

**THE ROLE OF FOREIGN DIRECT INVESTMENT IN THE GROWTH OF THE AUTOMOTIVE  
INDUSTRY IN SOUTH AFRICA**

**Terence Mbulaheni Tshikosi**

**37297171**

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**Supervisor: Dr Samuel John Chiromo**

**Co-Supervisor: Prof Godfrey Marozva**

## **Abstract**

The purpose of this study was to investigate how Foreign Direct Investment (FDI) affects the growth of South Africa's automotive sector. The main goal was to evaluate the short-term and long-term interactions between FDI inflows and the performance of the automotive industry, with a particular focus on production output. To this end, the study employed a descriptive research design with a quantitative methodology, using secondary time-series data collected from 1988 to 2023. Data was sourced from STATS SA, UNCTAD, and the World Bank. The study utilised advanced econometric methods, including the Autoregressive Distributed Lag (ARDL) model and Johansen cointegration tests, to assess both the presence and strength of long-term relationships. The study tackled an essential deficiency in the existing research regarding the relationship between FDI and industry-specific growth, focusing on South Africa's role within the BRICS economies. The findings indicated that despite South Africa's continued attraction of FDI, the automotive sector shows lower production output relative to other BRICS members. The analysis demonstrated that FDI correlates positively with long-term industry growth, but its short-term impact is minimal and lacks statistical significance. Moreover, issues like macroeconomic instability, energy insecurity, and policy uncertainty were identified as factors that undermine the advantages of FDI. The study concluded that while FDI can encourage growth, its effect is constrained without robust supportive policies and a stable economic climate. Consequently, depending solely on FDI may not be adequate to revolutionise the industry. From these findings, the following recommendations are suggested: (1) Increase investor confidence by implementing consistent and clear policies, (2) improve the reliability of energy supply to aid production, (3) bolster local supplier networks to boost value addition, (4) invest in skill development relevant to automotive technologies, and (5) promote regional integration to tap into larger markets. This study adds to the existing knowledge base by empirically showing how FDI conditionally influences growth in specific industries within a developing economy, providing sectoral perspectives that go beyond the usual aggregate-level studies found in the literature. The study was constrained to the automotive sector and excluded other segments of manufacturing. Furthermore, it relied exclusively on secondary data, potentially overlooking qualitative elements affecting FDI outcomes. Future studies might investigate firm-level information or utilise mixed-method strategies to achieve a more thorough understanding of investor views and sectoral dynamics. Comparative analyses

with other BRICS countries could illuminate structural challenges that are distinctive to South Africa.

## **DECLARATIONS**

I, Mbulaheni Terence Tshikosi, declare that “The Role of Foreign Direct Investment in the Growth of South Africa’s Automotive Industry: An Empirical Analysis, 1988–2023” is my own work and that all the sources I have used or quoted have been duly indicated and acknowledged through comprehensive references. I have not previously submitted this dissertation for a degree at the University of South Africa (Unisa) or any other university. This dissertation is submitted in fulfilment of the requirements for the Master of Commerce Degree in Business Management.

Signