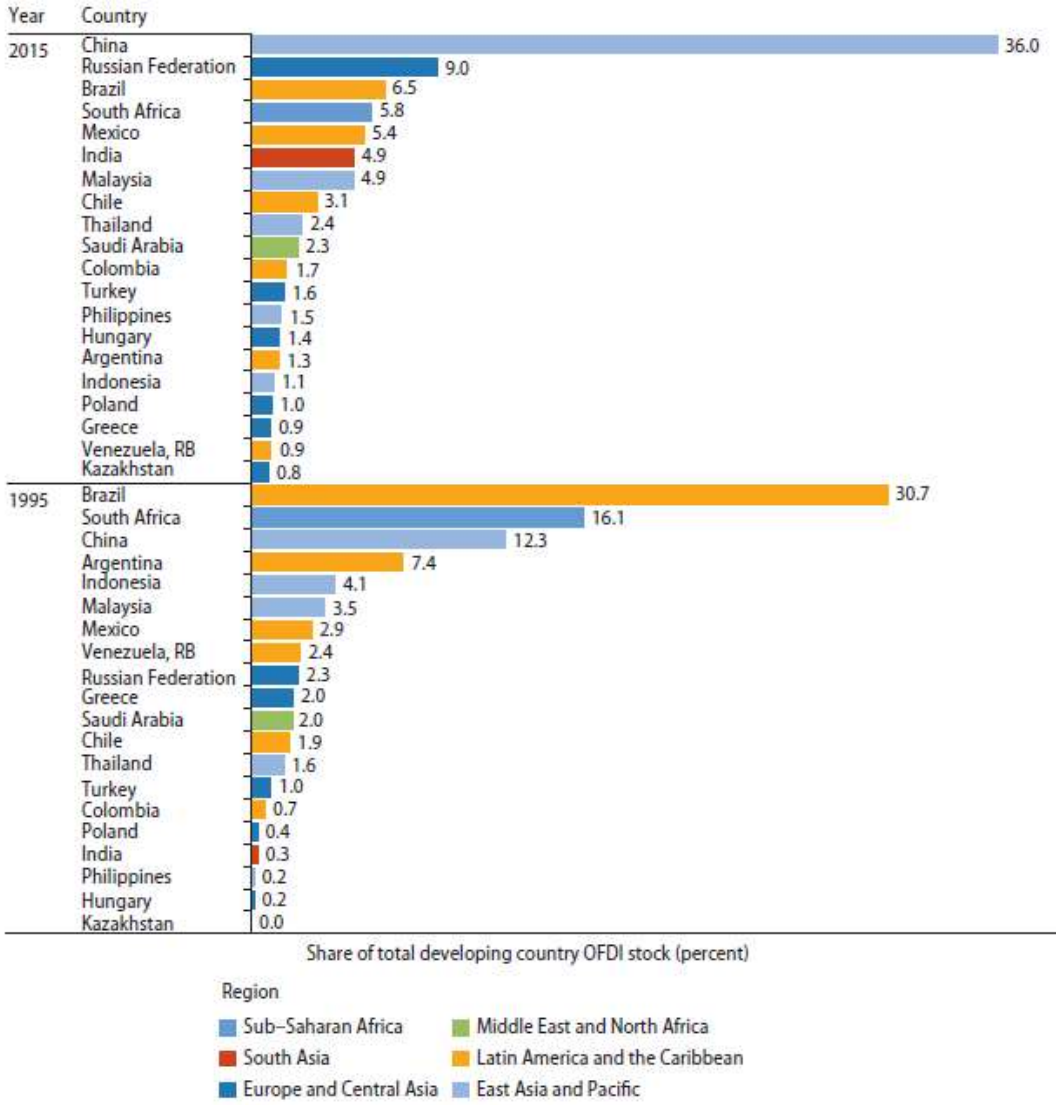
Numerous countries adopted the dependency theory in the 1970s, and a bulk of those were in Latin America. Multiple countries in Latin America implemented an import substitution strategy and were not keen on FDI. This approach was to the detriment of their economies (Hein, 1992). Their approach was different to that of Asian countries because these countries were open and encouraged FDI participation. The FDI participation resulted in rapid economic growth in East Asia during the 1970s and 1980s (Hein, 1992). This deflated the support for the dependency theory and led to increased interest to study the impact of FDI's contribution on an economy.

II. FDI Theories Explaining Investment from Developing Countries

Most of the FDI literature on spillovers focuses on North-to-North, or North-to-South investment flows (World Bank, 2017), and thus neglects to concentrate on South-to-South FDI flows, which are predominantly those from Third World Multi-National Enterprises (TWMNEs) to other developing countries. TWMNEs can be found in countries such as Brazil, Russia, India, China, South Africa, Mexico and the Philippines, to name but a few (Kumar & McLeod, 1981, as cited in Bruhn & Calegario, 2018; World Bank, 2018). TWMNEs have established themselves in all sectors of business internationally (Bruhn & Calegario, 2014). As identified by the World Bank in its Global Investment Competitiveness (GIC) report focusing on foreign investor perspectives and policy implications, outward FDI (OFDI) from developing countries to other developing countries has gained considerable momentum over the last two decades and by 2015 accounted for one-fifth of total global outward FDI. Most of the investment from TWMNEs is from BRICS (Brazil, Russia, India, China and South Africa) countries. BRICS countries account for 62% of total OFDI from developing countries, with China accounting for 36% (World Bank, 2018).

The graph below illustrates FDI from TWMNEs to developing countries. As can be seen in 1995, the top five countries in terms of percentage of total direct investment to developing countries were Brazil, South Africa, China, Argentina and Indonesia, each accounting for 30.7%, 16.1%, 12.3%, 7.4% and 4.1%, respectively of the total. In 2015 the top five countries in terms of total OFDI to developing countries were China, Russia, Brazil, South Africa and Mexico, accounting for 36%, 9%, 6.5%, 5.8% and 5.4%, respectively.

Figure 3-6: Third world multi-national corporations outward FDI to developing countries



Source: The World Bank, 2018. Compiled from UNCTAD data

The theories on the product life cycle, industrial organisation, ownership and location; constitute some motivations for investments abroad by TWMNEs and (Developed Country Multi-National Enterprise) DCMNEs. The product life-cycle, industrial organisation,

ownership and location theories are underpinned by the accumulation of technology and the nature of FDI, which is bundled by capital stock and technological know-how, to unpack the motivation of MNEs from both developing and developed countries to expand operations abroad.

DCMNEs and TWMNEs as a spillover channel for local firms

MNCs have not only emerged from first world countries, but also from developing countries. FDI trade theories thus far have been predisposed to analyse flows of investment from developed economies to other economic regions. TWMNEs are seen to be optimising on investment abroad in innovation-intensive economies to improve R & D at home (World Bank, 2017). The host country's R & D capacity is a consideration for TWMNE to locate in a particular country abroad. Findings also support that outward FDI is more probable in knowledge-driven industries (World Bank, 2017). Studies looking at TWMNEs postulate that third world countries may offer greater spillover prospects than DCMNEs to developing countries. This is partly because knowledge generation and its application from developing countries may be better suited, integrated and adapted to the conditions of other developing countries (World Bank, 2017). The latter is consistent with FDI paradigms explaining the technology gap between nations containing homogenous attributes in knowledge, technology, R & D intensity, infrastructure and education; leads to better prospects for technology imitation (Caniëls & Verspagen, 2003). However, the literature also acknowledges that the wider the knowledge gap between firms, the greater the opportunities for technological imitation; and the developing countries may be able to leapfrog and gain from the advantage of "backwardness" (Fan, 2002; Manca, 2010; Phelps & Nelson, 1966). International trade theory indicates that irrespective of whether the MNE is from a first or third world country; the spillover potential is dependent on the technology gap (Caniëls & Verspagen, 2003; Fan, 2002; Manca, 2010; Phelps & Nelson, 1966), and the absorptive capacity at national and firm-level of the local economy (Chitambara & Malikane, 2017).

3.2.2.6 Conclusion on Theories

The study's main objective is to examine the spillover effects and impact of FDI in the TSC sector in ZA. The growth theories are best positioned to achieve the objectives of the study. The endogenous growth theory is the most appropriate for this study because it considers that FDI benefits are not only through capital accumulation to stimulate economic productivity and create jobs, but through the attainment of intangible assets, such as skills and knowledge transfer to the local economy (Borensztein et al., 1998). This theory postulates the view that domestic firms can emulate foreign businesses to improve the management of operations. Endogenous growth theories reveal that FDI plays an essential role in economic growth through labour mobility, training, and skills acquisition. According to endogenous growth theory, FDI may result in externalities that increase productivity and output. Multinational corporations (MNCs) possess superior technology and management skills, some of which can be absorbed by firms in the host country. MNCs have tangible and intangible assets; knowledge; superior technology; managerial competencies; capital; and better networks, marketing and global value chains (Blomström & Sjöholm, 1998; Dunning, 1993; Papaioannou, 2005). The nature of this research necessitates the application of quantitative-based analysis, over and above the qualitative constructs, which give context to the empirical findings. These qualitative constructs are summarised in Table 3.4 on the next page. Thereafter, the empirical literature review follows.

3.2.3 Summary of theoretical literature review

Table 3.4: Summary of theoretical literature review

TRADE THEORY SCHOOL OF THOUGHT	TRADE THEORY	CONTRIBUTION TO SPILLOVER KNOWLEDGE REPOSITORY	RELEVANCE TO THE STUDY
FDI theories underpinned by growth	1. Neoclassical Growth Theory	Neoclassical growth theory describes the prerequisites for growth as follows: capital, labour and technological progress (BusinessDictionary, 2019). The Solow (1956) and Swan (1956) neoclassical theory stresses the importance of knowledge generation to long-term economic development. Technological progress and population growth are exogenous in the neoclassical growth theory (BusinessDictionary, 2019).	Technological progress is part and parcel of the econometric study on spillovers.
	2. Endogenous Growth Theory	Endogenous growth theory takes into account that benefits from FDI are not only through capital accumulation to stimulate economic productivity and jobs in the economy but also through the attainment of intangible assets such as skills and knowledge transfer to the domestic economy (Blomstrom et al., 1992; Borensztein et al., 1998).	Technological progress through intangible skills such as knowledge transfer indicates the presence of spillovers. As elaborated in the methodology section, the study is underpinned by the endogenous growth theory.
	3. Barro Model Theory	Barro & Sala-i-Martin (1995, 1992) combine the neoclassical and endogenous theories of growth to counter shortcomings in both approaches. Sala-I. Martin (1997) puts	The endogenous growth model explains long-term growth within the paradigm for technological amelioration but is not adequately clear for convergence. Barro & Sala-i-Martin

TRADE THEORY SCHOOL OF THOUGHT	TRADE THEORY	CONTRIBUTION TO SPILLOVER KNOWLEDGE REPOSITORY	RELEVANCE TO THE STUDY
		forth that developed countries benefit from imitating industrialised nations' technologies because copying costs are smaller than the expense of inventing. Grossman and Helpman (1991) note that technology transfer often has a considerable effect on R & D and innovation and contributes to enhanced productivity (Sur & Nandy, 2018).	(1995, 1992) point out that several economies may imitate and not innovate, thus allowing for conditional convergence.
FDI theories underpinned by perfect competition	4. Perfect Competition Theories	The reality is that FDI would have no place to exist in a world of perfect competition (Kindleberger, 1969). Imperfect market conditions are required for capital mobility across nations and thus for FDI to exist (Hymer, 1976).	Citing perfect competition in the study is intended to accentuate the reality that FDI cannot exist under such an economic regime. Imperfect competition gives rise to capital and labour mobility and thus foreign investment (Hymer, 1976). Theories underpinned by imperfect competition explored in this research are: Dunning's eclectic theory, industrial organisation theory, factor mobility theory, and product cycle theory.
FDI theories underpinned by imperfect competition	5. Dunning's Eclectic Theory	OLI is an acronym for **O**wnership, **L**ocation and **I**nternalisation. The OLI paradigm is an approach that conceptualises the three plausible advantages that may influence a firm's decision to invest abroad.	In itself, the OLI paradigm does not represent a systematic hypothesis that can be tested with evidence quantitatively but offers grounds for qualitative conceptualisation. The application of the OLI paradigm provides a framework within which to

TRADE THEORY SCHOOL OF THOUGHT	TRADE THEORY	CONTRIBUTION TO SPILLOVER KNOWLEDGE REPOSITORY	RELEVANCE TO THE STUDY
		The application of the OLI paradigm in the context of spillovers is as follows: The ownership advantage theory puts forth the argument that MNEs with a domestic competitive advantage penetrate markets abroad (locate abroad) to exploit their advantage. According to the OLI paradigm, internalisation decreases the potential imminent threat of spillover transfer to local firms. But the firm is then presented with a paradox, that as operations abroad expand, the transfer of its knowledge asset to its affiliate abroad and the threat of spillovers to competitors and local firms is inevitable (Smeets & de Vaal, 2006).	analyse the empirical evidence.
	6. Industrial Organisation Theory	Hymer (1976), in his exploration into MNCs, looked at the role of these institutions as international industrial organisations. MNCs apply the CAGE (**C**ultural, **A**dministrative, **G**eographic and **E**conomic) distance framework to understand better the disparities between different nations relative to domestic businesses (Buckley & Casson, 1998; Caves, 1971, 1974).	This framework offers a hypothesis to interrogate intangible benefits from FDI. Spillovers are intangible and lie within the bounds of this theory. But a glaring weakness, as mentioned before, is that qualitative approaches cannot substantiate the research empirically.
FDI theories underpinned by international trade	7. Factor Mobility Theory	As previously indicated, factor mobility refers to the movement of labour, capital and other assets. In the context of FDI,	This theory offers a hypothesis to explain the spillover potential in the context of knowledge diffusion via

TRADE THEORY SCHOOL OF THOUGHT	TRADE THEORY	CONTRIBUTION TO SPILLOVER KNOWLEDGE REPOSITORY	RELEVANCE TO THE STUDY
		capital mobility across nations is an easy and seamless process where money can be moved. Literature indicates that capital mobility and the related probability of creating economic growth is based on these three channels: trade, FDI, and staff turnover (Ansah, 2019). Capital mobility encourages FDI and thus has a role in the investment decision to locate abroad. Through the realisation of investment abroad, the spillover potential through the diffusion of knowledge is unleashed (Ansah, 2019).	factor mobility mediums such as capital and labour. But this theory empirically cannot adequately rationalise spillovers as it is qualitative.
	8. Product Cycle Theory	International trade and direct investment by firms were explained by Vernon (1979) by using the product cycle as the theoretical framework. The product cycle theory has three stages: introduction (innovation), maturity, and standardisation. Vernon's product life-cycle theory suggests that the spillover effect of FDI is based on an acquired competitive edge or an advantage whereby the innovating business takes advantage of international markets (Jindra, 2011).	Essentially, the product life cycle theory is a conceptual framework because it has not been scientifically verified (Boddewyn, 1985, as cited in Makoni, 2015). This theory is taken into account to give context and interpret the results from the quantitative analysis.
FDI theories explaining investments from FIRST and THIRD world MNEs		MNEs are from both first and third world countries, even though the latter is less orthodox. Theory on foreign trade argues	FDI theories on TWMNEs and DCMNEs provide a theoretical construct that includes the premise for

TRADE THEORY SCHOOL OF THOUGHT	TRADE THEORY	CONTRIBUTION TO SPILLOVER KNOWLEDGE REPOSITORY	RELEVANCE TO THE STUDY
		that, regardless of whether the MNE originates from first or third world regions, the magnitude of the spillover potential depends on the technological difference between the MNE and the local economy, and the absorptive capacity. But, the theory of foreign trade also indicates that TWMNE investments in third world countries could provide developing countries with greater spillover capacity than DCMNEs. This is because TWMNEs could be well-positioned to adapt to the environment and conditions of other developing countries than DCMNEs (World Bank, 2017).	the justification of the magnitude of the spillover potential, given the dynamics of whether the MNE is from a first or third world country and the technology portfolio's role in facilitating absorptive capacity for the host country. But this theory is essentially theoretical and, therefore, falls short of quantifying the magnitude of the spillover.

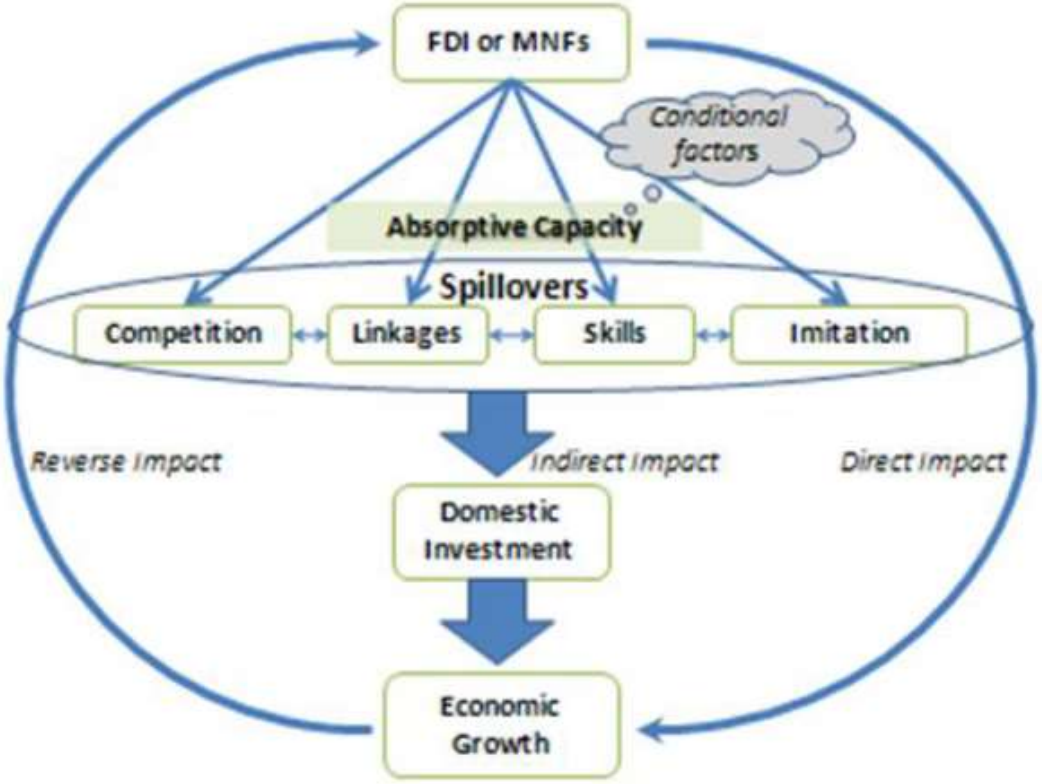
Source: Author's compilation

Source of Watermark: Thomas (2016)

3.3 EMPIRICAL LITERATURE REVIEW

Drawing from the theoretical literature review and for the relevance of this study, the empirical literature review is underpinned by growth theory, as depicted in the diagram below by Nowbutsing (2009). This section takes on a three-prong approach that assesses the nature of the relationship between FDI, spillovers and economic growth within the paradigm of growth theory. This section explores empirical evidence on FDI, FDI spillovers, total factor productivity (TFP) and growth. Lastly, this section looks into the reverse relationship displayed when growth or any other factor stimulates inward FDI in an economy; such a relationship can be assessed through methods that look into the causal or directional relationships.

Figure 3-7: Relationship between FDI, spillovers and economic growth



Source:Nowbutsing (2009)

The relationship between FDI, spillovers and economic growth is depicted in Figure 3-7 above. The relationship is threefold: (1) the direct impact from FDI to economic growth, which occurs through the amassment of tangible assets or capital; (2) the indirect impact, which refers to the attainment of intangible assets through transmission such as skills,

learning-by-doing (imitation), competition effects or linkages; and (3) the reverse relationship, which manifests when growth impacts on FDI inflows in an economy (Nowbutsing, 2009). Nowbutsing (2009) employs neoclassical growth theory to explain the relationship of FDI on economic growth through the constructs of a production function, given by Q = f(L, K), indicating that output, represented by Q is a function or can be explained by labour, L and Capital, K. Neoclassical growth theory applied to FDI theory suggests that an increase in foreign and domestic investment impacts on economic growth in the long-term. However, this does not fully explain the impact of FDI on the economy, and thus in this regard, it is necessary to also take into cognisance the indirect impact of FDI and reverse impact. The indirect impact of FDI is factored into the endogenous growth theory because, it takes into account that benefits from inward FDI to the domestic economy are not limited to amassing capital stock to fuel productivity and create jobs in the economy (Arisoy, 2012), but also through the transmission of intangible assets such as skills, learning-by-doing (imitation), competition effects or linkages (Nowbutsing, 2009). The ability of tangible assets to spill over into the local economy depends on the absorptive capacity (Nowbutsing, 2009).

3.3.1 Empirical studies on FDI spillovers and total factor productivity

Empirical studies on FDI cite evidence of positive spillovers (Aiello & Cardamone, 2005; Buck et al., 2007; Dunne & Masiyandima, 2016; Ghebrihiwet, 2018; Gholami et al., 2003; Girma et al., 2008; Hlongwane, 2011; Keller & Yeaple, 2009; Masron et al., 2012; Todo, 2006), negative spillovers (Konings, 2000; Lu et al., 2016; Mühlen, 2013), the absence of spillovers (Acharya & Economic Research and Policy Analysis Branch, 2014; Barrios et al., 2010; Braconier et al., 2001), or both positive and negative spillovers (Aitken & Harrison, 1999; Bruhn & Calegario, 2014; Masiyandima, 2015). Evidence on FDI spillover effects has been weak and ambiguous due to some of the following reasons: (i) knowledge spillovers are inherently difficult to measure, *"knowledge flows...are invisible; they leave little or no paper trail by which they may be measured and tracked",* as highlighted by Moen & Burchardt, 2010 (citing Paul Krugman (1991, p. 53)); (ii) research has been unable to establish the timing of spillovers (De Loo & Verspagen, 1998). According to Agosin & Mayer (2000), MNCs with their advanced technology are likely to take advantage of the economies of scale and access to funding which may take local firms out of business (crowding out). If the effects of crowding out result in the reduction of firms in a market, then there is a risk of

monopoly rents and the corrosion of administration of resources. In the short term, spillovers are prone to be negative to the host country because of competition, although in the long-run FDI can lead to the restructuring of an entire industry and better opportunities for the most efficient local participants (Farole & Winkler, 2014).

Cross country studies

Acharya et al. (2014) studied sixteen OECD (Organisation for Economic Cooperation and Development) countries from 1973 – 2004, estimated a production function from firm-level data in the Information and Communications Technology sector and applied the OLS and generalised method of moments (GMM) analyses. They concluded that productivity growth is mainly the result of industries that use Information and Communications Technology. There is no evidence supporting the existence of spillovers due to FDI.

Pietrucha & Żelazny (2020) investigated trade and FDI as conduits for total factor productivity (TFP) spillovers in 41 countries in the European Union and OECD over the period of 1995 to 2014. A general regression is computed to estimate the model, and the generalised method of moments (GMM) estimation technique is used. The study concludes that when trade and FDI are examined separately, there is a significant positive impact on TFP.

Developed country studies

Aiello & Cardamone (2005), in their study of 1017 Italian manufacturing firms, from 1995 – 2000, modelled the relationship of the variables in the study with a Cobb-Douglas (CD) production function. The following methods are employed: Generalised least squares method (GLS) and generalised method of moments (GMM). The study found that spillovers are present because external R & D leads to improved productivity. The results are robust and significant. In line with much of the modern growth theory literature, external R & D exerts positive spillovers on local firms' productivity growth.

Barrios et al. (2010) conducted a study using the GMM on data from Ireland, from 1983 – 1998. Initially, the authors are unable to find evidence of spillovers due to backward linkages. After relaxing assumptions and applying alternative models, the existence of vertical spillovers through backward linkages is substantiated.

Braconier et al. (2001), in their study from 1978 – 1994, utilised cross-sectional and firm-level data. The Cobb-Douglas production function parameters are estimated, and then the OLS method is applied. It is established that FDI related R & D spillovers are absent at the firm-level and industry level in Swedish manufacturing. The only variable that impacts total factor productivity is domestic investment in R & D.

Girma et al. (2008), in their study using firm-level data of the United Kingdom, from 1992 – 1999, utilised the Perpetual Inventory Method to construct FDI stock and then compute the parameters of the model using the Cobb Douglas production function. But to counter biased estimates of the coefficients, the Olley and Pakes (1996) semiparametric approach for systematically computing the production function parameters is applied. Regression analysis is used to determine FDI spillovers across horizontal and vertical conduits from export-oriented and domestic-oriented markets. The empirical findings prove that only domestic-oriented multinationals generate spillovers through backward linkages.

Konings (2000), in his paper: “The Effects of Direct Foreign Investment on Domestic Firms: Evidence from Firm-Level Panel Data in Emerging Economies”, carried out research on panel firm-level data in Bulgaria, Romania and Poland for the period 1993 –1997. The study employs instrumental variables to compute a fixed effects model in the general method of the moment technique. Konings concludes that where the technology gap is too wide between the MNEs and the local firms, as is the case with Bulgaria and Romania as opposed to Poland, which is more technologically advanced, spillovers may be negative due to increased competition. No spillover effects to local firms in Poland are detected.

Developing country studies

Buck et al. (2007), in their study of Chinese firms from 1998 – 2001, applying ordinary least squares (OLS) methodology, confirm the existence of positive spillover effects on host firms’ exports. Their findings corroborate Dunning’s Trade Development Path hypothesis that transnational corporations positively impact local firms' exports through spillover mediums, such as worker mobility, agglomeration economies, emulation and exporting knowledge.
Li (2010) estimates a Cobb-Douglas production function employing panel data of 27 Chinese manufacturing firms from 2001 to 2007 to compute total factor productivity. Li (2010) applied the OLS analysis, and the results indicate that MNCs have positive technology spillover effects on Chinese large-scale local firms.

Lu et al. (2016), in their study of Chinese firms, covering the duration from 1998 – 2007, adopted the approaches by Olley and Pakes (1996) and Levinsohn and Petrin (2003) to estimate the production function parameters. The fixed effects estimation methodology is applied, and it is established that horizontal spillovers are statistically significant and negative, indicating that FDI has an adverse effect on the productivity of local enterprises intra-industry.

Masron et al. (2012) examine Malaysian industries from 1999 – 2004, focusing on the manufacturing sector. The authors applied correlation analysis to quantify the magnitude of the spillover effect. The research found a positive relationship between FDI spillovers and the manufacturing sector. However, the methodology has limitations due to the fact that a simple correlation method was employed.

Todo (2006), who investigates Japanese firms from 1995 – 2002, approximates the parameters of a Cobb Douglas production function and applies: (i) a regression anchored on the OLS estimation with lagged variables as explanatory; and (ii) the instrumental variable (IV) technique using lagged explanatory variables to address endogeneity problems. The study concludes that foreign businesses' R & D knowledge externalities are positively correlated with their R & D operations and not manufacturing. The scale of the spillovers from R & D from MNEs is much greater than R & D from local enterprises.

Aitken & Harrison (1999) conducted a study on panel firm-level data in Venezuela, from 1976 – 1989, employing the OLS regression methodology. The study establishes that foreign ownership of firms generates improved productivity for joint ventures. However, foreign investment adversely impacts the productivity of domestic wholly owned enterprises. The effect on local businesses of intensified competition may be detrimental since local firms can be replaced by more profitable and efficient corporations.

Bruhn & Calegario (2014) conducted a study using data from the Brazilian processing industry. They applied Moderated Multiple Regression (MMR) and Generalized Linear Models (GLM) analysis and found both positive and negative FDI spillover effects. In labour-intensive industries, foreign presence leads to adverse effects. The results substantiate the widely held view that FDI spillovers rely on an individual domestic firm’s absorptive capacity.

Mühlen (2013) carried out a firm-level study on ten developing countries in Latin America to analyse the spillover impact from FDI on local firms' productivity levels. The assessment was conducted on the following countries in Latin America: Argentina, Bolivia, Chile, Colombia, Ecuador, Guatemala, Panama, Paraguay, Peru, and Uruguay, over the duration of 2006 and 2010. The fixed effects (FE) estimator is applied, and negative spillover effects are found. The results differ depending on the region because of nation-specific nuances. The country-specific findings show a slight negative influence due to international presence intra-industry.

3.3.2 Empirical studies of spillovers in Africa and South Africa (ZA)

Much of the empirical evidence from various studies put forward has juxtaposing views on the impact of FDI in Africa. The overall impact of the long-term relationship of productivity, growth and impact on GDP of FDI in Africa yield insignificant results.

The lack of spillover impact in Africa is attributed to numerous factors, which include: the implications of colonialism and imperialism on the continent; land expropriation; and trade policies and systems, which are legacies of past colonial rule. The South African economic structure still retains many remnants of the policy and trajectory imposed by the apartheid system. This is evident in numerous spheres, such as the low demand for high skilled labour, which leads to low human capital accumulation; this is also linked to an economic structure that exports raw materials and imports finished goods (Bond, 2006).

South Africa, since 1994, post the election of the new democratic government, has embarked on a development path that includes reversing structures that foster an import-orientated economy. The promotion of inward FDI facilitates an export-orientated economy (Edwards & Golub, 2004).

Most of the literature on FDI in Africa takes account of the impact of FDI on economic growth and productivity. Much of the empirical evidence on FDI and economic growth in Africa are in consensus that the effect of FDI is insignificant in most cases and argue that the inadequacy in absorptive capacity is the main contributor to the negligible impact. In South Africa, the spillovers from FDI are mainly limited to the primary sectors, which account for a fraction of the economic contribution to the country (Strauss, 2015). Moreover, studies on spillovers in ZA are limited and focus mainly on manufacturing.

Bezuidenhout (2009) examines the variables in Southern Africa from 1990 to 2005 and proposes that FDI explains an insignificant negative effect on growth. The paper further argues that this may be because most of the FDI in the region is accounted for in the primary sectors of the economies. Thus, this limits the R & D, technology and knowledge spillovers to the sectors that contribute significantly to economic growth. Bezuidenhout's findings are corroborated by Adams. According to Adams (2009), FDI inflows to the primary sector of the host country do not offer as much spillover potential as capital investments in the manufacturing and tertiary sectors of the economy.

Magwiro et al. (2017) looked at manufacturing firms in South Africa in 2007 using the Cobb Douglas functional form and applied regression analysis. They found a weak positive correlation between inter-industry spillovers and a weak negative correlation between intra-industry spillovers and FDI to domestic firms. The paper suggests instituting policies to facilitate the collaboration between MNCs and local companies in manufacturing.

Masiyandima (2015) employed the instrumental variables (IV) and fixed effects (FE) estimation techniques. Masiyandima investigated horizontal and vertical (backward and forward linkages) spillover effects in the Southern Africa Development Community (SADC) region with the employ of firm-level data from the World Bank Enterprise Surveys. Masiyandima (2015) finds evidence of a positive correlation between vertical spillovers from FDI to local firms, even though this relationship is weak. There is also a weak negative correlation from horizontal FDI to the host economy.

Mebratie & Bedi (2013) investigated the impact of FDI on South Africa's labour productivity from 2003 – 2007 and estimated a production function using firm-level panel data. The authors applied the OLS and the pooled ordinary least squares (POLS) regressions and fixed effects technique, and found no evidence of spillover effects.

3.3.3 FDI spillover studies including the TSC sector

Arnold et al. (2011), using the fixed effects estimation methodology, reveal that foreign presence in the services sector (this includes the transport and communications sector) results in increases in productivity in the manufacturing sector of the Czech Republic during the period of 1998 – 2003. There is no correlation between positive spillovers and foreign entities operating in the same sector (i.e., lack of evidence supporting the presence of

horizontal spillovers). Reforms through trade liberalisation allow for the entry of foreign investors and are crucial for vertical productivity spillovers through backward linkages to occur in the manufacturing sector.

Duggan et al. (2013), in their working paper on Indonesia, from 1997 – 2009, apply fixed effects estimation and find evidence corroborating that the transport, logistics and telecommunications sector generates positive spillovers and is central to the performance of the whole economy. Worth noting is that FDI in the TSC sector leads to improved manufacturing sector performance.

Fernandes and Paunov (2008), in their research of firms in Chile from 1992 to 2004, focused on services (including transport and communications sector) and manufacturing sectors. Fernandes and Paunov (2008) draw on the perpetual inventory method to compute FDI stock. The Levinsohn and Petrin (2003) approach is adopted to estimate the production function parameters. The fixed effects method is employed, and the authors found that FDI stimulated productivity due to price reductions, better quality, a broader range of services available, and knowledge. The results showed positive spillovers on total factor productivity in the transport and communications sector due to FDI. The full potential of spillovers from FDI in the transport and communications sector could not be realised, partly because when MNEs located operations in Chile, they acquired the best performing services firms and did not necessarily open new entities. Serfraz (2017), in his paper, is in pursuit to uncover whether inward FDI results in economic growth for developing nations. Serfraz (2017) applies empirical methods to investigate the impact of inward sector-wise FDI on corresponding sector-wise productivity in Pakistan from 1997 – 2016. The sectors identified in the study are: (1) Agriculture, (2) Manufacturing and Mining (3) Construction, (4) Electricity and Gas Distribution, (5) Transport, (6) Trade, and (7) Others (Financing, Real Estate, Business Services, Extra Territorial and Other Public and Private Services). The analysis yields outcomes indicating positive spillovers on productivity in all sectors, including the transport sector. The study finds evidence of both inter (vertical) and intra (horizontal) industry spillovers.

Thakur & Burange (2016) explore the impact of FDI in the services sector in India from 2000 – 2010. The Cobb-Douglas (CD) production function is used to estimate the parameters of the model. The fixed effects estimation methodology is applied. Spillovers across several

fields within the services sector are examined. The authors draw inferences that spillovers through vertical conduits are inversely related to total factor productivity, and horizontal spillovers depicted a positive association.

Tondl & Fornero (2008) researched sectoral productivity and spillover effects of FDI in Latin America from 1998 – 2006. Regression analysis and the generalised method of moments (GMM) estimator are employed, and positive FDI spillovers are found in all sectors. Direct productivity spillovers are most robust in the primary and financial services sectors. Interestingly, significant positive FDI spillovers in the TSC sector are found, which boost productivity in the manufacturing industry. FDI in the TSC sector spills over to nearly all other sectors.

In the study titled, “Is foreign direct investment good for growth? Evidence from sectoral analysis of China and Vietnam,” by Vu et al. (2008), the results for both countries indicate that FDI inflows in the transport sector have a significant and positive effect on total factor productivity, which in turn leads to economic growth. For Vietnam, the regressions for the transport sector reveal positive spillovers within the sector, and the impact of spillovers on other sectors is negligible. For China, the transport, post and telecommunications sector results indicate positive externalities because the FDI inflows increase total factor productivity.

3.3.4 Empirical studies on FDI and economic growth

Several empirical studies on FDI that applied cointegration and causality analysis found a positive long-run relationship between output and the variables for developing countries, with Granger causality running from FDI to output or bi-directional (Herzer, 2012).

Cross country studies

Lund (2010) examines developing and developed countries in East Asia and Latin America from 1980 to 2003 to establish whether FDI is a catalyst for economic growth. The countries assessed are Argentina, Brazil, Chile, Colombia, Mexico, Hong Kong, Indonesia, Korea, Malaysia, Singapore, Taiwan and Thailand. The Pedroni (1999) tests, Johansen test of cointegration, the vector autoregressive (VAR) model, the forecast error variance decomposition, and the Granger causality test are applied to establish the long-run, short-

run and causal directional relationships. In most countries under study, FDI leads to economic growth only in the industrial sector.

Pradhan (2009) conducts a study, from 1970 – 2007, on FDI and economic growth in five countries in the ASEAN (Association of Southeast Asian Nations) region, namely, Indonesia, Malaysia, Philippines, Singapore and Thailand. The econometric analysis applies Johansen's procedure to cointegration to establish the long-run relationships. The Granger causality test for the directional relationship between variables in the model is applied. The findings indicate a long-run relationship between FDI and economic growth in the ASEAN region. The causal analysis shows bidirectional causality between FDI and growth, with the exception of Malaysia.

Developed country studies

The research by Apostolov (2016), using firm-level data, looks into the interrelationships between output and FDI explanatory variables on six Southeast European countries from 2002 – 2013, namely: (i) Albania, (ii) Bosnia and Herzegovina, (iii) Croatia, (iv) Macedonia, (v) Serbia and (vi) Slovenia. The research takes on a two-prong approach. Firstly, country-specific outcomes are established through regression analysis, and secondly, the fixed effects technique probes the relationship between FDI and output in Southeast Europe. The analysis finds that FDI has positive effects on the gross domestic product in every recipient economy.

Cañal-Fernández & Fernández (2018) investigate the interrelations between FDI, exports and economic growth in Spain employing time-series data from 1970 to 2016. The autoregressive distributed lag (ARDL) bounds testing approach and the error correction model (ECM) are used to investigate the long-run and short-run effects. The vector error correction model (VECM) Granger causality approach is applied to establish the causal relationship. The results confirm a long-run relationship among the variables under study. The causality test indicates a robust unidirectional causal relationship from FDI to exports. Juxtaposing the widely spread view that FDI exerts a positive impact on economic growth, the results on FDI and economic growth are unable to establish significant Granger causality in both directions between FDI and economic growth.

Developing country studies

Belloumi (2014) conducts a study on Tunisia from 1970 to 2008, on FDI, trade openness and economic growth. Belloumi (2014) applied the autoregressive distributed lag (ARDL) bounds testing approach to cointegration analysis and established a long-run relationship. The Granger causality test was used, and the outcomes did not indicate any significant causality. Thus, results fail to find positive spillovers from FDI. Belloumi (2014) concludes that the study is relevant for Tunisian policymakers and recommends that FDI is more likely to yield positive economic growth effects if concrete policy reforms and binding obligations are put in place.

Dkhili (2019) examines the relationship between FDI and economic growth in Saudi Arabia over the period 1970 - 2016. The vector error correction model (VECM) and Granger causality approaches are applied. The results indicate that FDI has a robust positive long-run effect on economic growth in Saudi Arabia. The Granger causality test shows that there is unidirectional causality between FDI and growth.

Javaid (2016) probes the impact of FDI on the GDP of Pakistan from 1996 to 2014. The study employs the autoregressive distributed lag-error correction model (ARDL-ECM) test to establish the long and short-run effects. The results show evidence of the robust and positive impact of FDI on GDP growth in the long and short-term.

The findings by Herzer et al. (2008) on 28 developing countries from 1970 to 2003, dispute the widely held view that FDI has a positive effect on economic growth in developing countries. The paper applies cointegration analysis through the following approaches: Engle–Granger, the ECM, the Johansen and the Gregory–Hansen. The research establishes that for all countries, there is no long-term impact running from FDI to economic growth.

African and South African Studies

Inekwe (2013) investigated the correlation between economic growth, employment, and FDI in Nigeria in the manufacturing sector from 1990 to 2009. Inekwe employed the Johansen technique, VECM and Granger causality test to examine the data. The results found a long-

term positive correlation between FDI on growth in the services sector. The cointegration tests between FDI and the manufacturing industry yielded a negative relationship.

Masipa (2014) conducted research in South Africa from 1990 to 2013 on FDI, GDP and employment. Masipa (2014) conducted cointegration analysis and established a long-run relationship between the variables. The Granger causality test showed a unidirectional relationship running from FDI to GDP and from FDI to employment. Thus, these results indicate that inward FDI stimulates GDP growth and employment.

Nchoe (2016) analysed the relationship between FDI and sectoral growth in South Africa from 1970 – 2014. The vector autoregressive (VAR) model, the Johansen cointegration test, and the vector error correction model (VECM) were used. The study found that FDI inflows did not benefit the agricultural and manufacturing industries but led to gains in the services sector.

Sunde (2016) employs the ARDL bounds testing approach and the error correction model (ECM) to compute the long run and short-run relationship between economic growth, FDI and exports in South Africa from 1990 to 2014. The VECM Granger causality technique was applied to examine the direction of causality between the variables in the model. The study finds evidence of cointegration between economic growth, FDI and exports. It also found evidence of unidirectional causality running from FDI to exports, and from FDI to economic growth. There is also a bidirectional relationship running between exports and economic growth.

3.3.5 Sectoral studies on FDI and growth which include the transport, storage and communication (TSC) sector

Gholami et al. (2003) explore the causal relationship between information and communications technology investments and FDI in the context of economic growth. The study was conducted on 23 countries from 1976 to 1999, from developed and developing nations in Africa, Asia, Europe, North and South America and Oceania. These nations exhibited varying socio-economic conditions and levels of development. Using Johansen cointegration and Granger causality testing, Gholami et al. (2003) draw inferences on a causal relationship running from ICT to FDI due to an increase in ICT investment that stimulates FDI inflows. ICT indirectly contributes to higher economic growth by attracting

foreign investment. In developed countries, there is ICT capacity and infrastructure, which causes the inflow of FDI. In developing countries, the inflows of FDI lead to increases in ICT investment and capacity (Gholami et al., 2003). Therefore, these results indicate that it is critical to determine the nature of the cause and effect between the variables employed in the study so that accurate conclusions on the effect of FDI factoring in the dynamics at play can be drawn.

Kasi & Mahmood (2016), in their study conducted on Bangladesh, India, Nepal and Pakistan, from 1990 - 2013, draw on the Fully Modified Ordinary Least Square (FM-OLS) regression and found positive effects of FDI in the primary, manufacturing and services sectors. However, the services sector (trade, transport, and communication) exhibited the most robust productivity effects from FDI. In the transportation and telecommunications sector, the research determined that an increase of 1% in FDI resulted in an increase of 0.463% in productivity. The study concluded that FDI leads to improved productivity of the transport and telecommunications sector through competition, transfer of technologically related knowledge, and cheaper transportation of goods.

Khaliq (2007) conducted a study from 1997 to 2007 on various sectors in Indonesia, namely: (1) agriculture, livestock, forestry and fishery; (2) mining and quarrying; (3) manufacturing; (4) electricity, gas and water; (5) construction; (6) trade, hotel and restaurant; (7) transport and communications; (8) bank and finance; and (9) other finances. The study estimated a Cobb-Douglas (CD) production function by OLS method. OLS regressions were used and entailed testing a benchmark model, after which the time-fixed effects and sectoral-fixed effects models were applied. The findings on inward FDI in the transport and communication sector are the focal point due to the topic of my study. The study found a positive correlation between productivity increases in the transport and communication sector due to FDI, leading to improved economic growth.

3.3.6 Reverse impact: Transport, storage and communication (TSC) sector as a determinant of inward FDI

Extensive research has been carried out on the determinants of FDI, including the TSC sector. Conventionally the transport and storage sector has been at the core of economic development, especially in developing countries, where transport and storage networks are

at the centre of development potential (Hilling, 1996). The lack of well-developed transport infrastructure and networks constrain economic growth (UNCTAD, 2007c). There is vast literature presenting evidence and arguments advocating for the significance of the transport and storage sector for economic growth and productivity. Eddington (2006), who states the importance of transport and communications in an economy, indicates that connectivity is vital for rapid economic growth, particularly for developing countries.

Ellyne & Yu (2017) analyse the lessons South Africa can learn from the success of China in attracting foreign investment. The study investigates the ICT and transport sectors in both China and South Africa, contributing to their economies, 9.22% and 4.42%, respectively, over the period of 2011 to 2016.

By 2015, one hundred and forty-five (145) high-tech industrial development zones were built in China. These zones have ignited the interest of both local and international investors. They attract foreign investment because of the spillover effects of agglomeration economies. South Africa also attracts substantial foreign investment in the ICT sector. The South African government has provided for tax incentive policy in the ICT industry to stimulate R & D spending. The policy permitted ICT companies to deduct 150% of the R & D spending from their taxable income in the development of ICT products and services in South Africa, and the country was able to export more goods and services in the sector. In 2000 the level of ICT imports was higher than the exports by 6.33%. But, by 2014, for the first time in the history of the country, ICT exports of goods and services were higher than imports. Simultaneously, between 2000 and 2014, FDI inflows increased as a result of improved technology.

Alfaro & Chen (2017) conducted a survey that analysed the impact of transport and communication costs and the impact on FDI and MNEs. There is evidence that inward FDI to developing countries can result in spillover benefits through technology diffusion and skills transfer, and consequently, this has received policy consideration globally. Lydon & Williams (2005) substantiate that average FDI inflows in developing nations are more significant where the communications infrastructure is better.

Underdeveloped infrastructure and inadequate service provision increase the cost and time for products to reach their destinations. The transport sector is an elementary requirement for development. Transport networks are critical because they link numerous growth factors

and development through the movement of cargo and passengers. Transport networks contribute to greater inclusion and facilitation in the economic, social and cultural aspects of nations. Therefore, transport is critical in bringing about economic growth and development. Coughlin et al. (1991) studied factors impacting FDI into the USA between 1981 and 1983; and found evidence of a positive correlation between transport networks and FDI. Mjacu (2018), in his study on "The Role of Transport Infrastructure in Attracting Foreign Direct Investment in South Africa", observed that transportation infrastructure, among other metrics, has had a strong influence on South African foreign direct investment. The study recommends that transport infrastructure must be upgraded to strengthen and attract more FDI.

Optimal utilisation of the transport and communications sector's capacity and policy formulation to maximise efficiency is essential. Generally, a country with good physical infrastructure such as transport (highways, ports, bridges) and communications networks is likely to attract more FDI (Bakar et al., 2012). In his study, Asiedu (2004) explained the reason behind declining FDI flows into Sub-Saharan countries, which shows that deteriorating electricity, ICT and transportation infrastructure leads to a decrease in FDI inflows. The effects of the transport (Asiedu, 2004; Bakar et al., 2012; Barzelaghi et al., 2012; Coughlin et al., 1991; Mjacu, 2018) and communication (Alfaro & Chen, 2017; Bakar et al., 2012; Cristea, 2015; Ellyne & Yu, 2017; Lydon & Williams, 2005) networks are critical in the investment decision of an MNE.

Table 3.5 on page 113 provides details of international studies on spillovers from foreign direct investment inflows. The table stipulates the (i) authors, (ii) country/ region of study, (iii) duration of the study, (iv) methodology, (v) aggregation level, and (vi) effect on spillovers, productivity and economic growth.

Table 3.5: Summary of selected empirical literature on FDI spillovers

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
Acharya et al. (2014)	Across 16 OECD countries	1973 – 2004	Ordinary least squares (OLS) regression Generalised method of moments (GMM)	16 OECD countries for 24 industries	Productivity growth is mainly the result of sectors that use Information and Communications Technology. There is no evidence supporting the existence of spillovers due to FDI.
Aiello & Cardamone (2005)	Italy	1995 – 2000	Generalised least squares method (GLS) Generalised method of moments (GMM)	Panel firm-level data	Spillovers are present because external R & D results in improved productivity.
Aitken & Harrison (1999)	Venezuela	1976 – 1989	Ordinary least squares (OLS) regression	Panel firm-level data	Foreign ownership of firms generates improved productivity. But foreign investment adversely impacts the productivity of domestically wholly owned enterprises.
Apostolov (2016)	Six Southeast European countries, namely: Albania, Bosnia and Herzegovina, Croatia, Macedonia, Serbia and Slovenia.	2002 – 2013	Fixed effects estimation methodology	Firm-level data	Positive effects of FDI on the gross domestic product in every recipient economy under study are found.
Arnold et al. (2011)	Czech Republic	1998 – 2003	Fixed effects estimation using Olley-Pakes productivities	Firm-level data	Positive spillover effects of FDI in the services sector (including the transport and communications sector) stimulate manufacturing productivity.

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
Barrios et al. (2010)	Ireland	1983 – 1998	Generalised method of moments (GMM)	Country-level	Initially, the authors are unable to find evidence of spillovers due to backward linkages. After relaxing assumptions and applying alternative models, the existence of vertical spillovers through backward linkages is substantiated.
Belloumi (2014)	Tunisia	1970 – 2008	Autoregressive distributed lag (ARDL) bounds test Granger causality test	Country-level	The ARDL bounds testing approach established a long-run relationship. The Granger causality test outcomes did not find any significant causality. Thus, the results failed to find positive spillovers from FDI.
Braconier et al. (2001)	Sweden	1978 – 1994	Ordinary least squares (OLS)	Cross-sectional and firm-level	FDI related R & D spillovers are absent at the firm-level and industry level in Swedish manufacturing. The only variable that impacts total factor productivity is domestic investment in R & D.
Buck et al. (2007)	China	1998 – 2001	Ordinary least squares (OLS)	Firm-level data	Positive spillover effects on host firms' exports are found.
Cañal-Fernández & Fernández (2018)	Spain	1970 – 2016	Autoregressive distributed lag (ARDL) bounds testing approach Error correction model (ECM) Vector error correction model	Country-level	Robust unidirectional causal relationship from FDI to exports. No significant Granger causality in both directions between FDI and economic growth.

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
			(VECM) Granger causality test		
Demena & van Bergeijk (2019)	Uganda	2015	Qualitative research	33 firms interviewed	Both positive and negative spillovers were found in the firms interviewed.
Dkhili (2019)	Saudi Arabia	1970-2016	Granger causality test	Country-level	FDI has a robust positive long-run effect on economic growth. There is unidirectional causality running from FDI and growth.
Duggan et al. (2013)	Indonesia	1997 – 2009	Fixed effects estimation	Firm-level data	Positive spillover effects from FDI in the TSC sector.
Dunne & Masiyandima (2016)	SADC	2006 – 2011	Instrumental variables (IV) estimation technique Fixed effects (FE) estimation methodology	Cross-sectional and firm-level	Horizontal productivity spillover effects for the SADC region indicate the presence of more significant spillovers for smaller companies. At country level, there is an indication of heterogeneities on the productivity impact of FDI (Dunne & Masiyandima, 2016).
Fernandes & Paunov (2008)	Chile	1992 – 2004	Fixed effects estimation	Sectoral	Positive spillover effects on the TSC sector attributed to foreign investment.
Ghebrihiwet (2018)	South Africa	2002 – 2011	Regression	Cross-sectional and firm-level	Firms operating in the primary sector are more likely to pioneer product or process innovations when they have research agreements with MNCs (Ghebrihiwet, 2018).

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
Gholami et al. (2003)	International – 23 developed and developing countries	1976 – 1999	Johansen cointegration analysis Granger causality testing	Panel data Country-level data	The study revealed that emerging countries benefit more from foreign spillovers of ICT than industrialised countries. The more extensive ICT networks are in the host countries, the likelier that spillovers will occur.
Girma et al. (2008)	United Kingdom	1992 – 1999	Regression analysis	Panel firm-level data	Vertical spillovers through backward linkages are found.
Herzer et al. (2008)	28 developing countries. These countries are: Argentina, Brazil, Costa Rica, Ecuador, Dominican Republic, Mexico, Chile, Peru, Venezuela, Colombia, Sri Lanka, India, Pakistan, Indonesia, Malaysia, Korea, Philippines, Thailand, Singapore, Cameroon, Zambia, Côte d'Ivoire, Nigeria, Tunisia, Kenya, Morocco, Ghana, and Egypt.	1970 – 2003	Engle–Granger Error correction model (ECM) Johansen technique to cointegration Gregory–Hansen technique to cointegration	Country-level	No long-term impact running from FDI to economic growth.
Hlongwane (2011)	South Africa	1996 – 2009	Regression	Panel Country-level data	The results indicated that the FDI inflows from developed nations create spillovers which led to employment opportunities in ZA (Hlongwane, 2011).

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
Inekwe (2013)	Nigeria.	1990 to 2009	Johansen technique VECM Granger causality	Sectoral	The results found a long-term positive correlation between FDI and growth in the services sector. The cointegration tests between FDI and the manufacturing industry yielded a negative relationship.
Javaid (2016)	Pakistan	1996 – 2014	Autoregressive distributed lag- error correction model (ARDL-ECM) technique	Country-level data	Positive impact of FDI on GDP growth in long and short-term.
Kasi & Mahmood (2016)	Bangladesh, India, Nepal, and Pakistan.	1990 – 2013	Fully modified ordinary least square (FM-OLS)	Sectoral	Positive productivity spillover effects in the TSC sector were determined.
Keller & Yeaple (2009)	United States	1987 – 1996	TFP computed using the Olley-Pakes (1996) through the OLS method Instrumental variable techniques	Firm-level data	Local firms with low productivity absorb more spillovers than more productive firms.
Khaliq (2007)	Indonesia	1997 – 2007	Ordinary least square (OLS) regressions Time-fixed effects and sectoral-fixed effects	Sectoral	A statistically significant positive correlation was found between productivity and FDI in the TSC sector.
Konings (2000)	Bulgaria, Romania and Poland	1993 –1997	A fixed effects model in the generalised method of moments (GMM) technique is	Panel Firm-level data	Adverse spillover effects to local firms in Bulgaria and Romania. No spillovers to local firms in Poland.

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
			approximated		
Li (2010)	China	2001 - 2007	Ordinary least squares (OLS) analysis	Panel data of 27 Chinese manufacturing firms	Positive technology spillover effects on Chinese large-scale local firms are found.
Lu et al. (2016)	China	1998 – 2007	Fixed effects methodology	Firm-level data	The productivity of local enterprises in the same industry is adversely impacted due to FDI (Lu et al., 2016).
Lund (2010)	Developing and developed across countries East Asia and Latin America, namely: Argentina, Brazil, Chile, Colombia, Mexico, Hong Kong, Indonesia, Korea, Malaysia, Singapore, Taiwan and Thailand.	1980 – 2003	Pedroni (1999) tests Johansen Test of Cointegration Vector autoregressive (VAR) model Granger causality test	Country-level	In most countries under study, FDI leads to economic growth in the industrial sector.
Lydon & Williams (2005)	Developing Countries	1990 – 2002	Baseline regression Instrumental variables (IV) estimation	Sectoral	FDI inflows in developing nations are more significant where the communications infrastructure is better.
Magwiro et al. (2017)	South Africa	2007	Linear regression	Cross-sectional and firm-level	The results show a weak positive correlation between inter-industry spillovers from FDI to local firms. There is a weak negative correlation between intra-industry externalities from FDI to domestic firms in ZA (Magwiro et al., 2017).

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
Masipa (2014)	South Africa	1990 – 2013	Johansen cointegration test Granger causality test	Country-level	Inward FDI stimulates GDP growth and employment.
Masiyandima (2015)	SADC	1980 – 2011	Instrumental variables (IV) estimation technique Fixed effects (FE) estimation methodology	Firm and country-level	Countries in the SADC region are recommended to advance FDI policies that promote bilateral FDI from more industrialised nations to optimise potential FDI productivity spillovers (Masiyandima, 2015).
Masron, Zulkafli, and Ibrahim (2012)	Malaysia	1999 – 2004	Correlation analysis	Industry-level	The methodology has limitations because a simple correlation method was employed. The correlation indicated a positive relationship between FDI spillovers and the manufacturing sector.
Mebratie & Bedi (2013)	South Africa	2003 – 2007	Ordinary least squares method Fixed effects estimation	Country-level	No spillover gains were detected.
Mühlen (2013)	Latin America: Argentina, Bolivia, Chile, Colombia, Ecuador, Guatemala, Panama, Paraguay, Peru, and Uruguay	2006 – 2010	Fixed-effects (FE) estimator	Firm and country-level	Negative spillover effects were found.
Nchoe (2016)	South Africa	1970 – 2014	Vector autoregressive (VAR) model	Sectoral	The study found that FDI inflows do not benefit the agricultural and manufacturing industries but lead to

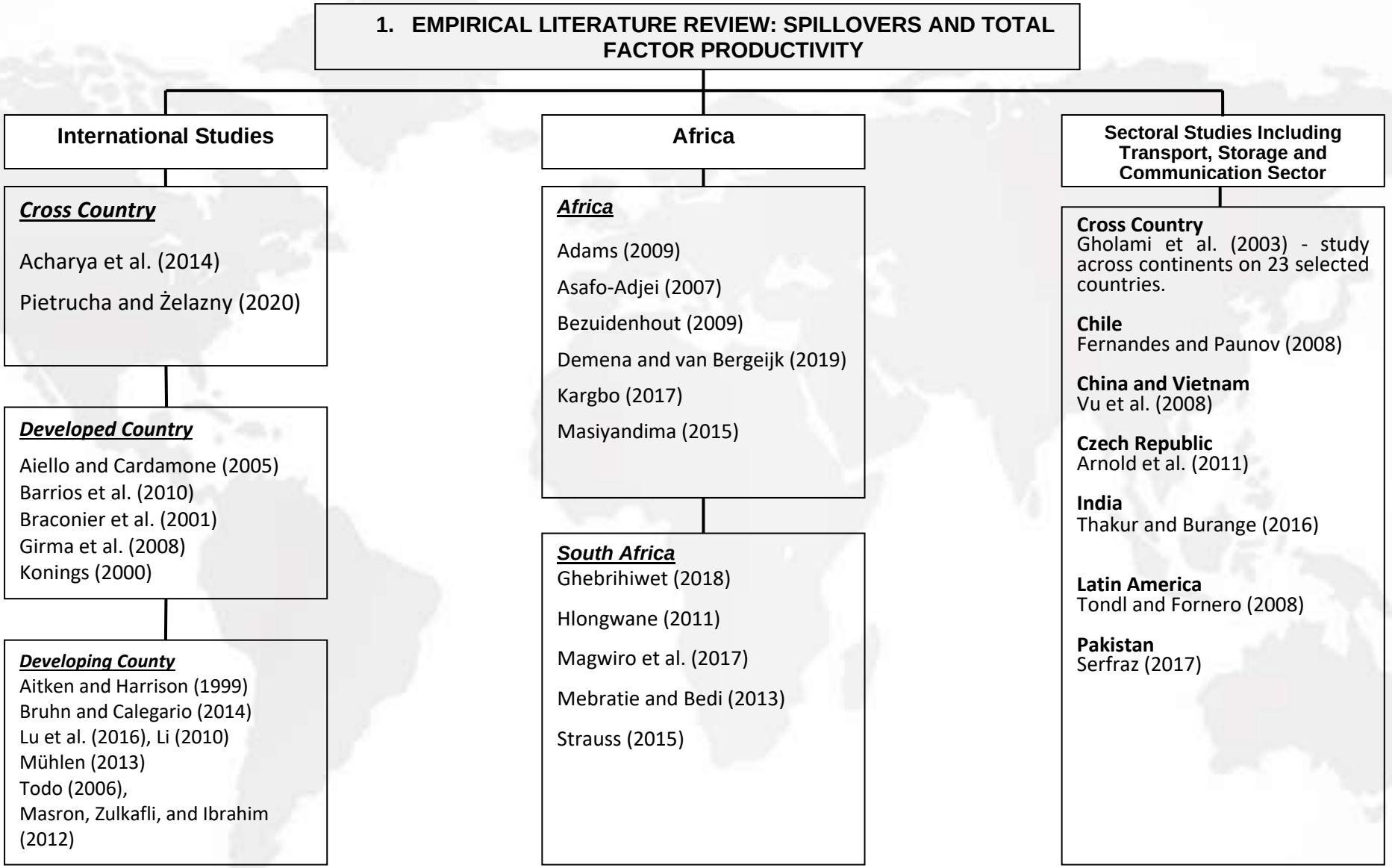
AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
			Johansen cointegration test, Vector error correction model (VECM)		gains in the services sector.
Pietrucha & Żelazny (2020)	41 countries, in the European Union and OECD. The countries are: Australia, Austria, Belgium, Bulgaria, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea Rep., Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States	1995 – 2014	General regression Generalized method of moments (GMM) estimation technique	Country-level	Trade and FDI individually have a significant positive impact on total factor productivity.
Pradhan (2009)	Five countries in the ASEAN (Association of Southeast Asian	1970 – 2007	Johansen's procedure to cointegration	Country-level data	A long-run relationship between FDI and economic growth in the ASEAN region was detected.

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
	Nations) region, namely: Indonesia, Malaysia, Philippines, Singapore and Thailand.		Panel Granger causality test		Bidirectional causality between FDI and growth was found, with the exception of Malaysia.
Serfraz (2017)	Pakistan	1997 – 2016	Cointegration and pair-wise Granger-causality testing	Sectoral data	Positive spillovers on productivity are reported.
Sunde (2016)	South Africa	1990 – 2014	ARDL bounds testing approach Error correction model (ECM) VECM Granger causality technique	Country-level	A long-run relationship between economic growth, FDI and exports is detected. Unidirectional causality running from FDI to exports, and from FDI to economic growth is established There is a bidirectional relationship between exports and economic growth.
Thakur & Burange (2016)	India	2000 – 2010	Fixed effects estimation	Sectoral data	Postive horizontal spillover effects. Negative vertical spillover effects.
Todo (2006)	Japan	1995 – 2002	Ordinary least squares (OLS) estimation Instrumental variable (IV) estimation	Panel firm-level data	Foreign businesses' R & D knowledge externalities are positively correlated with their R & D operations and not production.
Tondl & Fornero (2008)	Latin America	1998 – 2006	Generalised method of moments (GMM)	Sectoral	Positive productivity spillover effects can be found in all sectors of the economy. FDI in manufacturing, transport, and telecommunications leads to productivity spillovers in

AUTHORS	REGION	DURATION	METHOD	AGGREGATION	SPILLOVER/ PRODUCTIVITY/ ECONOMIC GROWTH EFFECT
					nearly all other sectors.
Vu et al. (2008)	China and Vietnam	1990 – 2004	Feasible generalized least squares estimator	Sectoral data	Positive spillover effects from FDI on economic growth in both China and Vietnam. Positive spillover effects from the transport sector in Vietnam. Positive spillover effects in the transport, post and telecommunications sector in China.

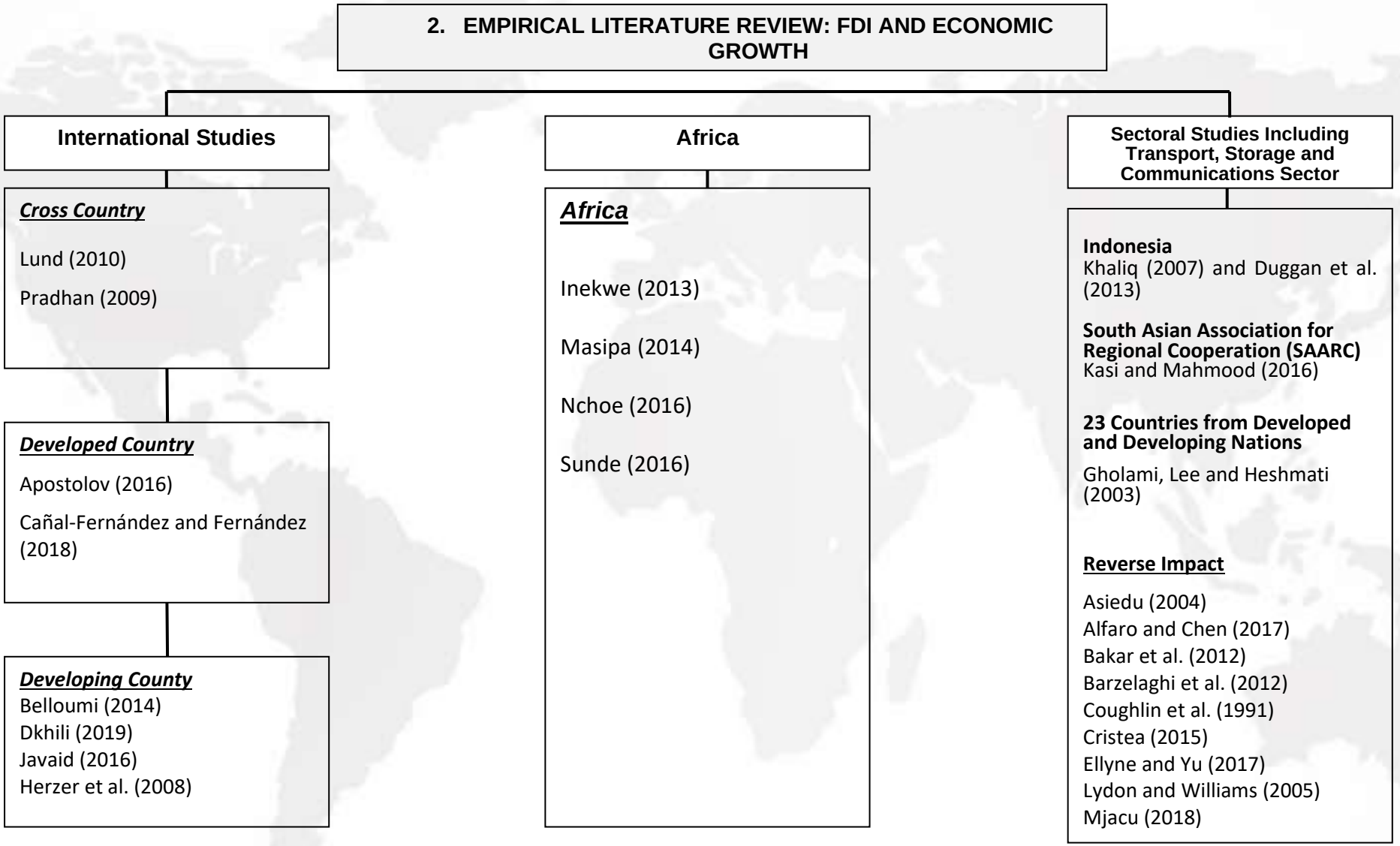
Figure 3-8 and Figure 3-9 on the next pages summarise the authors and the geographic spread of the studies contained in the literature review.

Figure 3-8: Breakdown of empirical review on spillovers and total factor productivity



Source of watermark: University of Cambridge (2020). Source of figure: Author's compilation

Figure 3-9: Breakdown of empirical review on FDI and economic growth



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3.4 VARIABLES TO MEASURE FDI SPILLOVER IMPACT AND TFP

Building on the theoretical and empirical literature, Table 3.6 on page 126 comprises studies and variables employed to measure the spillover impact through the computation of TFP. Approaches by Sunde (2016), Bruhn et al. (2018), Lashaki & Ahmed (2017), Arisoy (2012), and Li (2010) are taken into account and adapted for my study.

Sunde (2016) refers to the formulation by the UNCTAD (1992) on the relationship between FDI and economic growth. The relationship is such that GDP_t, is expressed as a function of capital formation (CF_t), labour employment (EMP_t), foreign direct investment (FDI_t), human capital (HC_t), new technique (M_t), and international trade (TRD_t). International trade comprises exports and imports. A similar approach is pursued in the studies by Bruhn et al. (2018), Lashaki & Ahmed (2017), and Arisoy (2012), but Bruhn et al. (2018), Lashaki & Ahmed (2017), include telecommunications infrastructure as an explanatory variable for GDP. Bruhn et al. (2018), Lashaki & Ahmed (2017) also include absorptive capacity in the equation. The authors then derive total factor productivity (TFP) as the residual between inputs and outputs. FDI spillovers are explained in the context of total factor productivity. Amongst other explanatory variables applied to estimate total factor productivity, Ahmed and Lashaki (2019 and 2017) include human capital and absorptive capacity in the computation. Human capital data in the TSC sector in ZA is not available for most of the period under review; thus, this paper pursues an approach taken by studies such as Arisoy (2012 and Li (2010) that do not factor human capital in the calculation of TFP.

The variables in this study comprise annual time-series data for the transport, storage and communication (TSC) sector, over the period 1985-2018 for gross domestic product (GDP), amount of labour (L), gross fixed capital formation (FCF), FDI inflows, infrastructure (INFRA), exports (EXP) and imports (IMP) of goods and services. The equation is specified according to studies by Sunde (2016), Arisoy (2012), Lashaki & Ahmed (2017), and Ahmed & Lashaki (2019).

The table below gives additional details on the studies mentioned in this section, which have employed similar variables as those in my research and computed TFP to ascertain the impact of FDI spillover effects on a sector or an economy.

Table 3.6: Variables employed from selected studies to measure FDI spillover impact and total factor productivity

STUDY	METHODOLOGY	VARIABLES
FDI inflows spillover effect implications on the Asian-Pacific's catching up process by Ahmed and Lashaki (2019).	The study applies time series data from 1970 to 2012. The parameters of a modified Cobb-Douglas production function are estimated through the least squares method.	1. Gross domestic product 2. Physical capital 3. Labour force 4. FDI inflows 5. Human capital 6. Absorptive capacity 7. Telecommunications investment 8. The residual term (referred to as total factor productivity)
A study on the productivity spillover effects in Latin America by Bruhn et al. (2018).	Authors compute total factor productivity to determine spillover effects employing the generalised method of moments (GMM).	1. Gross domestic product 2. Gross fixed capital formation 3. FDI inflows 4. International trade (the sum of imports and exports) 5. High-technology exports 6. Dummy variables for post-world financial crisis period (2008-2014)
FDI inflow spillover effect implications on the Asia Pacific productivity growth through the export channel by Lashaki & Ahmed (2017).	Annual panel data over the period 1970 to 2012, the Cobb-Douglas functional form is applied. The fixed effects and random effects methodologies are used to determine the spillover effects.	1. Gross domestic product (GDP) 2. Aggregate physical capital (K) Labour (L) 3. Foreign direct investment (FDI) 4. Human capital (HC) 5. Absorptive capacity (AC) 6. Telecommunications investment (Telint) 7. Export of goods and services (EPT) 8. A, proxies for total factor productivity (TFP) as a technological progress of the selected economies and indicator of spillover effects. 9. Absorptive capacity (FDI*HC)
The impact of foreign direct investment on total factor productivity and economic growth in Turkey by Arisoy (2012).	The Cobb-Douglas production function is applied to represent the mathematical relationship between the inputs and output. The Johansen and Juselius (1990) cointegration test is employed to measure total factor productivity.	1. Y denotes the output of the economy 2. K expresses physical capital stock 3. L expresses the labour force 4. A is the level of TFP on output growth 5. hL is a measure of the human capital stock that is embodied in the labour force. 6. α and β denote the elasticity of domestic physical capital and human capital.
The effect of technology	The study applies panel data of	1. Value-added (Y) of total Chinese

STUDY	METHODOLOGY	VARIABLES
spillover from FDI: An empirical analysis of Chinese manufacturing industries by Li (2010).	27 Chinese manufacturing industries from 2001 to 2007. The study estimates the parameters of a Cobb-Douglas production function through a method of OLS, and then derives total factor productivity to determine the FDI spillover effect. The OLS and Granger causality techniques are used to estimate the spillover effects.	domestic firms. 2. Capital stock (K) applies fixed assets of large-scale industries for capital. 3. Labour (L) is the annual average number of the labour force 4. A is technology level, this denotes the other input factors except labour and capital, other studies may refer to this as total factor productivity.

CHAPTER FOUR: METHODOLOGY

4.1 INTRODUCTION

This chapter discusses the methods, framework and analysis employed to address the research problem and objectives. This paper seeks to determine the effect of FDI spillovers from the transport, storage and communication (TSC) sector in South Africa from 1985 to 2018. The study adopts quantitative methods to analyse time-series data and draws inferences on the secondary data's behaviour, trends, and interaction.

Descriptive statistics are applied to summarise the characteristics of the dataset in the study. The descriptive statistics provided are the following: the number of observations, mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and the Jarque-Bera statistic.

The econometric approach in this study is as follows: The ordinary least squares method determines total factor productivity, and then the spillover impact in South Africa's TSC sector from 1985 to 2018 is computed. Cointegration tests are used to estimate the impact of FDI on the TSC sector’s GDP contribution in South Africa from 1985 to 2018. When conducting cointegration analysis, testing for unit roots is an essential pre-test (Wei, 2014). Unit root tests are applied as these are diagnostic techniques that determine the order of integration. The ARDL bounds test to cointegration is employed. Granger causality is used to identify the patterns of interactions between variables to determine the direction of causation.

4.2 UNIT ROOT TESTS

A stationary time-series (or has no unit roots) has statistical properties such as the mean, variance, and autocorrelation as constant over time (Chetty, 2018; Gujarati, 2006). A unit root is a stochastic trend in a time series, and if a series has a unit root, it exhibits a systematic pattern that is unpredictable (Chandra, 2018). Time-series tests based on non-stationary variables (or has unit roots) may result in misleading, inaccurate and biased results. Time-series analysis necessitates that variables must be tested for stationarity before running cointegration tests. The unit root test outcomes determine the appropriate approach to cointegration analysis.

The first step is to establish the order of integration of each variable because the ARDL approach employs each variable at the level at which it is stationary. If all variables are stationary, it is recommended that the ordinary least squares (OLS), vector autoregressive (VAR), or a similar technique be applied (Shrestha & Bhatta, 2018). If all variables in the model are non-stationary, the Johansen cointegration test can be applied (Iheanacho, 2017; Shrestha & Bhatta, 2018). The ARDL bounds test is applied if the assumption that variables are integrated either of order zero I(0), or one I(1), or a combination of both (mixed) is fulfilled. The variables should not be integrated of order two I(2) to avoid spurious results (Iheanacho, 2017).

A battery of tests is available to run the unit root tests. The most common are the (Dickey–Fuller) DF, (augmented Dickey–Fuller) ADF, (Phillips–Perron) PP and (Kwiatkowski–Phillips–Schmidt–Shin) KPSS, and their extensions, namely, ADF-GLS (modifying the augmented Dickey-Fuller test statistic using a generalised least squares (GLS)) and NG-Perron (NGP) tests. The ADF and PP tests are asymptotically similar (i.e., essentially equal) and are likely to yield similar results (Pesaran, 2015, as cited in Arltová & Fedorová, 2016), with the difference in the tests being that the PP test has an advantage in its robustness in the treatment of serial correlation and heteroskedasticity in the errors (Shi et al., 2012). The selection of the appropriate unit test depends on the judgement of the analyst. Table 4.1 on page 130 by Arltová and Fedorová (2016), makes recommendations on the optimal test to employ, taking into account the sample duration and parameter. The tests under consideration are the DF, ADF, PP, ADF-GLS and NG-Perron. Arltová and Fedorová (2016) summarise the simulation results of a study conducted to determine the optimal test for the unit root tests at a significance level of 5% (α= 5%), and thus a confidence interval of 95%. The study considers the length or duration under analysis depicted as T, and the value of the parameter. Their results show that ADF and PP tests were the most suitable time-series tests over a short period, with optimal results for a length of T = 25 (T is the time-period). For T = 100 and parameters > 0.8, the ADF was the most optimal measure. The tests DF, ADF, PP, KPSS, ADF-GLS and NG-Perron (NGP) produced similar results, when T = 500 (i. e., the long duration). For parameters of low value, the PP and KPSS tests are ideal. The optimal results for parameters < 0.9 are achieved from the NGP, ADF and PP tests, and > 0.9 from the ADF-GLS and NGP. The duration of my study is 34 years and thus lies between T = 25 and T = 50. But for all time periods (i. e., T = 25, 50, 100 and 500) and parameters stipulated in the simulation, the ADF test is the most ideal.

Table 4.1: Overview of unit root tests on different time durations and various parameters Φ1, α = 0.05

PARAMETER Φ_1	TIME (T) = 25	T = 50	T = 100	T = 500
0; 0.5>	PP, ADF, +KPSS	PP, ADF, +KPSS	ADF, PP	ADF, PP, NGP
0.5; 0.7>	PP, ADF, +KPSS	PP, ADF, +KPSS	ADF, PP	ADF, PP, NGP
0.7; 0.9>	ADF, NGP, PP	ADF, NGP, PP	ADF, NGP	ADF, NGP
0.9; 1>	PP, NGP, ADF	ADF, NGP	ADF, NGP	ADF, NGP

Source: Arltová & Fedorová (2016)

Another study of simulations was carried out by Imam et al. (2016) to determine the ideal test out of the ADF, KPSS and PP. The null hypothesis of stationarity versus the alternative of a unit root at different orders of the ARDL model and various sample sizes ranging from 20 to 200 (i.e., 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200) is tested. The PP test proved to be the best relative to the ADF and KPSS tests.

4.2.1 Augmented Dickey-Fuller (ADF) and Phillip-Perron's (PP) tests

To establish the stationarity of the series, and thus determine the order of integration of each variable, the Augmented Dickey-Fuller (ADF) unit root testing procedure (Dickey and Fuller, 1979) and the Phillips-Perron (PP) test (Phillips and Perron, 1988) are employed. In equations 4.1 and 4.2, which are the ADF and the PP tests, respectively - the size of the coefficient δ_2 is estimated (Sunde, 2016).

(4.1)

$$\Delta Z_t = \delta_0 + \delta_1 t \ + \delta_2 Z_{t-i} + \sum_{i=1}^{n} \beta_i \Delta Z_{t-i} + \varepsilon_t$$

Equation 4.1 tests for the presence of the unit root of Z_t, at time *t*. ΔZ_{t-i} is the first difference with n lags, and $\mathcal{E}_t$ adjusts the errors of autocorrelation. The following coefficients, namely, δ_0, δ_1, δ_2, and βi are predicted. The null hypothesis (H_0: $\delta_2 = 0$) is that the series has a unit root or is non-stationary, and the alternative hypothesis (H_0: $\delta_2 < 0$) is that the series is stationary. The size of the coefficient δ_2 is determined to ascertain whether to accept or reject the null hypothesis of a unit root (Sunde, 2016). The lag length is computed by applying the Akaike information criterion (AIC) or the Schwartz Bayesian criterion (Nchoe, 2016).

Sunde (2016), factoring inputs by Enders (2004), states that the other method used to test for unit roots is the Phillips-Perron method, which corrects serial correlation and heteroscedasticity in the error terms by directly modifying the test statistics without including lags. Thus, the equations and hypothesis to be tested are similar to the ones for equation 1.1, except that the lags of the variables are excluded.

(4.2)

$$\Delta Z_t = \delta_0 + \delta_1 t + \delta_2 Z_{t-i} + \varepsilon_t$$

4.3 FUNCTIONAL FORM AND ORDINARY LEAST SQUARES METHOD

The Cobb-Douglas (CD) production function represents the functional form of the relationship between inputs and outputs (Paul, 2011). In this study, the parameters of the CD production function are estimated by employing the ordinary least squares (OLS) method. The OLS method is applied to determine the impact of total factor productivity (TFP). Examining TFP allows for inferences to be drawn on the impact of spillover effects in the TSC sector in South Africa from 1985 to 2018.

Basic Cobb-Douglas Production Function: The CD production function is modelled to explain the correlation (relationship) between inputs and output. The CD production function was introduced by Knut Wicksell (1851 – 1926) and then examined through empirical methods by Charles Cobb and Paul Douglas in 1928 (Tan, 2008).

Equation 4.3 denotes the Cobb Douglas production function as follows:

$Y = A L^a K^b$, where: Y, K, L and A are output, physical capital stock, human capital stock (labour) and total factor productivity, respectively. *a* and *b* are output elasticities for labour and capital, respectively. *a* and *b* lie between zero and one.

The equation shows that L and K directly impact on output and the part of output which cannot be explained by L and K is explained by A. A is the "residual", often called total factor productivity (TFP) or technical change (Arisoy, 2012; Li, 2010). "A" indicates the TFP effect on output growth, and it is assumed that the effect of FDI on growth is reflected through "A", moreover, the effect of FDI on "A" is also explained through human capital

(Arisoy, 2012). As the objective is determining TFP, it is, therefore, appropriate from equation 4.3 to formulate TFP as follows (Arisoy, 2012):

$$TFP = A = Y / (K^b L^a) \quad \textbf{(4.4)}$$

TFP can be given a natural log on both sides of the equation, and the formulation of TFP can be expressed by subtracting the factors of production from output. Thus, the equation is expressed as follows (Arisoy, 2012; Li, 2010):

$$Ln(TFP) = LnA = Ln=Y - (bLnK - aLnL) \quad \textbf{(4.5)}$$

The translog form resolves the following problems (Wooldridge, 2015):

I. When y>0, equations using log(y) as the dependent variable tend to better conform to the Classical Linear Model (CLM) assumptions than models utilising the level of y;
II. Strictly positive variables regularly comprise heteroscedastic or skewed conditional distributions;
III. Narrowing the range of the variables can make OLS estimates less susceptible to outliers (or extremes);
IV. Nonetheless, caution must be exercised, not to indiscriminately transform to logarithmic form because it may generate extreme values.

The production function of an economy adapted for this study is expressed as follows:

$$GDP = (A)(L^{\beta 1})(FDI^{\beta 2})(FCF^{\beta 3})(EXP^{\beta 4})(IMP^{\beta 5})(INFRA^{\beta 6}) \quad \textbf{(4.6)}$$

Where,

I. GDP is gross domestic product in the TSC sector
II. L is labour input in the TSC sector
III. FDI are foreign direct investment inflows in the TSC sector
IV. FCF is fixed capital formation (FCF) in the TSC sector
V. EXP is exports in transport and communications
VI. IMP is imports in transport and communications
VII. INFRA is infrastructure (investment in information, computer, and telecommunications is a proxy for infrastructure in the South African economy)

VIII. A stands for the residual that is a proxy for total factor productivity (TFP)

The next step estimates the parameters of the regressors. Adapted for this study and following studies from Arisoy (2012), Lashaki & Ahmed (2017), Ahmed & Lashaki (2019), and Bruhn et al. (2018), equation 4.6 is transformed into a logarithm and first difference and expressed as equation 4.7 below.

$$\Delta LNGDP = A + \beta_1 \Delta LNL + \beta_2 \Delta LNFDI + \beta_3 \Delta\ LNFCF + \beta_4 \Delta LNEXP + \beta_5 \Delta LNIMP + \beta_6 \Delta LNINFRA + \mu \quad \textbf{(4.7)}$$

Where,

I. β_1, β_2, β_3, β_4, β_5 and β_6 are the parameters to be predicted, these are coefficients of input factors
II. Assuming constant returns to scale, therefore, $\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 = 1$
III. β_1 denotes output elasticity with respect to labour input in the TSC sector
IV. β_2 denotes output elasticity with respect to FDI inflows in the TSC sector
V. β_3 denotes output elasticity with respect to FCF in the TSC sector
VI. β_4 denotes output elasticity with respect to exports in transport and communications
VII. β_5 denotes output elasticity with respect to imports in transport and communications
VIII. β_6 denotes output elasticity with respect to infrastructure (investment in information, computer and telecommunications is a proxy for infrastructure in the South African economy)
IX. μ is the error term
X. LN denotes logarithm form
XI. Δ stands for the first difference

Ahmed and Lashaki (2019), in their study, modified the estimation technique to determine the spillover effect and thus TFP. They combined the growth accounting and econometric approaches to bridge the gap in both methods and measured technological advancement through the estimation of TFP. This gap is filled by transforming equation 4.7 to be explained in the context of TFP to account for productivity, as Ahmed (2006–2012) did to bridge the two different approaches (Ahmed & Lashaki, 2019). Also, considering studies by

Li (2010), Arisoy (2012), Lashaki & Ahmed (2017), and Ahmed & Lashaki (2019), equation 4.8 is derived:

$$\Delta LNTFP = \Delta LNGDP - (\beta_1 \Delta LNL + \beta_2 \Delta LNFDI + \beta_3 \Delta LNFCF + \beta_4 \Delta LNEXP + \beta_5 \Delta LNIMP + \beta_6 \Delta LNINFRA) \quad \textbf{(4.8)}$$

Where,

I. $\Delta LNGDP$ denotes the growth rate of output
II. $\beta_1 \Delta LNL$ denotes labour input in the TSC sector
III. $\beta_2 \Delta LNFDI$ denotes FDI inflows in the TSC sector
IV. $\beta_3 \Delta LNFCF$ denotes the contribution of fixed capital formation (FCF) in the TSC sector
V. $\beta_4 \Delta LNEXP$ is the contribution of exports in transport and communications
VI. $\beta_5 \Delta LNIMP$ is the contribution of imports in transport and communications
VII. $\beta_6 \Delta LNINFRA$ is the contribution of infrastructure (investment in information, computer and telecommunications is a proxy for infrastructure in the South African economy)
VIII. $\Delta LNTFP$ is the contribution of total factor productivity
IX. LN denotes logarithm form
X. Δ stands for the first difference

In equation 4.8, the residual is usually expressed as the amount of the quality of the above explanatory variables, referred to as TFP, or the technological advancement referred to as the spillover effect (Ahmed & Lashaki, 2019; Arisoy, 2012; Lashaki & Ahmed, 2017; Li, 2010). Lashaki & Ahmed (2017), and Ahmed & Lashaki (2019) indicate that this approach decomposes the growth rate of output into the contribution of input factors, namely labour, foreign direct investment (FDI), fixed capital formation (FCF), exports (EXP), imports (IMP), and infrastructure (INFRA).

4.4 AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) BOUNDS TESTING APPROACH TO COINTEGRATION

The autoregressive distributed lag (ARDL) bounds approach by Pesaran, Shin, & Smith (2001) is used to establish the short-run and long-run relationships between variables. The ARDL model establishes the short-run and long-run relationships in the TSC sector between GDP, FDI, labour, fixed capital formation, exports, imports, and infrastructure. This is to fulfil

the study's objective to determine the impact of FDI on GDP output in the TSC sector. The assumptions of the ARDL bounds test must be fulfilled for the approach to be applied. *This* test is premised on the assumption that variables are integrated either of order zero I(0), or one I(1), or a combination of both (mixed). The aim is that all variables should not be integrated of order two I(2) to avoid spurious results, which are hard to interpret when applying the F-statistics given by Pesaran et al. (2001) (Iheanacho, 2017). The ARDL bounds test can be applied regardless of the order of integration of the variables. The ECM in the ARDL bounds test has the advantage of replenishing the data which has been lost through differentiating the time-series in the process to ensure stationarity. This allows the establishment of the short and long-run relationship of the variables in the series (Belloumi, 2014; Zheng et al., 2012). Odhiambo (2009, as cited Belloumi, 2014) stated that the main limitation of ECMs apart from the ARDL bounds test to cointegration by Pesaran et al. (2001), is that these studies may not be optimal when the sample size is very small. Another advantage of the ARDL technique is that it computes unbiased estimates of the long-run model (Harris & Sollis, 2003).

The ARDL bound test is underpinned by the Wald-test (F-statistic). If the F-statistic is greater than the critical value in the upper bound, then the null hypothesis (H_0) of cointegration is assumed. If the F-statistic is less than the lower critical bound, then the null hypothesis (H_0) of no cointegration is accepted. If the F-statistic is between the lower and upper critical bounds, then the results are unclear and inconclusive (Dritsakis, 2011). In addition, it should be noted that cointegration testing analysis consists of numerous specification decisions that reduce the accuracy and thus, the outcomes are sensitive to the specification decisions for the following reasons: structural breaks (Banafea, 2014; Ghouse et al., 2018); autoregressive lag length (Begum et al., 2010; Ghouse et al., 2018; Hundie & Daksa, 2019); and innovation process distribution or extensions and adaptations of the models (Ghouse et al., 2018).

As indicated by the objectives, this test is used to determine the short-run interactions and long-run equilibrium between factor inputs and output. In the instance that cointegration is present, then the causality test is conducted. If no cointegration is present, then the test procedure ends at this stage.

The ARDL bounds models as applied by Dritsaki & Stamatiou (2019), Belloumi (2014) and Sunde (2016) in their studies to compute the short-run and long-run equilibrium are adapted for this research, as shown in the equations below.

$$LNGDP_t = \delta_{11} + \delta_{12}LNGDP_{t-1} + \delta_{13}LNL_{t-1} + \delta_{14}LNFDI_{t-1} + \delta_{15}LNFCF_{t-1} + \delta_{16}LNEXP_{t-1} + \delta_{17}LNIMP_{t-1} + \delta_{18}LNINFRA_{t-1} + \sum_{i=1}^{p} \theta_{1i}LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{1i}LNL_{t-i} + \sum_{i=1}^{p} \sigma_{1i}LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{1i}LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{1i}LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{1i}LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{1i}LNINFRA_{t-i} + \mu_{1t} \quad \textbf{(4.9)}$$

In equation 4.9 above, LNGDP is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{12} = \delta_{13} = \delta_{14} = \delta_{15} = \delta_{16} = \delta_{17} = \delta_{18} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{12} \neq \delta_{13} \neq \delta_{14} \neq \delta_{15} \neq \delta_{16} \neq \delta_{17} \neq \delta_{18} \neq 0$.

$$LNL_t = \delta_{21} + \delta_{22}LNGDP_{t-1} + \delta_{23}LNL_{t-1} + \delta_{24}LNFDI_{t-1} + \delta_{25}LNFCF_{t-1} + \delta_{26}LNEXP_{t-1} + \delta_{27}LNIMP_{t-1} + \delta_{28}LNINFRA_{t-1} + \sum_{i=1}^{p} \theta_{2i}LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{2i}LNL_{t-i} + \sum_{i=1}^{p} \sigma_{2i}LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{2i}LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{2i}LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{2i}LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{2i}LNINFRA_{t-i} + \mu_{2t} \quad \textbf{(4.10)}$$

In equation 4.10 above, LNL is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{22} = \delta_{23} = \delta_{24} = \delta_{25} = \delta_{26} = \delta_{27} = \delta_{28} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{22} \neq \delta_{23} \neq \delta_{24} \neq \delta_{25} \neq \delta_{26} \neq \delta_{27} \neq \delta_{28} \neq 0$.

$$LNFDI_t = \delta_{31} + \delta_{32}LNGDP_{t-1} + \delta_{33}LNL_{t-1} + \delta_{34}LNFDI_{t-1} + \delta_{35}LNFCF_{t-1} + \delta_{36}LNEXP_{t-1} + \delta_{37}LNIMP_{t-1} + \delta_{38}LNINFRA_{t-1} + \sum_{i=1}^{p} \theta_{3i}LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{3i}LNL_{t-i} + \sum_{i=1}^{p} \sigma_{3i}LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{3i}LNFCF_{t-i} + \sum_{i=1}^{p} \lambda_{3i}LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{3i}LNIMP_{t-i} + \sum_{i=1}^{p} \varpi_{3i}LNEXP_{t-i} + \sum_{i=1}^{p} \lambda_{3i}LNINFRA_{t-i} + \mu_{3t} \quad \textbf{(4.11)}$$

In equation 4.11 above, LNFDI is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{32} = \delta_{33} = \delta_{34} = \delta_{35} = \delta_{36} = \delta_{37} = \delta_{38} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{32} \neq \delta_{33} \neq \delta_{34} \neq \delta_{35} \neq \delta_{36} \neq \delta_{37} \neq \delta_{38} = 0$.

$$LNFCF_t = \delta_{41} + \delta_{42}LNGDP_{t-1} + \delta_{43}LNL_{t-1} + \delta_{44}LNFDI_{t-1} + \delta_{45}LNFCF_{t-1} + \delta_{46}LNEXP_{t-1} + \delta_{47}LNIMP_{t-1} + \delta_{48}LNINFRA_{t-1} + \sum_{i=1}^{p}\theta_{4i}LNGDP_{t-i} + \sum_{i=1}^{p}\psi_{4i}LNL_{t-i} + \sum_{i=1}^{p}\sigma_{4i}LNFDI_{t-i} + \sum_{i=1}^{p}\beta_{4i}LNFCF_{t-i} + \sum_{i=1}^{p}\varpi_{4i}LNEXP_{t-i} + \sum_{i=1}^{p}\kappa_{4i}LNIMP_{t-i} + \sum_{i=1}^{p}\lambda_{4i}LNINFRA_{t-i} + \mu_{4t} \quad \textbf{(4.12)}$$

In equation 4.12 above, LNFCF is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{42} = \delta_{43} = \delta_{44} = \delta_{45} = \delta_{46} = \delta_{47} = \delta_{48} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{42} \neq \delta_{43} \neq \delta_{44} \neq \delta_{45} \neq \delta_{46} \neq \delta_{47} \neq \delta_{48} = 0$.

$$LNEXP_t = \delta_{51} + \delta_{52}LNGDP_{t-1} + \delta_{53}LNL_{t-1} + \delta_{54}LNFDI_{t-1} + \delta_{55}LNFCF_{t-1} + \delta_{56}LNEXP_{t-1} + \delta_{57}LNIMP_{t-1} + \delta_{58}LNINFRA_{t-1} + \sum_{i=1}^{p}\theta_{5i}LNGDP_{t-i} + \sum_{i=1}^{p}\psi_{5i}LNL_{t-i} + \sum_{i=1}^{p}\sigma_{5i}LNFDI_{t-i} + \sum_{i=1}^{p}\beta_{5i}LNFCF_{t-i} + \sum_{i=1}^{p}\varpi_{5i}LNEXP_{t-i} + \sum_{i=1}^{p}\kappa_{5i}LNIMP_{t-i} + \sum_{i=1}^{p}\lambda_{5i}LNINFRA_{t-i} + \mu_{5t} \quad \textbf{(4.13)}$$

In equation 4.13 above, LNEXP is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{52} = \delta_{53} = \delta_{54} = \delta_{55} = \delta_{56} = \delta_{57} = \delta_{58} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{52} \neq \delta_{53} \neq \delta_{54} \neq \delta_{55} \neq \delta_{56} \neq \delta_{57} \neq \delta_{58} = 0$.

$$LNIMP_t = \delta_{61} + \delta_{62}LNGDP_{t-1} + \delta_{63}LNL_{t-1} + \delta_{64}LNFDI_{t-1} + \delta_{65}LNFCF_{t-1} + \delta_{66}LNEXP_{t-1} + \delta_{67}LNIMP_{t-1} + \delta_{68}LNINFRA_{t-1} + \sum_{i=1}^{p}\theta_{6i}LNGDP_{t-i} + \sum_{i=1}^{p}\psi_{6i}LNL_{t-i} + \sum_{i=1}^{p}\sigma_{6i}LNFDI_{t-i} + \sum_{i=1}^{p}\beta_{6i}LNFCF_{t-i} + \sum_{i=1}^{p}\varpi_{6i}LNEXP_{t-i} + \sum_{i=1}^{p}\kappa_{6i}LNIMP_{t-i} + \sum_{i=1}^{p}\lambda_{6i}LNINFRA_{t-i} + \mu_{6t} \quad \textbf{(4.14)}$$

In equation 4.14 above, LNIMP is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{62} = \delta_{63} = \delta_{64} = \delta_{65} = \delta_{66} = \delta_{67} = \delta_{68} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{62} \neq \delta_{63} \neq \delta_{64} \neq \delta_{65} \neq \delta_{66} \neq \delta_{67} \neq \delta_{68} = 0$.

$$LNINFRA_t = \delta_{71} + \delta_{72}LNGDP_{t-1} + \delta_{73}LNL_{t-1} + \delta_{74}LNFDI_{t-1} + \delta_{75}LNFCF_{t-1} + \delta_{76}LNEXP_{t-1} + \delta_{77}LNIMP_{t-1} + \delta_{78}LNINFRA_{t-1} + \sum_{i=1}^{p}\theta_{7i}LNGDP_{t-i} + \sum_{i=1}^{p}\psi_{7i}LNL_{t-i} + \sum_{i=1}^{p}\sigma_{7i}LNFDI_{t-i} + \sum_{i=1}^{p}\beta_{7i}LNFCF_{t-i} + \sum_{i=1}^{p}\varpi_{7i}LNEXP_{t-i} + \sum_{i=1}^{p}\kappa_{7i}LNIMP_{t-i} + \sum_{i=1}^{p}\lambda_{7i}LNINFRA_{t-i} + \mu_{7t} \quad \textbf{(4.15)}$$

In equation 4.15 above, LNINFRA is the dependent variable. The null hypothesis of no cointegration is H_0: $\delta_{72} = \delta_{73} = \delta_{74} = \delta_{75} = \delta_{76} = \delta_{77} = \delta_{78} = 0$, and the alternative hypothesis of cointegration is H_1: $\delta_{72} \neq \delta_{73} \neq \delta_{74} \neq \delta_{75} \neq \delta_{76} \neq \delta_{77} \neq \delta_{78} = 0$.

Where:

I. Logged value of output or value-added is denoted by LNGDP represents GDP share of the TSC sector from 1985 to 2018

II. Logged value of the labour force in the TSC sector from 1985 to 2018 is denoted as LNL

III. Logged value of inward FDI in the TSC from 1985 to 2018 is indicated as LNFDI

IV. Logged value of fixed capital formation (domestic investment) expressed as LNFCF from 1985 to 2018 in the TSC sector

V. Logged value of exports and imports in the transport and communications sector from 1985 to 2018 denoted as LNEXP and LNIMP, respectively.

VI. Logged value of infrastructure from 1985 to 2018 denoted as LNINFRA (investment in information, computer and telecommunications is a proxy for infrastructure in the South African economy)

VII. $\delta_{11}, \delta_{21}, \delta_{31}, \delta_{41}, \delta_{51}, \delta_{61}$ *and* δ_{71} are constants

VIII. θ, σ, ψ, β, ʎ, ϖ and Ƙ denote the coefficients

IX. $\mu_{1t}, \mu_{2t}, \mu_{3t}, \mu_{4t}, \mu_{5t}, \mu_{6t}$ and μ_{7t} are error correction terms

X. Δ denotes the difference operator

XI. *p* represents the numbers of lags

4.5 GRANGER CAUSALITY ANALYSIS

The Granger causality analysis can only be applied if there is a long-run relationship between variables (Belloumi, 2014; Takaendesa & Odhiambo, 2007).

Granger causality testing is underpinned by the principle that a future event cannot be the reason for a past occurrence, but a past event can be the cause for a future event to occur (Takaendesa & Odhiambo, 2007). The definition of Granger causality states that if the past dataset of a time-series, namely H_P, can significantly predict the future values of another time-series, namely H_Q, then H_P Granger causes H_Q (Baig et al., 2018; Takaendesa & Odhiambo, 2007).

Failure to determine the causal relationship may indicate the presence of spillovers where there are none. The conclusion that the inputs are the cause or explain the behaviour of output may not hold even if there may be cointegration between the variables. It could be

that the behaviour of output is not explained by the inputs but by another unknown explanatory variable not factored in the model (Shrestha & Bhatta, 2018). Regressions can indicate a positive and statistically significant correlation between FDI and productivity, consistent with spillovers, even though the FDI did not cause the high levels of productivity but was rather enticed by them (Görg & Greenaway, 2003). When the results indicate that correlations exist, it is critical to determine whether the statistical correlation(s) can be attributed to the causal effect of the treatment of the variable outcome(s). This is referred to as the endogeneity problem. "*Endogeneity* renders estimates of the association between treatment and the outcome based on correlations biased estimates of the causal effect between treatment on outcome" (Schlotter et al., 2011).

There is evidence that FDI in developing countries creates spillover benefits through technology diffusion and skills transfer; thus, this matter has received policy consideration globally (Willem te Velde, 2019). Evidence from empirical studies has indicated that improvements in infrastructure in the transport, storage and communication (TSC) sector will attract foreign investment. South Africa boasts the most extensive transport infrastructure in Africa. The region is home to the largest air and maritime transport companies on the continent. South Africa ranks first on the Logistics Performance Index of the World Bank in Africa. ZA also has one of the most advanced ICT systems in Africa (The Department of Trade, Industry and Competition - InvestSA, 2018). These attributes enable South Africa to be a desirable location for investments in the TSC sector but can make the interpretation of econometric analysis in the case of South Africa cumbersome because it could be that foreign investment in the TSC comes to ZA due to the good infrastructure in place, which does not necessarily lead to improvements in the sector, but rather enters one which is productive. Addison & Heshmati (2004) in their study of 23 countries from 1976 – 1999 examine the causal relationship between ICT and FDI flows. The causal relationship established confirms that ICT attracts inward FDI. Lydon & Williams (2005), in their research, found that in developing countries with more robust telecommunications networks, on average FDI inflows are higher. Typically, a nation with good physical infrastructure, namely: roads, ports, bridges, and communications, is likely to entice FDI (Bakar et al., 2012)**.** Babatunde (2011) carried out a study of 42 Sub-Saharan developing countries from 1980 to 2003, which found a considerable positive correlation between FDI and infrastructure development. The study emphasised that underdeveloped infrastructure may deter investors and will result in additional costs.

When cointegration is found between the series, the ECM models can be established. Granger causality based on the ECM and, as applied by Belke et al. (2010) and Sunde (2016), is adapted for this study to determine the direction of the causal relationship. The ECMs for the study are depicted in the equations below.

$$\Delta LNGDP_t = \delta_{11} + \sum_{i=1}^{p} \theta_{1i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{1i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{1i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{1i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{1i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{1i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{1i} \Delta LNINFRA_{t-i} + \alpha_{1i} ECT_{t-1} + \mu_{1t} \quad \textbf{(4.16)}$$

$$\Delta LNL_t = \delta_{21} + \sum_{i=1}^{p} \theta_{2i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{2i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{2i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{2i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{2i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{2i} \Delta LNINFRA_{t-i} + \alpha_{2i} ECT_{t-1} + \mu_{2t} \quad \textbf{(4.17)}$$

$$\Delta LNFDI_t = \delta_{31} + \sum_{i=1}^{p} \theta_{3i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{3i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{3i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{3i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{3i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{3i} \Delta LNINFRA_{t-i} + \alpha_{3i} ECT_{t-1} + \mu_{3t} \quad \textbf{(4.18)}$$

$$\Delta LNFCF_t = \delta_{41} + \sum_{i=1}^{p} \theta_{4i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{4i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{4i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{4i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{4i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{4i} \Delta LNINFRA_{t-i} + \alpha_{4i} ECT_{t-1} + \mu_{4t} \quad \textbf{(4.19)}$$

$$\Delta LNEXP_t = \delta_{51} + \sum_{i=1}^{p} \theta_{5i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{5i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{5i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{5i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{5i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{5i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{5i} \Delta LNINFRA_{t-i} + \alpha_{5i} ECT_{t-1} + \mu_{5t} \quad \textbf{(4.20)}$$

$$\Delta LNIMP_t = \delta_{61} + \sum_{i=1}^{p} \theta_{6i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{6i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{6i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{6i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{6i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{6i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{6i} \Delta LNINFRA_{t-i} + \alpha_{6i} ECT_{t-1} + \mu_{6t} \quad \textbf{(4.21)}$$

$$\Delta LNINFRA_t = \delta_{71} + \sum_{i=1}^{p} \theta_{7i} \Delta LNGDP_{t-i} + \sum_{i=1}^{p} \psi_{7i} \Delta LNL_{t-i} + \sum_{i=1}^{p} \sigma_{7i} \Delta LNFDI_{t-i} + \sum_{i=1}^{p} \beta_{7i} \Delta LNFCF_{t-i} + \sum_{i=1}^{p} \varpi_{7i} \Delta LNEXP_{t-i} + \sum_{i=1}^{p} \kappa_{7i} \Delta LNIMP_{t-i} + \sum_{i=1}^{p} \lambda_{7i} \Delta LNINFRA_{t-i} + \alpha_{7i} ECT_{t-1} + \mu_{7t} \quad \textbf{(4.22)}$$

Where:

I. Logged value of output or value-added is denoted by LNGDP represents GDP share of the TSC sector from 1985 to 2018

II. Logged value of the labour force in the TSC sector from 1985 to 2018 is denoted as LNL

III. Logged value of inward FDI in the TSC from 1985 to 2018 is indicated as LNFDI

IV. Logged value of fixed capital formation (domestic investment) expressed as LNFCF from 1985 to 2018 in the TSC sector

V. Logged value of exports and imports in the transport and communications sector from 1985 to 2018 denoted as LNEXP and LNIMP, respectively.

VI. Logged value of infrastructure represents investment in the telecommunications and information technology from 1985 to 2018 denoted as LNINFRA.

VII. δ denotes the constants

VIII. θ, σ, ψ, β, ʎ, ϖ, and Ƙ denote the coefficients

IX. Δ is the difference operator

X. ECT_{t-1} represents the lagged error correction term

XI. α_{1i}, α_{2i}, α_{3i}, α_{4i}, α_{5i}, α_{6i}, and α_{7i} symbolise the velocity of the change from short-run to long-run equilibrium (Saidu et al., 2018)

XII. $\mu_{1t}, \mu_{2t}, \mu_{3t}, \mu_{4t}, \mu_{5t}, \mu_{6t}$ and μ_{7t} are white noise serially independent random error terms

XIII. p represents the numbers of lags (Sunde, 2016)

Δ is the difference operator, ECT_{t-1} represents the error correction term, established from the long-run association. The long-run causal relationship is established by the significance of the coefficient of the lagged error term indicated by the t-statistic (ECT_{t-1}). The presence of a significant relationship in first differences gives evidence on the direction of short-run causality (Hamdi et al., 2014).

4.6 DIAGNOSTIC AND STABILITY TESTS

The diagnostic tests are conducted to establish the residuals from the ECM. Diagnostic tests are conducted to determine the goodness of fit of the model. In order to furnish results that are robust with good explanatory power, the goodness of fit of the model is tested. These tests also look at the residuals to determine the statistical significance of the fitted regressed model. The diagnostic tests examine the serial correlation, functional form, normality, and heteroscedasticity (Iheanacho, 2017). The diagnostic tests include normality testing using the Jarque–Bera test, autocorrelation including the following approaches: Durbin-Watson test, the Lagrange Multiplier (LM) test, and White's heteroscedasticity test.

4.6.1 Jarque-Bera test

Kurtosis tests the series distribution's crest gradient or slope. Kurtosis is a mathematical method to describe the degree to which the cluster scores in the trough or crest of the series distribution are measured. When the kurtosis is greater than or equal to 3, then the variable's distribution is markedly different from a normal distribution in its tendency to produce outliers (Westfall & Henning, 2013). When the kurtosis is smaller than 3 for all the variables, this indicates that the dataset has lighter tails than a normal distribution.

Jarque-Bera is a metric to determine whether the series is normally distributed and thus calculates the disparity between the skewness and kurtosis of the sample versus that of the normal distribution. The distribution of the data is positively skewed and contains moderate deviations from the normal when the individual kurtosis estimates for all variables in the study are less than 3. The Jarque-Bera values and subsequent probabilities reaffirm the findings of the skewness and kurtosis.

4.6.2 Durbin-Watson test

The Durbin-Watson test statistic measures the autocorrelation, also referred to as serial correlation, which occurs when error terms in a regression model are correlated and have cross-signals in a particular data set at a given time. Gujarati (2006) defines autocorrelation as "correlation between members of observations ordered in time (i.e., time-series data) or space (i.e., cross-sectional-data)." It is necessary to account for the autocorrelation in time-series analysis. The consequences of autocorrelation include biased estimators, which are

not the optimal model fit. The estimated variances and errors of the OLS estimators may be inefficient – leading to *t* and *F* tests that are unreliable: "these are not best linear unbiased estimators (BLUE)"(Gujarati, 2006). The Durbin-Watson (DW) test statistic lies between 0 and 4 (i.e., $0 \leq d \leq 4$). 0 indicates a perfect positive correlation, and 4 is a perfect negative correlation. A test statistic of 2 shows that there is no autocorrelation and is thus the optimal outcome. The closer the Durbin-Watson test statistic value is to 2, the better. $\hat{\rho}$ is the estimator for the coefficient of autocorrelation of p and lies between -1 and 1, -1, indicating perfect negative correlation, and 1 is perfect positive correlation.

4.6.3 Breusch–Godfrey Test/ Lagrange Multiplier (LM)

To circumvent any of the drawbacks of the Durbin–Watson d autocorrelation test, statisticians Breusch and Godfrey created their own autocorrelation test. The Breusch–Godfrey test, also known as the Lagrange Multiplier (LM) test, determines the presence of autocorrelation (Gujarati, 2003). The null hypothesis states that no serial association exists of any order up to p. The test has a different lag order than the regressed model. The test statistic for the chosen lag order is calculated by performing an auxiliary regression on the residuals for the initial right-hand explanatory variables and the lagged residuals (Nchoe, 2016).

4.6.4 Ramsey's (1969) regression specification error test (Reset)

Ramsey's (1969) regression specification error test (RESET) has proven to be efficient to identify misspecification of general functional form. RESET applies polynomials in the OLS fitted values to identify general types of functional form misspecification. Ramsey's RESET establishes whether the non-linear combinations of the fitted values aid to explain the explanatory variable(s) (Wooldridge, 2013).

4.6.5 Cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ)

As per Iheanacho (2017), following from Brown et al. (1975), the stability tests are run with the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). If the plots of the CUSUM and CUSUMSQ statistics lie within the range of the critical values at the five percent significance level, then the null

hypothesis that all coefficients in the particular regression indicate stability and cannot be rejected (Iheanacho, 2017).

4.7 DATA SOURCES

The research is quantitative and thus, secondary data on FDI and other macroeconomic variables necessary for this study is compiled from the South African Reserve Bank (SARB), Statistics South Africa (StatsSA), and the United Nations Conference on Trade and Development. The information is freely available on their respective websites. The South African macroeconomic secondary data applied in the study is from 1985 - 2018. This data is published periodically as part of the reports providing indicators of economic performance for South Africa.

Constant 2010 values are applied for data on gross domestic product and not current prices. This is because constant rates calculate the actual shift in output and are not influenced by the impact of inflation (US Census Bureau, 2020).

The compilation of the transport, storage and communication (TSC) data by StatsSA and SARB is according to the South African Standard Industrial Classification (SIC) on economic activity (Statistics South Africa, 2012).

4.8 DATA ANALYSIS

The following programmes are employed to determine FDI spillover effects, short and long-run relationships, and causality in the TSC sector in ZA from 1985 to 2018: Stata version 14, Excel and EViews 10. These programmes are used to manage the data, compile descriptive statistics, and conduct statistical analysis.

4.9 SUMMARY OF DATA EMPLOYED IN THE STUDY AND EXPECTED SIGNS

The expected signs are computed by considering (i) Sunde (2016) applying variables as in the UNCTAD (1992) report, (ii) Albert Wijeweera et al. (2010), and (iii) Masipa (2018) on the relationship between FDI and economic growth. The relationship is such that GDP_t, expressed as a function of capital formation (CF_t), labour employment (EMP_t), foreign direct investment (FDI_t), human capital (HC_t), new technique (Mt), and international trade (TRD_t) (Sunde, 2016). The expected signs when the dependent variable is GDP, and explanatory

variables are labour, FDI, fixed capital formation, exports, and infrastructure are positive, with the expectation of imports which is negatively correlated to GDP. The dependent and explanatory variables excluding imports are expected to be positively correlated. Therefore, this means that increases in the dependent variables except for imports will lead to increases in GDP. Decreases in the explanatory variables except for imports will lead to decreases in GDP.

The table below details a summary of the secondary macroeconomic data applied in the study.

Table 4.2: Summary of data employed in the econometric analysis and expected signs

NO.	DESCRIPTION OF DATA OBTAINED	SOURCE	VARIABLE/ NOTATION AND DESCRIPTION	EXPECTED SIGN
		DEPENDENT VARIABLE		
1.	Historic GDP figures from the transport, storage and communication sector in South Africa, from 1985 to 2018.	The South African Reserve Bank (SARB) offers an online facility (the facility is termed – online statistical query) that provides historical macroeconomic time-series data.	GDP from the TSC sector is referred to as output measured in millions of rands. The output is denoted as Y, then transformed to logarithm form and denoted as LNGDP.	Positive
		EXPLANATORY VARIABLES		
2.	Foreign direct liability (alternatively known as foreign direct investment) in the transport, storage and communication (TSC) sector in South Africa, from 1985 to 2018, was obtained.	The South African Reserve Bank (SARB) offers an online facility (the facility is termed – online statistical query) that provides historical macroeconomic time-series data.	In the study, foreign direct liability measured in millions of rands and is denoted as FDI, then transformed to logarithm form and represented by LNFDI.	Positive/ Negative
3.	Labour force data from the transport, storage and communication sector in South Africa, from 1985 to 2018.	Statistics South Africa provided the data on the labour force via email correspondence.	The labour force measured by the number of employees in the TSC sector is represented by L, and then transformed into logarithm form and referred to as LNL.	Positive
4.	Gross Fixed Capital Formation (FCF) in the TSC sector, from 1985 to 2018.	The South African Reserve Bank (SARB) offers an online facility (the facility is termed – online statistical query) that provides historical macroeconomic time-series data.	LNFCF is the logarithm of gross fixed capital formation in the TSC sector. This is in line with guidelines set out in the System of National Accounts (SNA) 2008 and the revised Government Finance Statistics (GFS) of 2014, which categorises government income, expenditures, assets, and liabilities.	Positive

NO.	DESCRIPTION OF DATA OBTAINED	SOURCE	VARIABLE/ NOTATION AND DESCRIPTION	EXPECTED SIGN
			Gross Fixed Capital Formation (FCF) encompasses the following (Statistics South Africa, 2014): *I. Residential buildings.* *II. Non-residential buildings.* *III. Construction works.* *IV. Machinery and equipment includes - transport equipment, information, computer and telecommunications (ICT) equipment, and other machinery and equipment* *V. Intellectual property products include - computer software, research and development, and mineral exploration and evaluation* *VI. In addition, the costs incurred in selling an asset to another economic agent.* FCF is measured in millions of rands.	
5.	Exports from transport and communications from 1985 to 2018.	United Nations Conference on Trade and Development statistics	LNEXP is the logarithm of exports in current US$ in transport and communications.	Positive
6.	Imports from transport and communications from 1985 to 2018.	United Nations Conference on Trade and Development statistics	LNIMP is the logarithm of imports in current US$ in transport and communications.	Negative
7.	Information, computer and telecommunications from 1985 to 2018.	The South African Reserve Bank (SARB) offers an online facility (the facility is termed – online statistical query) that provides historical macroeconomic time-series data.	LNINFRA is transformed into logarithm form. Investment in information, computer and telecommunications from 1985 to 2018 is a proxy for infrastructure in South Africa (Bruhn et al., 2018; Lashaki & Ahmed, 2017; Sunde, 2016). This is measured in millions of rands.	Positive

4.10 CONCLUSION

The chapter detailed the empirical approach, beginning with a description of the unit root analysis using the popular augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) methods. The OLS method is applied, and modifications are made taking several studies into account to estimate total factor productivity. The autoregressive distributed lag model (ARDL) bounds testing approach to cointegration, and error correction Granger causality models are estimated. The diagnostic and stability tests are discussed. The section also discusses the data and compilation of the variables, giving an account of the sources, description and the expected signs.

CHAPTER FIVE: ESTIMATIONS AND ANALYSIS OF RESULTS

5.1 INTRODUCTION

The variables in this study comprise annual time-series data for the transport, storage and communication (TSC) sector, over the period 1985 – 2018. This section analyses the data collected and conducts econometric analysis. The data is presented in terms of descriptive statistics in which patterns and dispersion of the data are explained, utilising the mean, median, minimum, maximum, standard deviation, skewness, and kurtosis before processing the data in the analysis. The analysis includes unit root tests, ordinary least squares (OLS) method, autoregressive distributed lag (ARDL) bounds test, which can only be applied if the assumptions of the test are met; and lastly, if it is found that there is a long-run relationship, then the Granger causality analysis can be employed (Takaendesa & Odhiambo, 2007).

5.2 DESCRIPTIVE STATISTICS

The descriptive statistics for the logged variables contained in the study are computed from the components accounting for GDP, labour, FDI inflows (FDI), fixed capital formation (FCF), exports (EXP), imports (IMP), and infrastructure (INFRA) over 34 years, from 1985 to 2018 in South Africa in the TSC sector. The average value of the series is the mean, calculated from the summation of the series to the number of observations. The median is the mid-value and indicates the sequence of the values numbered from smallest to largest. The median is less sensitive to outliers than the mid-range to the centre of the distribution. The maximum and minimum values in the series are the max and min. Standard deviation is a dispersion or distribution metric (Hui, 2019).

Kurtosis tests the series distribution's crest gradient, or slope. Kurtosis is a mathematical method to describe the degree to which the cluster scores in the trough, or crest of the series distribution are measured. When the kurtosis is greater than or equal to 3, then the variable's distribution is markedly different from a normal distribution in its tendency to produce outliers (Westfall & Henning, 2013). The kurtosis is smaller than 3 for all the variables, which indicates that the dataset does not have the tendency to produce outliers.
Skewness is a function of series distribution asymmetry about its mean. If skewness is less than −1 or greater than +1, the distribution is highly skewed. If skewness is between −1 and – 0.5 or between + 0.5 and +1, the distribution is moderately skewed. If skewness is

between -0.5 and + 0.5, the distribution is approximately symmetrical (Brown, 2020). The individual skewness for LNFDI and LNGDP is -0.11 and therefore indicates that the distributions are highly skewed to the left. LNL approximated at -.0.49 falls short of symmetry. LNFCF and LNIMP are highly skewed as these values lie between -1 and +1. The summary statistics can be found in the table below.

Table 5.1: Descriptive statistics of logged variables

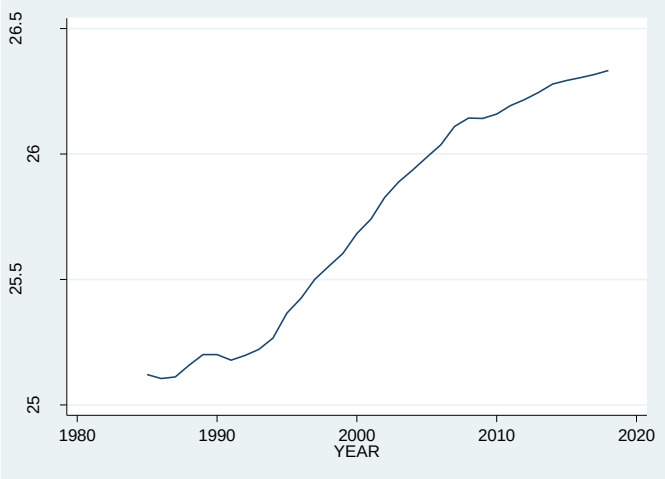
Variables	M	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P	N
LNGDP	25.74	25.78	26.33	25.10	0.45	-0.11	1.42	3.60	0.17	34
LNL	12.74	12.79	13.09	12.21	0.25	-0.49	2.30	2.04	0.36	34
LNFDI	22.53	22.94	26.11	18.93	2.62	-0.11	1.56	3.00	0.22	34
LNFCF	24.42	24.33	25.48	23.31	0.76	0.06	1.51	3.17	0.20	34
LNEXP	21.62	21.45	22.61	20.26	0.73	-0.18	1.83	2.11	0.35	34
LNIMP	22.35	21.98	21.15	23.42	0.77	0.09	1.41	3.62	0.16	34
LNINFRA_	22.74	23.07	24.34	20.59	1.19	-0.37	1.74	3.02	0.22	34

M – Mean
SD – Standard Deviation
N – Number of Observations
P – Corresponding Probability to Jarque-Bera Statistic

Source: Author's computations from EViews

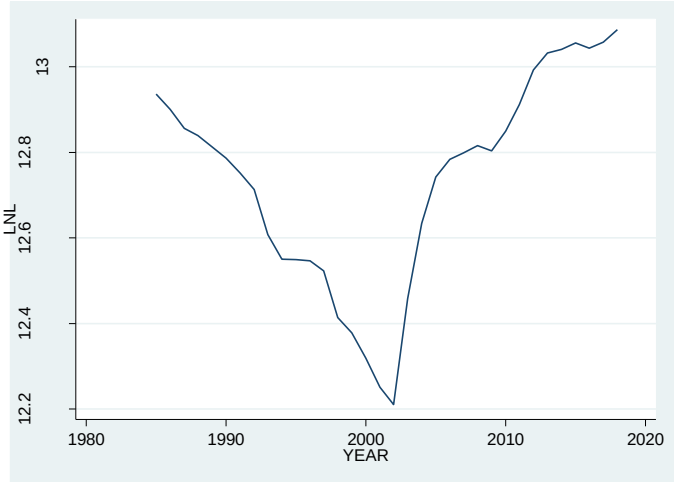
The figures on the next pages show the graphical representation of the variables in this paper during the period under study.

Figure 5-1: LNGDP in the TSC sector, 1985 – 2018



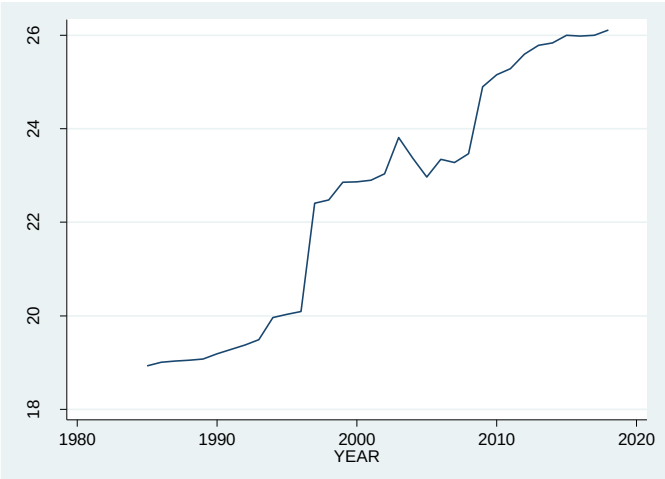
Between 1985 and 1990, the TSC's sector contribution to GDP gradually increased. After 1990 GDP climbed significantly and continued to do so until 2008 where the rate of increase slowed down. The value of the TSC's sector contribution to GDP from 1985 to 2018 has progressively increased over time, as shown in the adjacent graph. Given the increases in economic activity over the last few decades, more especially due to the dawn of democracy in 1994, the quantity of output of the TSC sector is expected to increase during the period under observation.

Figure 5-2: LNL in the TSC sector from 1985 to 2018



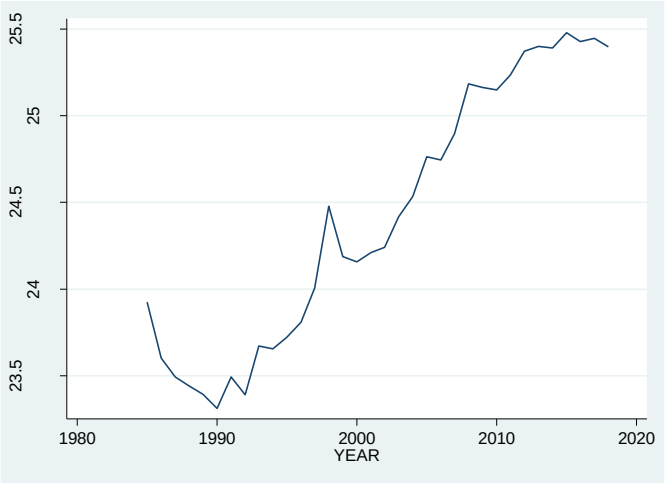
Between 1985 and 1990, labour in the TSC sector drastically decreased reaching a record low between 2003/4. 1985 to 2003, labour in the TSC sector has been increasing at a gradually declining rate. 2003 onwards the rate of labour has been progressively increasing.

Figure 5-3: LNFDI in the TSC sector, 1985 – 2018



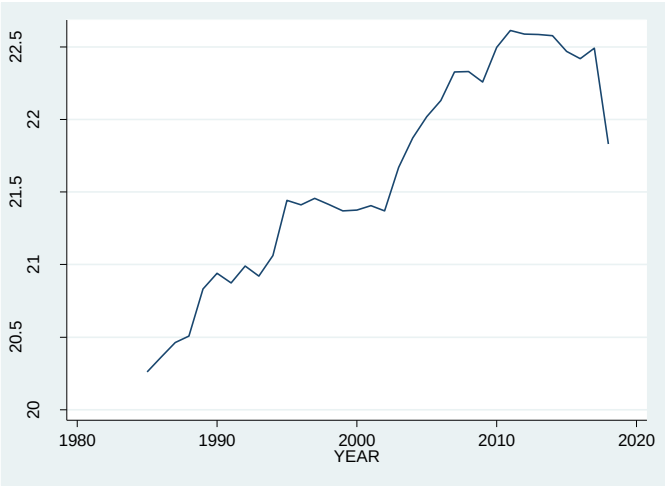
The value of FDI inflows in the TSC sector has progressively increased from 1985 to 2018. FDI in the TSC sector steadily increased between 1985 and 1995. After the first democratic elections in 1994, namely 1996 to 1997, there was a significant jump in the amount of FDI the TSC sector drew. This is partly due to international sanctions imposed on South Africa being lifted after the first democratic elections. There was a very steep increase in FDI in the TSC sector between 1996 and 1997. It steadily increased between 1998 to 2002, and dropping in 2007/8 and then increasing again from 2009 till 2018.

Figure 5-4: LNFCF in the TSC sector, 1985 – 2018



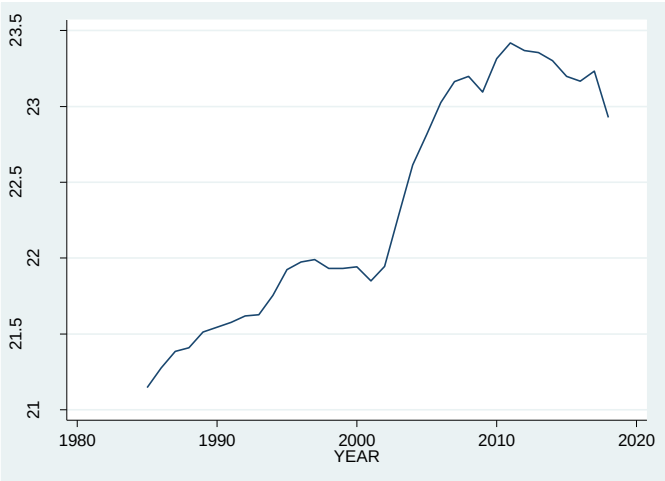
Fixed capital formation (FCF) in the TSC sector decreased from 1985 to 1989 and trended upwards in 1990, followed by short term ups and downs till 1994. From 1995, FCF in the TSC sector increased steeply till 1996, dropped in 1997 and trended upwards again in 2000. FCF in the TSC sector continued to increase/rise from 2000 through 2005 and 2010 when it temporarily slightly dropped.

Figure 5-5: LNEXP in the TSC sector, 1985 – 2018



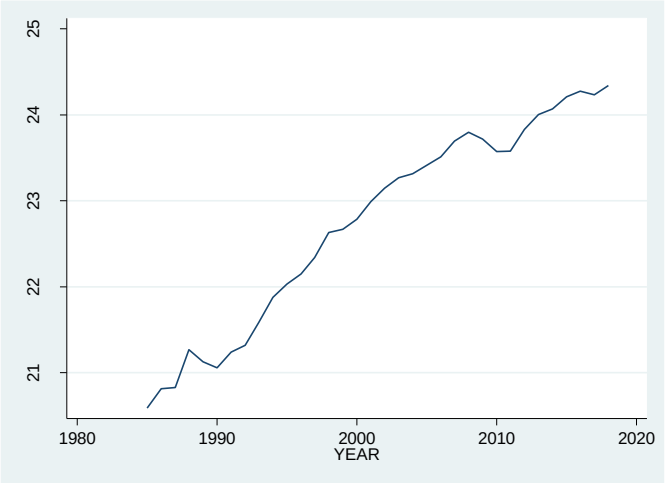
Exports in transport and communications increased between 1985 and 1990 before experiencing fluctuations up to 1993. Exports increased between 1994 and 1995, followed by a decrease between 1996 and 2004. There was a sharp increase in exports between 2003 and 2007 before dropping in 2008 and increasing again in 2009. By 2010 exports had stabilised and slightly decreased towards 2012, 2015 and 2018. Exports were subject to trade restrictions imposed on South Africa leading up to the first democratic elections in 1994.

Figure 5-6: LNIMP in the TSC sector, 1985 – 2018



Imports have been increasing from 1985 to 1995, stabilised between 1996 and 2000. These then dropped towards 2005 and reached a record low in 2010 before increasing and then declining towards 2018. During the period under study, imports were subject to trade restrictions imposed on South Africa leading up to the first democratic elections in 1994.

Figure 5-7: LNINFRA in the TSC sector, 1985 - 2018



Infrastructure investment from 1985 to 2018 is denoted as LNINFRA (information, computer and telecommunications is a proxy for infrastructure in South Africa). Information, computer and telecommunications experienced a short term annual low in 1989 and 1990 and faced another low in 2009/10. The graph indicates an incremental increase in infrastructure investment for the period under study.

Source: Author's computations from Stata

5.3 UNIT ROOT TEST RESULTS

The Augmented Dickey-Fuller (ADF) and Phillip-Perron's (PP) test were applied using EViews to establish the order of integration of the data. The null hypothesis is that the time series has a unit root or is non-stationary, and the alternative hypothesis is that the series is stationary. In this study, the lag selection was not applied as the model was estimated using the automatic lag selection option in EViews.

Table 5.2: Unit root test results

Variable	Model Specification	LEVEL						FIRST DIFFERENCE						DECISION
		ADF			PP			ADF			PP			
		No Constant, No Trend	Constant, No Trend	Constant, Trend	No Constant, No Trend	Constant, No Trend	Constant, Trend	No Constant, No Trend	Constant, No Trend	Constant, Trend	No Constant, No Trend	Constant, No Trend	Constant, Trend	
LNGDP	**T-Statistic**	2.50	-1.24	-1.17	4.53	-0.39	-1.60	-1.51	-3.02	-3.02	-1.41	-3.04	-3.02	
	5% Critical Value	-1.95	-2.96	-3.56	-1.95	-2.95	-3.55	-1.95	-2.96**	-3.56	-1.95	-2.96**	-3.56	I(1)
	10% Critical Value	-1.61	-2.62	-3.21	-1.61	-2.62	-3.21	-1.61	-2.62*	-3.21	-1.61	-2.62**	-3.21	I(1)
IN_L_	**T-Statistic**	0.31	-1.32	-1.93	0.23	-0.96	-1.47	-2.78	-2.76	-3.02	-2.75	-2.71	-2.82	
	1% Critical Value	-2.64	-3.65	-4.27	-2.64	-3.65	-4.26	-2.64***	-3.65	-4.27	-2.64***	-3.65	-4.27	I(1)
	5% Critical Value	-1.95	-2.96	-3.56	-1.95	-2.95	-3.55	-1.95**	-2.96**	-3.56	-1.95**	-2.96**	-3.56	I(1)
	10% Critical Value	-1.61	-2.62	-3.21	-1.61	-2.62	-3.21	-1.61*	-2.62*	-3.21	-1.61*	-2.62*	-3.21	I(1)
LNFDI	**T-Statistic**	2.46	-0.54	-2.46	2.55	-0.52	-2.55	-4.98	-5.89	-5.79	-5.06	-5.89	-5.79	
	1% Critical Value	-2.64	-3.65	-4.26	-2.64	-3.65	-4.26	-2.64***	-3.65***	-4.27***	-2.64***	-3.65***	-4.27***	I(1)
	5% Critical Value	-1.95	-2.95	-3.55	-1.95	-2.95	-3.55	-1.95**	-2.96**	-3.56**	-1.95**	-2.96**	-3.56**	I(1)
	10% Critical Value	-1.61	-2.62	-3.21	-1.61	-2.62	-3.21	-1.61*	-2.62*	-3.21*	-1.61*	-2.62*	-3.21*	I(1)
LNFCF	**T-Statistic**	1.63	-0.04	-4.20	1.63	-0.04	-4.20	-5.55	-6.23	-6.06	-5.55	-6.29	-6.11	

Variable	Model Specification	LEVEL						FIRST DIFFERENCE						DECISION
		ADF			PP			ADF			PP			
		No Constant , No Trend	Constant , No Trend	Constant , Trend	No Constant , No Trend	Constant , No Trend	Constant , Trend	No Constant , No Trend	Constant , No Trend	Constant , Trend	No Constant , No Trend	Constant , No Trend	Constant , Trend	
	1% Critical Value	-2.64	-3.65	-4.26	-2.64	-3.65	-4.26	-2.64***	-3.65***	-4.27***	-2.64***	-3.65***	-4.27***	I(1)
	5% Critical Value	-1.95	-2.95	-3.55**	-1.95	-2.95	-3.55**	-1.95**	-2.96**	-3.56**	-1.95**	-2.96**	-3.56**	I(0)
	10% Critical Value	-1.61	-2.62	-3.21*	-1.61	-2.62	-3.21*	-1.61*	-2.62*	-3.21*	-1.61*	-2.62*	-3.21*	I(0)
LNEXP	**T-Statistic**	1.48	-2.01	0.22	1.33	-1.98	0.39	-3.35	-3.44	-3.97	-3.53	-3.66	-3.92	
	1% Critical Value	-2.64	-3.65	-4.26	-2.64	-3.65	-4.26	-2.64***	-3.65***	-4.27	-2.64***	-3.65***	-4.27	I(1)
	5% Critical Value	-1.95	-2.95	-3.55	-1.95	-2.95	-3.55	-1.95**	-2.96**	-3.56**	-1.95**	-2.96**	-3.56**	I(1)
	10% Critical Value	-1.61	-2.62	-3.21	-1.61	-2.62	-3.21	-1.61*	-2.62*	-3.21*	-1.61*	-2.62*	-3.21*	I(1)
LNIMP	**T-Statistic**	0.69	-1.42	-1.08	1.73	-1.40	-1.09	-2.58	-2.59	-2.74	-2.48	-2.51	-2.79	
	5% Critical Value	-1.95	-2.96	-3.56	-1.95	-2.95	-3.55	-1.95**	-2.96	-3.56	-1.95**	-2.96	-3.56	I(1)
	10% Critical Value	-1.61	-2.62	-3.21	-1.61	-2.62	-3.21	-1.61*	-2.62	-3.21	-1.61*	-2.62	-3.21	I(1)
LNINFRA	**T-Statistic**	-4.96	-1.61	-1.27	4.85	-1.81	-1.31	-3.54	-5.38	-5.52	-3.54	-5.38	-5.58	
	1% Critical Value	-2.64	-3.65	-4.26	-2.63	-3.65	-4.26	-2.64***	-3.65***	-4.27***	-2.64***	-3.65***	-4.27***	I(1)
	5% Critical Value	-1.95	-2.95	-3.55	-1.95	-2.95	-3.55	-1.95**	-2.96**	-3.56**	-1.95**	-2.96**	-3.56**	I(1)
	10% Critical Value	-1.61	-2.62	-3.21	-1.61	-2.62	-3.21	-1.61*	-2.62*	-3.21*	-1.61*	-2.62*	-3.21*	I(1)

Source: Author's computations from EViews

I. ***, **, * represents the case where the null hypothesis cannot be rejected at the particular critical value level, namely 1%, 5% or 10%, respectively.

II. I(0) – Integrated of order zero, the series becomes stationary at level. I(1) – Integrated of order 1, the series becomes stationary at first difference (Gujarati, 2003).

5.4 RESULTS OF THE ORDINARY LEAST SQUARES REGRESSION

The regression results are detailed below. The tests were run in EViews using the ordinary least squares (OLS) method. TFP is computed to determine the impact of the spillover effect from FDI. β_1, β_2, β_3, β_4, β_5 and β_6 are the parameters to be predicted.

The approach that I pursued in this study is the same as that by Ahmed & Lashaki (2019), Bruhn et al. (2018), and Lashaki & Ahmed (2017), which was to run the regression model at first difference, because from our unit root results, the data becomes stationary at first difference. I have added the difference lagged value of the dependent variable to improve the model's explanatory power. This approach is followed by Bruhn et al. (2018), citing Arellano and Bover (1995) and Blundell and Bond (1998). The error term in equation 4.7 is, by design, autocorrelated and correlated with the lagged dependent variable. It is, therefore, essential that an estimator that tackles both matters. Endogeneity is resolved by taking into account that all values of $\Delta GDP_{i, t-k}$, with $k > 1$, can be applied as an instrument for $\Delta GDP_{i, t-k}$. Arellano and Bover (1995) and Blundell and Bond (1998) modified an estimator comprising lagged levels and lagged differences. But not withholding limitations identified, that the lagged variables are frequently flawed estimations for differentiated variables, particularly when the variables tend towards a random walk (Bruhn et al., 2018). The model is therefore modified as follows:

$$\Delta LNGDP = A + \beta_1 \Delta LNL + \beta_2 \Delta LNFDI + \beta_3 \Delta LNFCF + \beta_4 \Delta LNEXP + \beta_5 \Delta LNIMP + \beta_6 \Delta LNINFRA + \beta_6 \Delta LNGDP_{t-1} + \mu \quad \textbf{(5.1)}$$

Table 5.3: Estimated coefficients of variables

Intercept	ΔLNL	ΔLNFDI	ΔLNFCF	ΔLNEXP	ΔLNIMP	ΔLNINFRA	$\Delta LNGDP_{t-1}$	R^2	R^2 Adjusted	DW
0.005 (0.452)	-0.056 (0.389)	0.001 (0.909)	-0.052 (0.086)*	0.029 (0.449)	-0.056 (0.396)	0.088 (0.011)**	0.601 (0.000)***	0.621	0.510	2.31

Source: Author's computations from EViews

***, **, * represents the case where the null hypothesis cannot be rejected at the particular critical value level, namely 1%, 5% or 10%, respectively.

Probability values indicate whether coefficients are significant or not. If the p-value is 0.01 or smaller than 0.01, then the coefficient is significant at the 1% level, meaning that the estimated coefficient is highly significant. A p-value of 0.05 or smaller is significant at the 5% level. If it is 0.10 or smaller, then the coefficient is substantive but not as robust as the latter

probabilities (i.e., 1% and 5%). As can be deduced from Table 5.3 above, and as expected, the differenced lagged value of GDP is positively correlated to GDP at the 1% level of significance. Fixed capital formation (ΔLNFCF) has a negative impact on GDP and is significant at 10%. The coefficient of infrastructure (ΔLNINFRA), which is 0.088, positively impacts GDP and is significant at 5%. The lag of GDP ($\Delta LNGDP_{t-1}$) is also significant at the 1% level. The coefficients of labour (ΔLNL), FDI (ΔLNFDI), exports (ΔLNEXP), imports (ΔLNIMP), which are 0.056, 0.001, 0.029, -0.056, respectively, are insignificant because their associated probabilities lie outside the 1%, 5% and 10% levels of significance. The joint probability of the model measures the joint significance of all explanatory variables in the equation (Wooldridge, 2013). The joint probability is 0.001, which is smaller than 0.01 and therefore impacts the dependent variable at the 1% level of significance.

In addition to interpreting individual coefficient values, it is necessary to calculate statistics to measure how well the model fits the data, and so the R^2 value is considered. $R^2 = 0.621$. The value indicates that 62.10% of the variation in output in the TSC sector from 1985 to 2018 can be explained (or accounted for) by the model. This indicates the extent to which the variables explain the variation in the equation (Wooldridge, 2013). The Durbin-Watson test statistic measures the autocorrelation in a given data set (Uyanto, 2020). However, given that the OLS method is run at first difference, the Durbin-Watson test statistic is not adequate to conclude on autocorrelation in the model. Thus, the variance inflation factors (VIF) are computed for the model (Wooldridge, 2013). The centred variance inflation factors are less than 10, which indicates that there is no serial multicollinearity to correct for in the model and that the tests can proceed (Wooldridge, 2013).

ΔLNTFP is computed using equation 5.2, which incorporates equations 4.8 and 5.1.

$$\Delta LNTFP = \Delta LNGDP - (\beta_1\Delta LNL + \beta_2\Delta LNFDI + \beta_3\Delta LNFCF + \beta_4\Delta LNEXP + \beta_5\Delta LNIMP + \beta_6\Delta LNINFRA + \beta_6\Delta LNGDP_{t-1} + \mu) \quad \textbf{(5.2)}$$

Table 5.4: Estimated coefficients of variables

ΔLNGDP	ΔLNL	ΔLNFDI	ΔLNFCF	ΔLNEXP	ΔLNIMP	ΔLNINFRA	ΔLNTFP
0.382	0.011	-0.006	0.006	-0.011	0.046	-0.065	0.3411

Source: Author's computations from EViews

The results for equation 5.2 are shown in Table 5.4. TFP (ΔLNTFP) is computed from equation 5.2. FDI (ΔLNFDI), exports (ΔLNEXP), and infrastructure (ΔLNINFRA) have negative coefficient estimates of -0.006, -0.011 and -0.065, respectively. However, only infrastructure has a negative and statistically significant coefficient, meaning that reduction in infrastructure has a negative effect on TFP in the TSC sector. Foreign direct investment has a weak negative effect on TFP in the TSC sector. Gross domestic product (ΔLNGDP), labour (ΔLNL), fixed capital formation (ΔLNFCF), and imports (ΔLNIMP) have positive coefficient estimates of 0.382, 0.011, 0.006 and 0.046, respectively. However, only gross domestic product (ΔLNGDP) has a positive and statistically significant coefficient, meaning that improvement in GDP has a positive impact on TFP in the TSC sector.

The negative spillover effects of FDI and labour on GDP in the TSC sector may be due to several factors. Trade literature indicates that spillover prospects may be more significant when third-world multi-national companies (MNEs) invest in other developing countries, rather than first-world MNEs, because developing countries could be better positioned to impart knowledge that can be adapted to the requirements of other developing countries (World Bank, 2017). Much of the inward FDI in South Africa is from Europe, as indicated by Figure 2-5, this may have a bearing on spillover transfer because Europe is also the most industrialised continent (*7 Continents of the World and Their Countries*, 2008). In chapter 3, Cheng (1984) purports that technological leadership is unlikely to prevail where the technology gap between nations is large, and therefore does not affirm Gerschenkron's catch-up hypothesis that the larger the technology gap between countries, the greater the opportunity for the follower to learn from the leader. Gerschenkron's catch-up hypothesis also factors the absorptive capacity as an enabler of the follower's ability to receive, implement and utilise new technology (Abramovitz, 1986; Farole & Winkler, 2014; Görg & Greenaway, 2003; Phelps & Nelson, 1966). Another reason for the lack of spillover effects from FDI is the association between FDI and total factor productivity in the South African economy, given the skills shortage in the country, this has a bearing on the ability to establish the FDI spillover effects (Bonga-Bonga & Phume, 2017). According to Blake et al. (2009), FDI spillover transfer through labour mobility is constrained by a number of factors. For instance, MNEs may recruit workers from their home countries for their central operational functions, who are unlikely to be employed by local firms. Moreover, in practice, MNEs may generally be successful in ensuring that firm-specific assets and benefits do not spill over (Görg and Greenaway, 2003).

The spillover effects analysis is subject to several inherent attributes that may lead to inaccurate inferences. The shortfall of this study is that, even though a correlation may exist between variables, this does not infer causation. So, the relationship of the variables in the model does not necessarily run from the explanatory variables to the dependent variable (Bordacconi & Larsen, 2014; Rohrer, 2018). The model may also suffer from the computation of the explanatory variables. The regression does not separate the rent from the knowledge (or technology) spillovers, and this may overstate the outcomes for technology spillovers (Burchardt, 2010). The regression may suffer from problems of endogeneity, due to factors such as reverse causality and omitted variable bias. Endogeneity may lead to conclusions of a relationship between two or more variables, whereas this does not exist as in reality (Bordacconi & Larsen, 2014; Burchardt, 2010). To counter endogeneity, methods such as the generalised method of moments (GMM) are recommended (Damijan et al., 2003, as cited in Halpern & Muraközy, 2007). Knowledge spillovers are somewhat difficult to measure. Furthermore, knowledge is fundamentally challenging to quantify (Paul Krugman, 1991, as cited in Moen & Burchardt, 2010). Research is also unable to determine spillovers' timing. This may produce results indicating that spillovers are negligible precisely because the timing of economic effects is uncertain (De Loo & Verspagen, 1998).

5.5 ARDL BOUNDS TEST RESULTS

Having established that the variables are integrated of order zero and one, the next is to analyse if there exists any cointegration among the variables using the ARDL bounds test approach. Cointegration refers to the fact that two or more series share a stochastic trend (Stock & Watson, 1993). The bounds test is based on the joint F-statistic which its asymptotic distribution is non-standard under the null hypothesis of no cointegration. The null hypothesis of no cointegration is rejected if the F-statistic is higher than the critical value of both the I(0) and I(1) regressors, and not rejected if otherwise (Belloumi, 2014; Pesaran et al., 2001). The table below provides the finite-sample critical values for the 5% and 10% significance levels. The ARDL bounds test results are detailed below, starting with GDP as the endogenous factor, followed by FDI as an endogenous (dependent) variable. In order to fully understand all interactions between the macroeconomic indicators in this study, analysis on all other endogenous factors is run.

5.5.1 Gross domestic product in the TSC sector as the dependent variable

5.5.1.1 Results of ARDL bounds tests for equation 4.9 (LNGDP dependent variable)

The following table provides results to cointegration among the GDP (dependent or endogenous) variable and the explanatory (exogenous) variables. The table below shows the ARDL bounds test results for equation 4.9 (LNGDP is the dependent variable).

Table 5.5: Results of ARDL bounds tests for equation 4.9 (LNGDP dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	14.842	10%	2.12	3.23
K		5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	-4.2819	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.5%	-3.13	-4.66
		1%	-3.43	-4.99

Source: Author's computations from EViews

The calculated value of the F-statistic is 14.84, which is above the upper bound 3.61 at the 5% significance level. The null hypothesis of no cointegration among the variables is rejected because there is evidence of a long-run/cointegrating relationship. These results indicate the presence of a long-run relationship (cointegration) when LNGDP is the dependent variable. Therefore, these findings suggest evidence for the existence of a long-run/cointegrating relationship between GDP and the explanatory variables.

5.5.1.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.9 (LNGDP dependent variable)

Table 5.6 below shows the results of the long-run and short-run relationships for equation 4.9 (ECM where LNGDP is the dependent variable).

Table 5.6: Analysis of long-run and short-run relationships for equation 4.9 (LNGDP dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (1, 0, 2, 2, 1, 2, 0); Dependent Variable: LNGDP			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNFDI	0.071***	2.944	0.009
LNFCF	-0.284*	-2.100	0.051
LNEXP	-0.333**	-2.885	0.010
LNIMP	-0.494***	-3.497	0.003
LNINFRA	0.351***	7.253	0.000
LNL	-0.158*	-1.814	0.087
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
Dependent Variable: D(LNGDP); Selected Model: ARDL (1, 0, 2, 2, 1, 2, 0)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D(LNFCF)	-0.0834***	-5.458	0.000
D (LNFCF (-1))	-0.056***	-4.539	0.000
D(LNEXP)	0.007	0.373	0.714
D (LNEXP (-1))	0.086***	5.254	0.000
D(LNIMP)	-0.044*	-1.764	0.096
D(LNINFRA)	0.106***	6.895	0.000
D (LNINFRA (-1))	0.058***	3.641	0.002
CointEq (-1)	-0.289***	-11.856	0.000
R-squared	0.914		
Adjusted R-squared	0.884		
F-statistic	30.575		0.000
DW-statistic	2.490		
DIAGNOSTIC TESTS			
TEST		**STATISTIC**	**PROBABILITY**
Serial Correlation		2.700	0.100
Normality test (Jarque-Bera)		0.059	0.971
Heteroskedasticity		1.159	0.381
Ramsey RESET (t-statistic)		0.741	0.469
Ramsey RESET (F-statistic)		0.549	0.469

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

The null hypothesis in this ARDL model is that there is no long-run relationship between GDP and the independent variables. The long-run coefficients represent the equilibrium effects of the independent variables on the dependent variable (GDP) over time.

Table 5.6 indicates that the sign of the long-run coefficients of LNFDI (β=0.071, p<0.05) and LNINFRA (β=0.351, p<0.05) were positive and statistically significant at the 5% level. This means that increases in foreign direct investment (LNFDI) and infrastructure (LNINFRA) were likely to lead to an increase in gross domestic product (LNGDP) in the long run. On the other hand, coefficients of LNEXP (β=-0.333, p<0.05), LNIMP (β=-0.494, p<0.05) were negative and statistically significant, suggesting that fluctuations in export and import values were likely to lead to -0.33 and -0.49 times negative shocks in the GDP in the long run. Results at the 10% level of significance indicate that LNFCF (β=-0.284, p<0.1) and LNL (β=-0.158, p<0.1) also had negative effects on the GDP in the long run. These results suggest that unit changes or fluctuations in fixed capital formation (LNFCF), and labour (LNL) were likely to lead to a decrease or a negative shock in gross domestic product (LNGDP) in the long run.

The cointegration test examines the existence of a long-run relationship between GDP and exports. The short-run coefficients account for short-run fluctuations not due to deviations from the long-run equilibrium. Table 5.6 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level, with a negative sign (-0.289), indicating that 28.9% of the disequilibrium in the past year's shocks in GDP were corrected back to the long-run equilibrium in the current year. The long-run coefficients indicate how quickly variables return to equilibrium, hence these results confirm that GDP can converge back to long-term equilibrium quickly after a short-term shock in previous years.

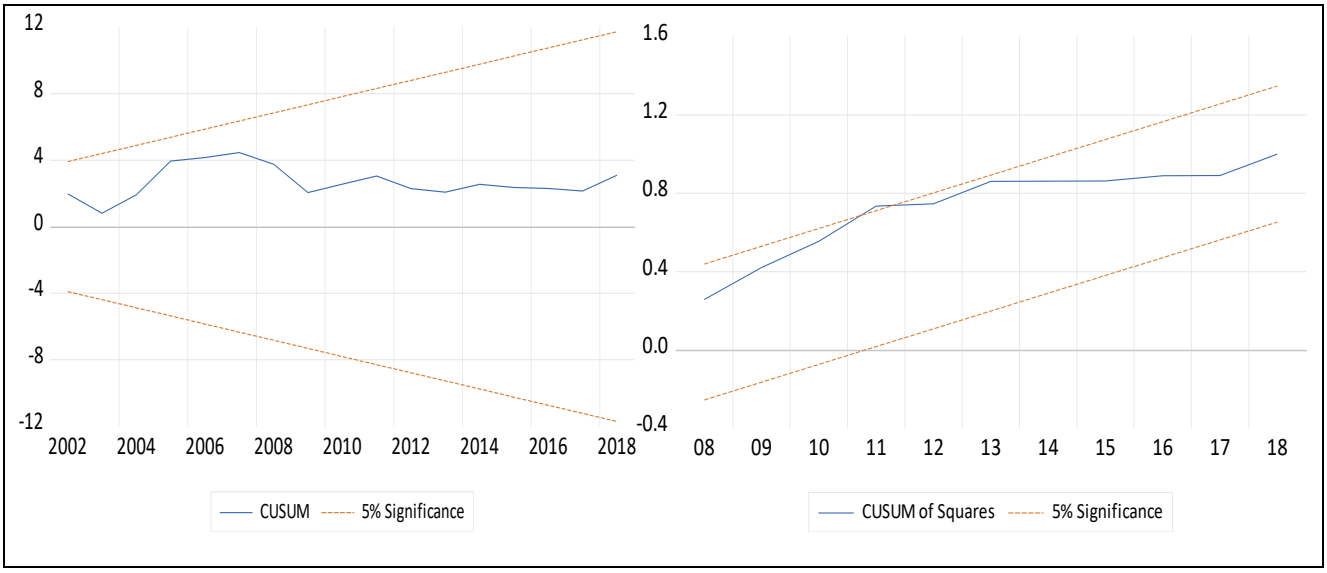
5.5.1.3 Diagnostic and stability tests for equation 4.9 (LNGDP dependent variable)

The validity of the bounds test relies on normally distributed error terms that are homoskedastic and serially uncorrelated, as well as stability of the coefficients over time. Table 5.6 above shows that the model passes all the diagnostic tests against serial correlation (Durbin-Watson test and Breusch-Godfrey test), heteroscedasticity (White Heteroskedasticity test) and normality (Jarque-Bera test). Diagnostic tests for serial correlation produced an insignificant p-value (0.1), which shows that there is no

autocorrelation. The p-values for the heteroskedasticity test were also insignificant (<0.05); thus, the conclusion is that the residuals are homoskedastic. The normality test also suggests that the model is well specified. These results reported in Table 5.6 indicate that there are no challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model. This means that the regression for the underlying ARDL equation fits very well, and the model is significant at the 5% level. The stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables. The Ramsey t-statistic (p<0.05) and F-statistic ((p<0.05) test results show that the p-values are greater than 0.05, hence the null hypothesis of absence of specification errors is not rejected, indicating no evidence of specification errors in the model where GDP is the endogenous variable.

Once the ECM model has been estimated, the cumulative sum of recursive residuals (CUSUM) and the CUSUM of squares (CUSUMSQ) tests were applied to assess the parameter stability of the long-run coefficient (Wooldridge, 2013).

Figure 5-8: Plot of CUSUM and CUSUMSQ for equation 4.9 (LNGDP dependent variable)



Source: Author's computations from EViews

Both the CUSUM and CUSUMSQ plots depict the stability of the model and lie between the critical lower and upper bounds (red lines) at the 5% significance level. Hence, a conclusion is made that the selected model is statistically stable and the parameters are reliable; the stability of this selected ARDL model is therefore confirmed.

5.5.2 Foreign direct investment (FDI) in the TSC sector as the dependent variable

5.5.2.1 Results of ARDL bounds tests for equation 4.11 (LNFDI dependent variable)

The table below shows the ARDL bounds test results for equation 4.11 (ECM where LNFDI is the dependent variable)

Table 5.7: Results of ARDL bounds tests for equation 4.11 (LNFDI dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	11.62268	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	-7.029558	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.5%	-3.13	-4.66
		1%	-3.43	-4.99

Source: Author's computations from EViews

The calculated value of the F-statistic is 11.62, this is above the upper bound 3.61 at the 5% significance level, hence the null hypothesis is rejected. These test results indicate the existence of a long-run relationship (cointegration) when LNFDI is the dependent variable. The bounds test confirms a long-run relationship between independent variables and FDI.

5.5.2.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.11 (LNFDI dependent variable)

Table 5.8 below shows the long-run and short-run relationships for equation 4.11 (LNFDI is the dependent variable).

Table 5.8: Analysis of long-run and short-run relationships for equation 4.11 (LNFDI dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (1, 1, 2, 1, 2, 2, 1); Dependent Variable: LNFDI			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNFCF	3.842***	7.461	0.000
LNEXP	3.174***	5.196	0.000
LNIMP	4.010***	5.524	0.000
LNINFRA	-1.365**	-2.572	0.021
LNL	-0.401	-0.866	0.400
LNGDP	3.544**	2.235	0.041
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
D(LNFDI); Selected Model: ARDL (1, 1, 2, 1, 2, 2, 1)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D(LNFCF)	2.381***	6.700	0.000
D(LNEXP)	1.086**	2.466	0.026
D (LNEXP (-1))	-3.127***	-7.514	0.000
D(LNIMP)	3.199***	4.630	0.000
D(LNINFRA)	-1.603***	-4.037	0.001
D (LNINFRA (-1))	-1.631***	-4.228	0.001
D(LNL)	3.517***	4.240	0.001
D (LNL(-1))	2.255**	2.666	0.018
D(LNGDP)	12.752***	6.322	0.000
CointEq (-1)	-1.128***	-10.673	0.000
R-squared	0.874		
Adjusted R-squared	0.813		
F-statistic	14.506		0.000
DW-statistic	2.577		
DIAGNOSTIC TESTS			
TEST		**STATISTIC**	**PROBABILITY**
Serial Correlation		6.201	0.103
Normality test (Jarque-Bera)		4.947	0.084
Heteroskedasticity		1.094	0.448
Ramsey RESET (t-statistic)		0.876	0.396
Ramsey RESET (F-statistic)		0.768	0.396

Source: Author's computations from EViews
Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

As shown in Table 5.8 above, the sign of the long-run coefficients of LNFCF (β=3.842, p<0.05), LNEXP (β=3.174, p<0.05), LNIMP (β=4.010, p<0.05), and LNGDP (β=3.544, p<0.05) were positive and statistically significant. This means that a unit increase or fluctuations in fixed capital formation (LNFCF), imports (LNIMP) and gross domestic product (LNGDP) were likely to result in an increase in foreign direct investment (LNFDI) by as much as 3 to 4 times.

On the other hand, the long-run coefficient of LNINFRA was negative and statistically significant (β=-1.365, p<0.05). These results suggest that a unit increase in LNINFRA at a current year was likely to lead to a decrease in foreign direct investments (LNFDI) by as much as 1.365 times. The coefficient of labour was negative but not statistically significant, meaning that labour (LNL) has no effect on D(LNFDI) in the long run.

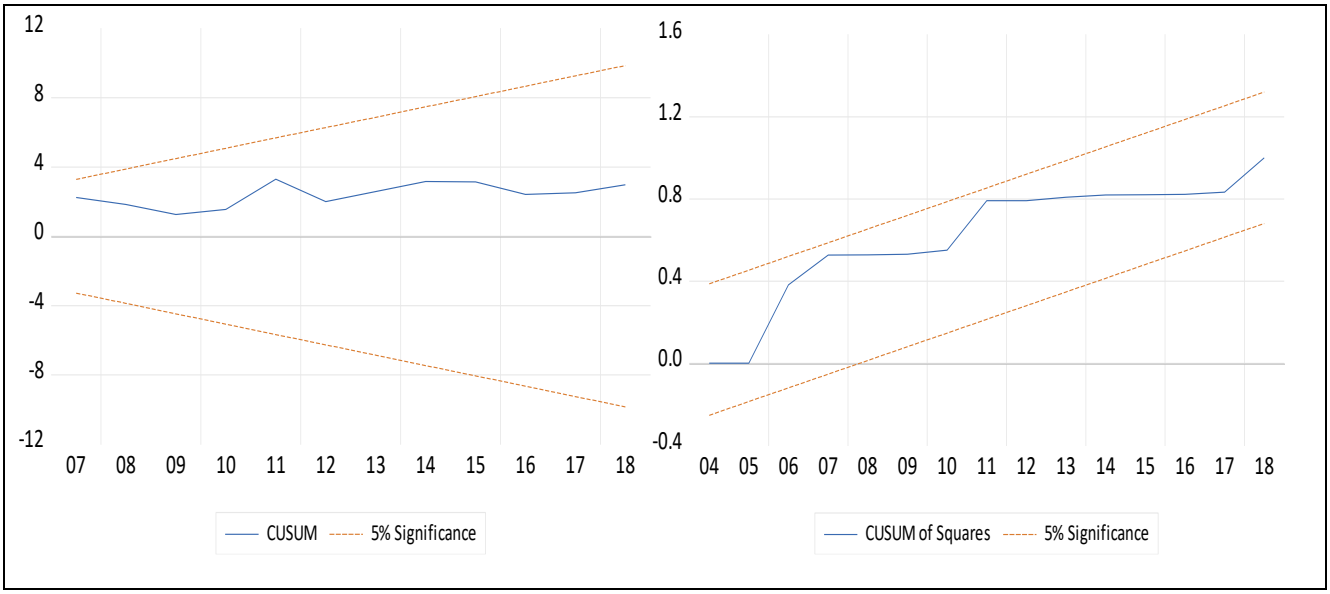
Table 5.8 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level with a negative sign (-1.128), indicating that the model can converge back to long-term equilibrium quickly after a short-term shock. These results suggest that over 100% of the disequilibrium of the previous year's shocks was corrected back to the long-run equilibrium.

5.5.2.3 Diagnostic and stability tests for equation 4.11 (LNFDI dependent variable)

Diagnostic tests for serial correlation (p>0.05) and heteroskedasticity (p>0.05) results were not significant at the 5% level, indicating that there was no autocorrelation or partial correlation in the ARDL model, and that the residuals were homoscedastic. However, weak results indicate that the ARDL model could be affected by normality as the results were significant at the 10% level. These results indicate that this model had no challenges of misspecification, heteroscedasticity, higher-order autocorrelation, except normality. As earlier stated, the stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables.

Table 5.8 indicates that the Ramsey test results, which show that the p-values are greater than 0.05, showing no evidence of specification errors.

Figure 5-9: Plot of CUSUM and CUSUMSQ for equation 4.11 (LNFDI dependent variable)



Source: Author's computations from EViews

To ensure the stability of the ARDL-ECM model, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests were used. As shown in Figure 5-9, both the CUSUM and CUSUMSQ plots lie between the critical lower and upper bounds (red lines) at the 5% significance level. The stability of this selected ARDL model is therefore confirmed. Hence, the selected model is statistically stable, and the parameters are reliable. This confirms the accuracy of the long-run and short-run parameters' impact on FDI in TSC over the period 1985–2018.

5.5.3 Exports in transport and communications as the dependent variable (LNEXP)

5.5.3.1 Results of ARDL bounds tests for equation 4.13 (LNEXP dependent variable)

Exports are necessary for an economy. These contribute to economic growth of a nation. The following results provide the long-run relationships of exports as the dependent variable and its explanatory variables, including GDP.

The table below shows the ARDL bounds test results for equation 4.13 (ECM where LNEXP is the dependent variable)

Table 5.9: Results of ARDL bounds tests for equation 4.13 (LNEXP dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	13.36732	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	-5.327989	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.5%	-3.13	-4.66
		1%	-3.43	-4.99

Source: Author's computations from EViews

The null hypothesis of the F-Bounds test is that there is no cointegration among variables. If the calculated F-statistic is below the lower bound, the null hypothesis is accepted. If the F-statistic is higher than the upper bound, the null hypothesis is rejected, and the cointegration among variables is verified. If the F-statistic lies between the upper and lower bounds, the results are inconclusive.

In Table 5.9, the calculated value of the F-statistic is 13.37, which is above the upper bound 3.61 at the 5% significance level, the null hypothesis is therefore rejected. These test results indicate the existence of a long-run relationship (cointegration) when LNEXP is the dependent variable. Therefore, these findings confirm that at least one long-run equilibrium relationship exists.

5.5.3.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.13 (LNEXP dependent variable)

Table 5.10 below shows the results of the long-run and short-run relationships for equation 4.13 (LNEXP is the dependent variable).

Table 5.10: Analysis of long-run and short-run relationships for equation 4.13 (LNEXP dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (1, 0, 2, 2, 0, 2, 1); Dependent Variable: LNEXP			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNIMP	-2.141***	-4.859	0.000
LNINFRA	1.005*	1.920	0.073
LNL	0.563	1.254	0.228
LNGDP	-2.318**	-2.217	0.042
LNFDI	0.509***	2.988	0.009
LNFCF	-1.884**	-2.741	0.015
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
Dependent Variable: D(LNEXP); Selected Model: ARDL (1, 0, 2, 2, 0, 2, 1)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D(LNINFRA)	-0.055	-0.459	0.652
D (LNINFRA (-1))	0.285**	2.821	0.012
D(LNL)	-0.543**	-2.262	0.038
D (LNL(-1))	-0.529**	-2.447	0.026
D(LNGDP)	-1.288*	-1.769	0.096
D (LNGDP (-1))	1.833**	2.730	0.015
D(LNFDI)	0.108***	3.989	0.001
D(LNFCF)	-0.440***	-3.480	0.003
CointEq (-1)	-0.877***	-11.343	0.000
R-squared	0.911		
Adjusted R-squared	0.875		
F-statistic	25.111		0.000
DW-statistic	2.303		
DIAGNOSTIC TESTS			
TEST		**STATISTIC**	**PROBABILITY**
Serial Correlation		2.175	0.150
Normality test (Jarque-Bera)		0.584	0.747
Heteroskedasticity		0.677	0.772
Ramsey RESET (t-statistic)		1.282	0.219
Ramsey RESET (F-statistic)		1.645	0.219

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

As shown in Table 5.10 the sign of the long-run coefficients of LNINFRA (β=1.005, p<0.10), and LNFDI (β=0.509, p<0.05) are positive and statistically significant. This means that increases in infrastructure (LNINFRA), and foreign direct investment (LNFDI) lead to an increase in exports (LNEXP). The results suggest that a unit change in INFRA and FDI in the current year was likely to increase export values in the long run by as much as 1 and 0.5 times, respectively.

On the other hand, the signs of the long-run coefficients of LNIMP, LNGDP and LNFCF are negative and statistically significant. The long-run elasticities of LNIMP, LNGDP and LNFCF are -2.141, -2.318 and -1.884, respectively. This implies that increases in imports (LNIMP), gross domestic product (LNGDP) and fixed capital formation (LNFCF) in the current year were likely to lead to a decrease in exports (LNEXP) by as much as -2.14, -2.3, and -1.88 times in the long run.

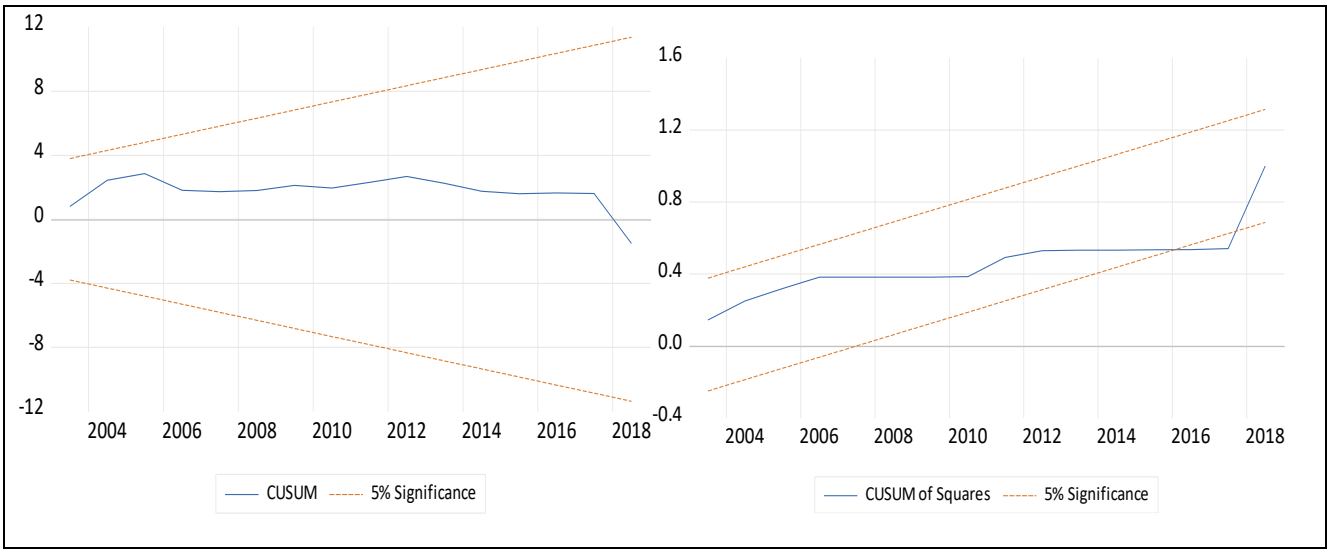
Table 5.10 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level with a negative sign, which is between 0 and -1, indicating that the model can converge back to long-term equilibrium quickly after a short-term shock. The value of -0.877 indicates that the speed of adjustment towards equilibrium is 87.7%, suggesting that the disequilibrium of the previous year's shocks was corrected back to the long-run equilibrium by 87.7%.

5.5.3.3 Diagnostic and stability tests for equation 4.13 (LNEXP dependent variable)

The validity of the bounds test relies on normally distributed error terms that are homoskedastic and serially uncorrelated, as well as stability of the coefficients over time. Diagnostic tests for serial correlation (p=0.150), normality test (p=0.747) and heteroskedasticity (0.772) produced insignificant p-value results, which show that there is no autocorrelation and that the residuals are homoskedastic. These results indicate no challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model. The stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables. The Ramsey t-statistics (0.219) and F-statistics (0.219) test results show that the p-values are greater than 0.05, indicating no evidence of specification errors.

The model stability results are depicted in Figure 5-10 by both the CUSUM and CUSUMSQ plots that lie between the critical lower and upper bounds (red lines) at the 5% significance level. This means that the stability of this selected ARDL model is therefore confirmed. Hence, the selected model is statistically stable, and the parameters are reliable. This confirms the accuracy of long-run and short-run parameters, which have an impact on exports in TSC over the period 1985–2018.

Figure 5-10: Plot of CUSUM and CUSUMSQ for equation 4.13 (LNEXP dependent variable)



Source: Author's computations from EViews

5.5.4 Fixed capital formation (LNFCF) in the TSC sector as the dependent variable

5.5.4.1 Results of ARDL bounds tests for equation 4.12 (LNFCF dependent variable)

The table below shows the ARDL bounds test results for equation 4.12 (LNFCF is the dependent variable)

Table 5.11: Results of ARDL bounds test for equation 4.12 (LNFCF dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	4.937174	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	-4.313935	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.5%	-3.13	-4.66
		1%	-3.43	-4.99

Source: Author's computations from EViews

The calculated value of the F-statistic is 4.94, which is above the upper bound 3.61 at the 5% significance level, and the null hypothesis is therefore rejected. These test results indicate the existence of a long-run relationship (cointegration) when LNFCF is the dependent variable. Therefore, these findings suggest that at least one long-run equilibrium relationship exists.

5.5.4.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.12 (LNFCF dependent variable)

Table 5.12 below shows the results of the long-run and short-run relationships for equation 4.12 (LNFCF is the dependent variable).

Table 5.12: Analysis of long-run and short-run relationships for equation 4.12 (LNFCF dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (2, 2, 2, 2, 0, 2, 2); **Dependent Variable:** LNFCF			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNL	0.099	0.591	0.565
LNGDP	-0.042	-0.068	0.947
LNFDI	0.153**	3.106	0.008
LNEXP	-0.222	-1.045	0.315
LNIMP	-0.597*	-2.018	0.065
LNINFRA	0.162	1.024	0.324
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
Dependent Variable: D(LNFCF); Selected Model: ARDL (2, 2, 2, 2, 0, 2, 2)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D (LNFCF (-1))	-0.184**	-2.286	0.040
D(LNL)	-0.764***	-3.219	0.007

D (LNL(-1))	-0.584*	-1.991	0.068
D(LNGDP)	-3.158***	-5.032	0.000
D (LNGDP (-1))	1.265**	2.281	0.040
D(LNFDI)	0.122***	4.748	0.000
D (LNFDI (-1))	0.072**	2.980	0.011
D(LNIMP)	-0.634***	-4.640	0.001
D (LNIMP (-1))	-0.605***	-3.628	0.003
D(LNINFRA)	0.444***	4.481	0.001
R-squared	0.898		
Adjusted R-squared	0.833		
F-statistic	13.923		0.000
DW-statistic	2.722		

DIAGNOSTIC TESTS

TEST	**STATISTIC**	**PROBABILITY**
Serial Correlation	8.341	0.206
Normality test (Jarque-Bera)	6.639	0.362
Heteroskedasticity	1.056	0.475
Ramsey RESET (t-statistic)	1.136	0.278
Ramsey RESET (F-statistic)	1.290	0.278

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

Table 5.12 indicates that only FDI had a long-run positive effect (β=0.153, p<0.05) on fixed capital formation because the results are significant at the 5% level. The results indicate that a unit increase in FDI in the previous years was likely to increase FCF in the long run. Weak results, at 10% significance, indicate that there were slight negative effects of imports on FCF (β=-0.597, p<0.10). The results suggest that fluctuations in imports in the previous years were likely to lead to a decrease and cause a negative shock in FCF in the long run. Labour, GDP, exports and infrastructure had no effects on FCF in this sample, as the results were not significant at the 5% level.

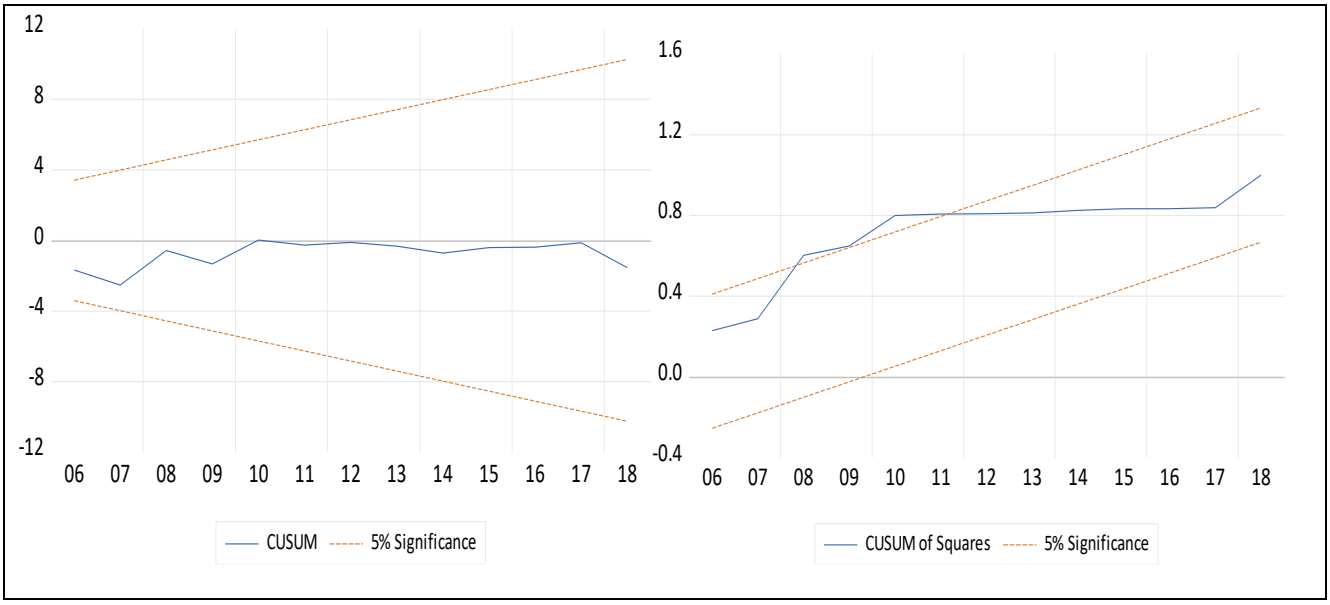
Table 5.12 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level with a negative sign (-1.009201), indicating that the model can converge back to long-term equilibrium

quickly after a short-term shock. These results suggest that over 100% of the disequilibrium of the previous year's shocks in FCF were corrected back to the long-run equilibrium.

5.5.4.3 Diagnostic and stability tests for equation 4.12 (LNFCF dependent variable)

Diagnostic tests for serial correlation produced an insignificant p-value (0.2062), showing no autocorrelation. The p-values for the normality test and heteroskedasticity were also insignificant, meaning that the residuals are homoskedastic. These results indicate that this model, with fixed capital formation as dependent variable had no challenges of misspecification, heteroscedasticity, or higher-order autocorrelation. The stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables. The Ramsey test t-statistics (0.278) and F-statistics (0.278) results show that the p-values are greater than 0.05, indicating no evidence of specification errors.

Figure 5-11: Plot of CUSUM and CUSUMSQ for equation 4.12 (LNFCF dependent variable)



Source: Author's computations from EViews

Table 5.11 shows the stability results of the ARDL-ECM model. Both the CUSUM and CUSUMSQ plots lie between the critical lower and upper bounds (red lines) at the 5% significance level. The stability of this selected ARDL model is therefore confirmed. Hence, the model with FCF as the dependent variable is statistically stable, and its parameters are reliable.

5.5.5 Imports (LNIMP) in transport and communications as a dependent variable

5.5.5.1 Results of ARDL bounds tests for equation 4.14 (LNIMP dependent variable)

The table below shows the ARDL bounds test results for equation 4.14 (LNIMP is the dependent variable)

Table 5.13: Results of ARDL bounds test for equation 4.14 (LNIMP dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	19.31089	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	-6.254425	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.5%	-3.13	-4.66
		1%	-3.43	-4.99

Source: Author's computations from EViews

The calculated value of the F-statistic is 19.31, which is above the upper bound 3.61 at the 5% significance level. The null hypothesis of no cointegration among the variables is rejected, as there is evidence of a long-run/cointegrating relationship. The test results indicate the presence of long-run cointegration when LNIMP is the dependent variable.

5.5.5.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.14 (LNIMP dependent variable)

Table 5.14 below shows the results of the long-run and short-run relationships for equation 4.14 (LNIMP is the dependent variable).

Table 5.14: Analysis of long-run and short-run relationships for equation 4.14 (LNIMP dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (1, 0, 2, 2, 2, 1, 0); Dependent Variable: LNIMP			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNINFRA	0.143	1.361	0.191
LNL	0.142	0.999	0.332
LNGDP	-1.003***	-3.034	0.008
LNFDI	0.206***	5.640	0.000
LNFCF	-0.608***	-3.595	0.002
LNEXP	-0.677***	-9.004	0.000
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
Dependent Variable: D(LNIMP); Selected Model: ARDL (1, 0, 2, 2, 2, 1, 0)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D(LNL)	-0.669***	-5.345	0.000
D (LNL(-1))	-0.266*	-2.016	0.060
D(LNGDP)	-1.241***	-3.839	0.001
D (LNGDP (-1))	1.730***	5.174	0.000
D(LNFDI)	0.076***	5.087	0.000
D (LNFDI (-1))	-0.029*	-1.925	0.071
D(LNFCF)	-0.234***	-3.909	0.001
CointEq (-1)	-0.678***	-13.524	0.000
R-squared	0.937		
Adjusted R-squared	0.914		
F-statistic	42.416		0.000
DW-statistic	2.514		
DIAGNOSTIC TESTS			
TEST		**STATISTIC**	**PROBABILITY**
Serial Correlation		8.731	0.103
Normality test (Jarque-Bera)		0.730	0.694
Heteroskedasticity		1.587	0.182
Ramsey RESET (t-statistic)		1.073	0.299
Ramsey RESET (F-statistic)		1.150	0.299

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

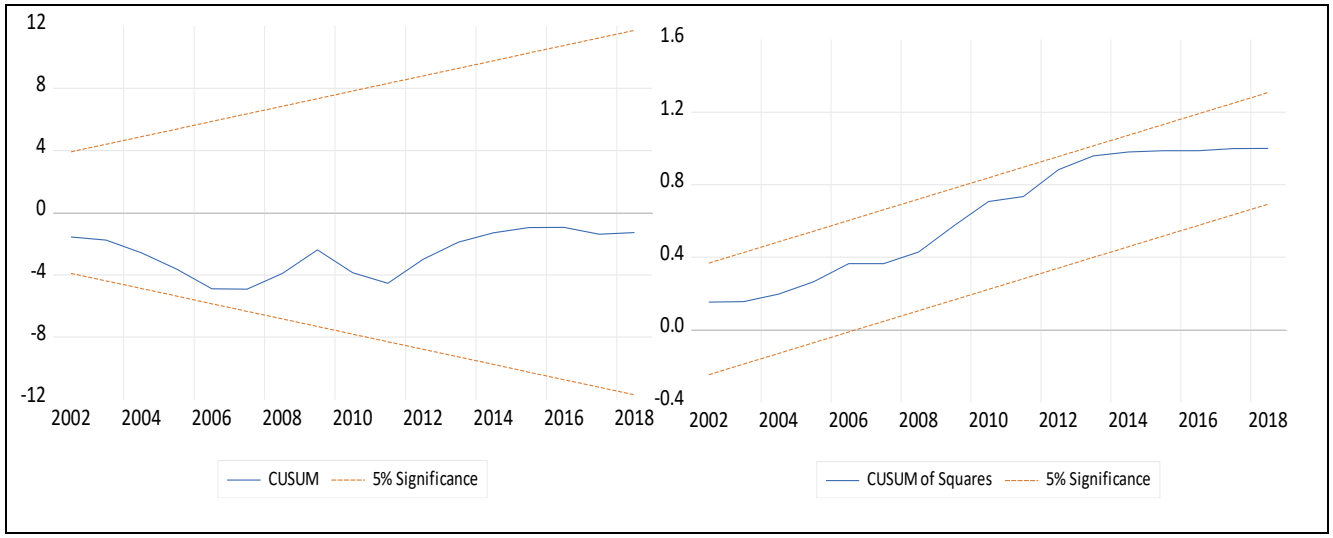
Table 5.14 indicates that only LNFDI results were positive and statistically significant (β=0.206, p<0.05). This means that a unit increase in foreign direct investment (LNFDI) was likely to lead to as much as 20% increase in imports (LNIMP) in the long run. On the other hand, coefficients of LNGDP (β=-1.003, p<0.05), LNFCF (β=-0.608, p<0.05), and LNEXP (β=-0.677, p<0.05) were negative and statistically significant. This implies that unit increases or fluctuations in gross domestic product (LNGDP), fixed capital formation (LNFCF), and exports (LNEXP) were likely to lead to over 60% decreases in imports (LNIMP).

Table 5.14 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level with a negative sign (-0.678), indicating that the model can converge back to long-term equilibrium quickly after a short-term shock. 67.8% of the disequilibrium is corrected.

5.5.5.3 Diagnostic and stability tests for equation 4.14 (LNIMP dependent variable)

Diagnostic tests for serial correlation produced an insignificant p-value (0.1031), indicating no autocorrelation. The p-values for the normality test and heteroskedasticity were also insignificant (<0.05); thus, the conclusion is that the residuals are homoskedastic. The results show no challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model. The stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables. The Ramsey t-statistics (0.299) and F-statistics (0.299) test results show that the p-values are greater than 0.05, indicating no evidence of specification errors.

Figure 5-12: Plot of CUSUM and CUSUMSQ for equation 4.14 (LNIMP dependent variable)



Source: Author's computations from EViews

The stability of the ARDL-ECM model tests of CUSUM and CUSUMSQ plots lie between the critical lower and upper bounds (red lines) at the 5% significance level. This is evidence that the selected model is statistically stable and the parameters are reliable.

5.5.6 Infrastructure as the dependent variable (LNINFRA)

5.5.6.1 Results of ARDL bounds tests for equation 4.15 (LNINFRA dependent variable)

The table below shows the ARDL bounds test results for equation 4.15 (LNINFRA is the dependent variable)

Table 5.15: Results of ARDL bound tests for equation 4.15 (LNINFRA dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	4.407686	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43

t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	-4.151493	10%	-2.57	-4.04

F-Bounds Test		Null Hypothesis: No levels relationship	
	5%	-2.86	-4.38
	2.5%	-3.13	-4.66
	1%	-3.43	-4.99

Source: Author's computations from EViews

The calculated value of the F-statistic is 4.41, this is above the upper bound 3.61 at the 5% significance level, hence the null hypothesis of no cointegration among the variables is rejected, as there is evidence of a long-run/cointegrating relationship. These test results indicate a long-run relationship (cointegration) when LNINFRA is the dependent variable in the model.

5.5.6.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.15 (LNINFRA dependent variable)

Table 5.16 below shows the results of the long-run and short-run relationships for equation 4.15 (ECM where LNINFRA is the dependent variable).

Table 5.16: Analysis of long-run and short-run relationships for equation 4.15 (LNINFRA dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (2, 0, 2, 2, 2, 0, 2); Dependent Variable: LNINFRA			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNFDI	-0.202**	-2.866	0.012
LNFCF	0.914**	2.687	0.017
LNEXP	1.084***	3.083	0.008
LNIMP	1.352***	3.254	0.005
LNL	0.259	1.158	0.265
LNGDP	2.375***	5.821	0.000
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
Dependent Variable: D(LNINFRA); Selected Model: ARDL (2, 0, 2, 2, 2, 0, 2)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D (LNINFRA (-1))	-0.333**	-2.543	0.023
D(LNFCF)	0.617***	6.166	0.000
D (LNFCF (-1))	0.238**	2.562	0.022
D(LNEXP)	-0.160	-1.231	0.237
D (LNEXP (-1))	-1.057***	-4.414	0.001
D(LNIMP)	0.194	1.053	0.309

D (LNIMP (-1))	-0.461**	-2.215	0.043
D(LNGDP)	5.361***	7.062	0.000
D (LNGDP (-1))	1.366	1.628	0.124
CointEq (-1)	-0.766***	-6.572	0.000
R-squared	0.815		
Adjusted R-squared	0.728		
F-statistic	9.278		0.000
DW-statistic	2.140		

DIAGNOSTIC TESTS

TEST	**STATISTIC**	**PROBABILITY**
Serial Correlation	0.349	0.712
Normality test (Jarque-Bera)	1.119	0.571
Heteroskedasticity	1.354	0.308
Ramsey RESET (t-statistic)	0.561	0.584
Ramsey RESET (F-statistic)	0.315	0.584

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

Table 5.16 above indicates that the sign of the long-run coefficients of LNFCF (β=0.914, p<0.05), LNEXP (β=1.084, p<0.05), LNIMP (β=1.352, p<0.05) and LNGDP (β=2.375, p<0.05) are positive and statistically significant. The long-run elasticities for LNFCF, LNEXP, LNIMP and LNGDP are 0.91, 1.083, 1.35 and 2.38, respectively. These results suggest that unit increases in fixed capital formation (LNFCF) exports (LNEXP), imports (LNIMP) and gross domestic product (LNGDP) were likely to lead to an increase in infrastructure (LNINFRA). The strongest positive effect on infrastructure was GDP (2.375 times), followed by imports (1.4 times), EXP (1.1 times) and FCF (0.9 times). Only the coefficients of LNFDI are negative and statistically significant (β=-0.201, p<0.05). The results imply that a unit increase in FDI was likely to lead to a slight decrease in infrastructure (LNINFRA), 0.2 times negative effect.

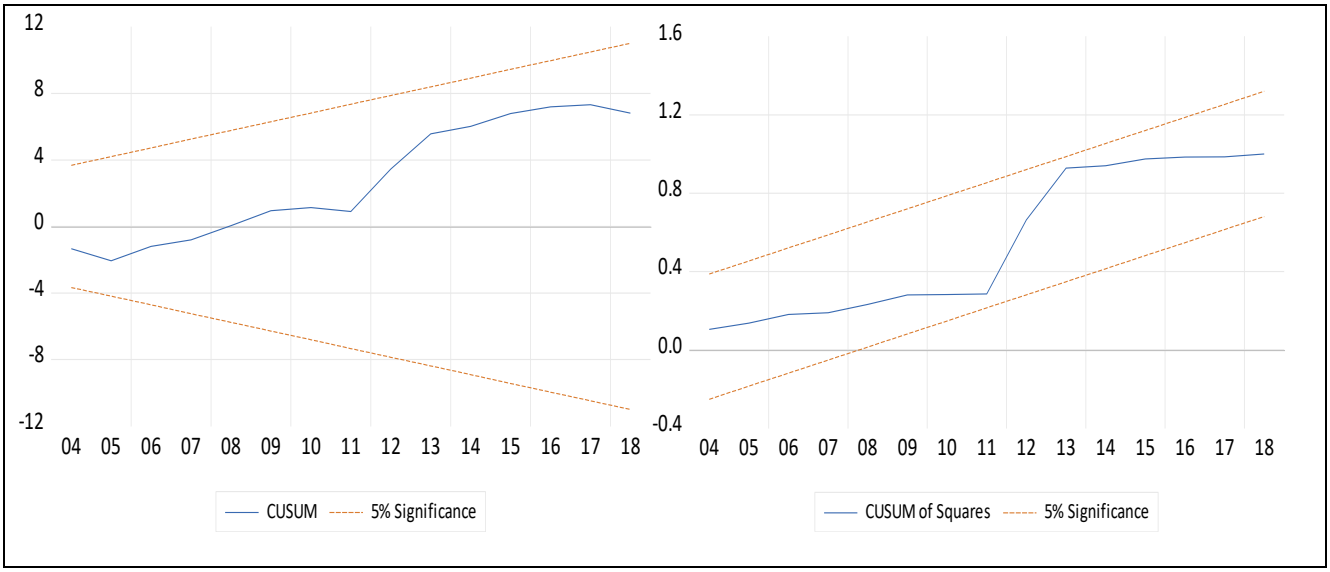
Table 5.16 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level with a negative sign (-0.766), indicating that the model can converge quickly back to long-term equilibrium after a short-term shock. About 76.6% of the disequilibrium in infrastructure were corrected in the long run.

5.5.6.3 Diagnostic and stability tests for equation 4.15 (LNINFRA dependent variable)

Diagnostic tests for serial correlation produced an insignificant p-value (0.712), showing no autocorrelation. The p-values for the normality test and heteroskedasticity were also insignificant (<0.05); thus, the conclusion is that the residuals are homoskedastic. The results indicate that there were no challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model.

The stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables. The Ramsey t-statistics (0.584) and F-statistics (0.584) test results show that the p-values are more than 0.05, showing no evidence of specification errors.

Figure 5-13: Plot of CUSUM and CUSUMSQ for equation 4.15 (LNINFRA dependent variable)



Source: Author's computations from EViews

The stability of the ARDL-ECM model results indicates that the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests' plots lie between the critical lower and upper bounds (red lines) at the 5% significance level. This is evidence of the stability of the selected ARDL model when the endogenous variable is infrastructure, meaning that the selected model is statistically stable and the parameters are reliable.

5.5.7 Labour in the TSC sector as the dependent variable (LNL)

5.5.7.1 Results of ARDL bounds tests for equation 4.10 (LNL dependent variable)

The table below shows the ARDL bounds test results for equation 4.10 (LNL is the dependent variable)

Table 5.17: Results of ARDL bounds tests for equation 4.10 (LNL dependent variable)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	4.573612	10%	2.12	3.23
K	6	5%	2.45	3.61
		2.5%	2.75	3.99
		1%	3.15	4.43
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Significance	I (0)	I (1)
t-statistic	0.999301	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.5%	-3.13	-4.66
		1%	-3.43	-4.99

Source: Author's computations from EViews

The calculated value of the F-statistic is 4.57, which is above the upper bound 3.61 at the 5% significance level. Hence, the null hypothesis of no cointegration among the variables is rejected because there is evidence of a long-run/cointegrating relationship. The test results indicate a long-run relationship (cointegration) when LNL is the dependent variable.

5.5.7.2 Analysis of the long-run equilibrium and short-run relationships for equation 4.10 (LNL dependent variable)

Table 5.18 below shows the results of the long-run and short-run relationships for equation 4.10 (LNL is the dependent variable).

Table 5.18: Analysis of long-run and short-run relationships for equation 4.10 (LNL dependent variable)

ESTIMATED LONG-RUN COEFFICIENTS USING ARDL MODEL			
Selected Model: ARDL (2, 2, 0, 0, 0, 2, 2); Dependent Variable: LNL			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
LNGDP	-2.902	-0.637	0.533
LNFDI	-0.825	-1.054	0.307
LNFCF	2.902	0.999	0.332
LNEXP	0.716	0.491	0.630
LNIMP	0.798	0.411	0.686
LNINFRA	0.560	0.454	0.656
ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL			
Dependent Variable: D(LNL); Selected Model: ARDL (1, 2, 0, 0, 0, 2, 2)			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
D(LNGDP)	-0.632*	-2.055	0.056
D (LNGDP (-1))	1.073***	4.193	0.001
D(LNIMP)	-0.502***	-8.192	0.000
D (LNIMP (-1))	-0.241***	-3.923	0.001
D(LNINFRA)	0.004	0.086	0.932
D (LNINFRA (-1))	0.139**	2.443	0.026
CointEq (-1)	-0.043***	-8.556	0.000
R-squared	0.861		
Adjusted R-squared	0.821		
F-statistic	21.322		0.000
DW-statistic	2.555		
DIAGNOSTIC TESTS			
TEST		**STATISTIC**	**PROBABILITY**
Serial Correlation		2.527	0.113
Normality test (Jarque-Bera)		0.172	0.918
Heteroskedasticity		0.930	0.549
Ramsey RESET (t-statistic)		2.461	0.026
Ramsey RESET (F-statistic)		6.057	0.026

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

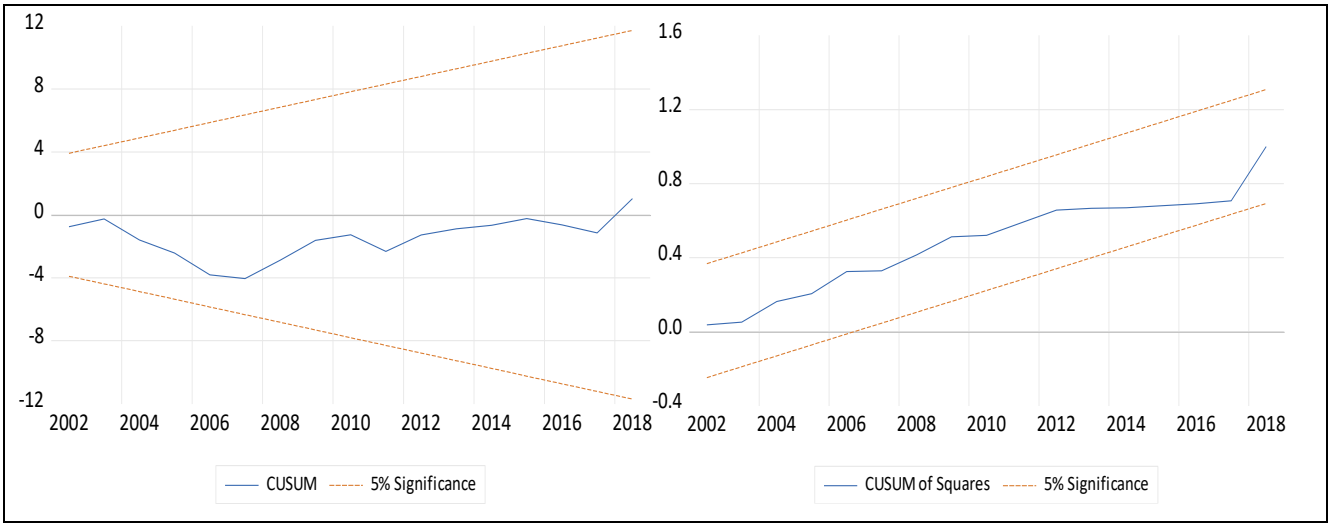
Table 5.18 indicates that the signs of the long-run coefficients were positive but not significant. This means that fluctuations in fixed capital formation (LNFCF) exports (LNEXP), imports (LNIMP) and infrastructure (LNINFRA) did not impact labour (LNL). In the same vein, the coefficients of gross domestic product (LNGDP) and foreign direct investment (LNFDI) are negative but not statistically significant, and have no effect on labour (LNL).

Table 5.18 presents the results of the short-run dynamic coefficients from the ECM. The error correction term CointEq (-1) coefficient is significant at the 1% level with a negative sign (-0.043), indicating that the model can converge back to long-term equilibrium quickly after a short-term shock. Only 4% of the disequilibrium was corrected by the change in labour trends.

5.5.7.3 Diagnostic and stability tests for equation 4.10 (LNL dependent variable)

Diagnostic tests for serial correlation produced an insignificant p-value (0.113), indicating no autocorrelation. The p-values for the normality test and heteroskedasticity were also insignificant (<0.05); thus, the conclusion is that the residuals are homoskedastic. The results indicate that there are no challenges of misspecification, heteroscedasticity, higher-order autocorrelation or normality in the model. The stability test for the estimated parameters of this selected ARDL model is important to avoid misspecification of the functional form, emanating from the volatility of the time variables. The Ramsey test t-statistic (p<0.05) and F-statistics (p<0.05) results show that the p-values are less than 0.05, indicating the presence of specification errors in this model.

Figure 5-14: CUSUM and CUSUMSQ for equation 4.10 (LNL dependent variable)



Source: Author's computations from EViews

Figure 5-14 indicates the stability of the ARDL-ECM model, indicated by the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests. Their plots lie between the critical lower and upper bounds (red lines) at the 5% significance level. A conclusion is drawn that the selected model is statistically stable and the parameters are reliable.

5.6 GRANGER CAUSALITY TEST

To test for the direction of causality, Granger causality was employed.

Table 5.19: Granger causality test

Dependent Variables	LNEXP	LNFDI	LNFCF	LNGDP	LNIMP	LNL	LNINFRA
LNEXP	-	4.210	8.658	1.948**	5.118	2.019	2.017***
LNFDI	3.174**	-	1.115**	0.136**	3.885	9.957	11.007***
LNFCF	0.338	2.956	-	3.984***	7.687	6.484	7.012***
LNGDP	7.885**	0.297***	8.844**	-	3.140	2.988	4.937*
LNIMP	1.012	3.903	4.126	3.341	-	3.371	0.175
LNL	0.248	5.661	8.658	9.377	1.911	-	3.025
LNINFRA	0.315	0.024	0.214	10.259	2.340	1.379	-

Source: Author's computations from EViews

Notes: *, **, *** indicate significance at 10%, 5% and 1% level, respectively.

The findings of this study are focused on the transport, storage and communication sector. The Granger causality test suggests a bi-directional causality between foreign direct investment and the gross domestic product. This indicates that foreign direct investment Granger causes gross domestic product (0.136, $p<0.05$), and there is reciprocity, meaning that gross domestic product also Granger causes foreign direct investment (0.297, $p<0.05$), with twice the effect size. This is evidence of a bi-directional long-run relationship between GDP and FDI in this study and evidence of a weaker relationship when GDP is the endogenous (dependent) variable.

In the same vein, Granger causality between gross domestic product and exports is also bi-directional. This implies that gross domestic product Granger causes exports (7.885, $p<0.05$), and there is feedback from exports (1.948, $p<0.05$), a much weaker effect. This is

evidence of a bi-directional long-run relationship between GDP and exports in this study and evidence of a weaker relationship when GDP is the endogenous (dependent) variable.

Results also revealed that the Granger causality between gross domestic product and fixed capital formation is bi-directional. This infers that gross domestic product Granger causes fixed capital formation (8.844, $p<0.05$) and fixed capital formation also Granger causes gross domestic product (3.984, $p<0.05$), with less than half as much impact. This is evidence of a bi-directional long-run relationship between GDP and exports, and evidence of a weaker relationship when GDP is the endogenous (dependent) variable. The results also suggest that gross domestic product Granger causes infrastructure (4.937, $p<0.05$), a unidirectional long-run relationship. Imports, labour, and infrastructure do not Granger cause GDP, as the results are not significant at the 5% level. Exports, fixed capital formation, and foreign direct investment all Granger cause GDP with evidence of reciprocity, a bidirectional long-run relationship. These results are comparable to those of Sunde (2016), because she finds a bi-directional relationship between economic growth and exports in the South African economy. Sunde (2016) corroborates the FDI-led growth theory for South Africa, due to the unidirectional relationship running from FDI to economic growth.

5.7 CONCLUSION

This chapter provides the empirical results focusing on FDI spillover effects and impact on gross domestic product in the TSC sector. The chapter commences by providing descriptive statistics on the variables in the study, and then conducts unit root tests applying the augmented Dickey-Fuller (ADF) and Phillip-Perron tests. Both tests revealed that the variables became stationary and level and at first difference. The OLS method is applied. The OLS method determines the effect of the explanatory variables on GDP, and ultimately, the effect of the explanatory variables on total factor productivity is computed. The condition that variables must be integrated either of order zero I(0) or one I(1) or a combination of both, and not integrated of higher order I(2) holds, and thus, the autoregressive distributed lag (ARDL) bounds test to cointegration is applied. The ARDL method examines the long-run relationship, and the error correction model examines the short-run dynamics. Granger causality is conducted, and the results are presented. The results from the OLS method indicate that FDI has a statistically insignificant effect on total factor productivity in the TSC sector. The ARDL bounds test establishes a long-run relationship amongst all ARDL models

specified in the study. Exports, fixed capital formation, and foreign direct investment all Granger cause GDP with evidence of reciprocity. At the 5% level of significance, imports, labour, and infrastructure do not Granger cause GDP.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The aim of this paper is two-prong, namely, (i) empirically examine the spillover effects and (ii) the impact of foreign direct investment on gross domestic product in the transport, storage and communication (TSC) sector in South Africa from 1985 to 2018. The OLS method was applied to determine total factor productivity (TFP) and draw inferences on the spillover effects. The ARDL model was employed to establish the long-run relationships and short-run dynamics between the following variables: (i) gross domestic product (GDP), (ii) foreign direct investment (FDI), (ii) fixed capital formation (FCF), (iv) labour, (v) exports, (vi) imports, and (vii) infrastructure. The long-run relationship was examined by applying the ARDL bounds testing approach. The short-run dynamics were investigated using the error correction model (ECM), and the direction of causality was established by applying the ECM Granger causality testing approach.

6.2 CONCLUDING REMARKS

The results of the OLS method indicate that FDI has a statistically insignificant effect on TFP in the TSC sector. The findings from the ARDL bounds test and Granger causality test indicate the positive impact of FDI on the transport, storage and communication sector because there is bi-directional Granger causality between FDI and GDP in the TSC sector. The insignificant impact of FDI on GDP in the TSC sector can be explained by the spillover effects theory, that the spillover propensity is contingent on the host economy's absorption capacity. The association between FDI and total factor productivity in the South African economy, given the skills deficit, has a bearing on establishing FDI spillover effects (Bonga-Bonga & Phume, 2017). Most of the inward FDI in South Africa is from Europe, as detailed in chapter 3, and this may impact the spillover potential, which is prone to be more significant when third-world multi-national companies (MNEs) invest in other developing countries. This is because developing countries could be better suited to transfer knowledge that can be adapted to the socio-economic conditions of other developing countries (World Bank, 2017). The results on FDI and GDP in the TSC sector are on par with several empirical studies such as those by Herzer (2012), Pradhan (2009), and Sunde (2016). The studies employ cointegration and causality analysis. These studies found a positive long-run

relationship between output and the variables for developing countries, with Granger causality running from FDI to output or bi-directional.

6.3 POLICY IMPLICATIONS AND RECOMMENDATIONS

Attracting FDI is not a means to an end, because attracting FDI does not guarantee the absorption of spillovers by the local economy. In the case of this study, the impact on FDI spillovers is negative in the TSC sector. MNEs are perceived as a medium to impart knowledge to host economies through spillovers from superior technology, tangible and intangible assets, management skills, capital, branding, global linkages and value chains (Dunning, 1993; Papaioannou, 2005). Numerous studies report on the positive impact of FDI on economic performance and productivity. Still, these are conditional on factors such as sector dynamics, value chain linkages, financial development, human capital, research and development, MNE entry strategies, absorptive capacity, policies and institutions (Farole & Winkler, 2014; Huang et al., 2012; Miroudot, 2006; Willem te Velde, 2019).

An array of factors must be taken into account when developing the policy framework for FDI. These factors must be balanced optimally to fulfil national socio-economic objectives (United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), 2017). South Africa must establish investment policies that will: (1) promote FDI without jeopardising the competitiveness and viability of local companies; (2) contribute to economic growth and development; (3) take into account the conventional trade practices under multilateral trading systems; (4) create a targeted strategy for FDI by the government. The successful transfers of vertical productivity spillovers in Ireland, Singapore, Taiwan, and China show that a targeted strategy facilitates spillover transfers (Willem te Velde, 2019). These countries deliberately facilitate local absorptive capacity through means such as: licensing; Research and Development (R&D) support; domestic linkage programmes; and labour mobility between local firms and MNEs (Willem te Velde, 2019).

6.4 LIMITATIONS AND AREAS FOR FUTURE RESEARCH

6.4.1 Sectoral studies of technology spillovers from FDI

The paper had limitations due to the unavailability of sectoral data, which is cumbersome to obtain. Much of the studies on FDI in South Africa are on the manufacturing sector. Areas for future research, therefore, may look into FDI spillovers in South Africa in the other

sectors rather than manufacturing, namely (i) Agriculture, forestry and fishing; (ii) Mining and quarrying; (iii) Electricity, gas and water; (iv) Construction; (v) Wholesale, retail, motor trade and accommodation; (vi) Transport, storage and communication; (vii) Finance, real estate and business services; (viii) General government services; and (ix) Personal services/ other products.

6.4.2 Factoring human capital in the estimation of spillovers

The study's weaknesses include the level of data aggregation, which precludes a more in-depth examination of the topic. Ahmed and Lashaki (2019 and 2017) factor human capital and compute absorptive capacity amongst other inputs in the computation of Total Factor Productivity (TFP). Due to the unavailability of such data for the TSC sector for the period under study, the paper follows studies that do not include human capital and account for labour in the computation of TFP, such as Arisoy (2012 and Li (2010).

6.4.3 Determinants of FDI in South Africa

Capital is accepted as a driving force for economic growth and development (Gert and Campbell, 2007). Developing nations at times request foreign loans to counteract capital deficiencies; it is more prudent for these nations to attract FDI as an instrument to acquire funds to counteract their capital deficiencies (Kanaani, 1999). Some studies find that FDI in developing countries leads to spillover benefits through technology diffusion and skills transfer (Lydon & Williams, 2005). Therefore, examining FDI determinants, particularly, in the South African context, is essential. These determinants include: (i) economic policy, (ii) economic structure, (iii) political stability, (iv) infrastructure such as roads, ports, telecommunications systems and information systems.

6.4.4 The impact of Covid-19 on FDI

The COVID-19 pandemic has attacked the world, and economies are struggling to mitigate the impact of the virus, with nations choosing life over the economy and therefore instituting lockdowns in an attempt to slow down the spread of the virus, whilst scientists work towards finding a vaccine and effective treatment. It would be interesting to establish the impact of the COVID-19 pandemic on FDI in South Africa and globally, to conceptualise and measure the disruption the virus has on FDI.

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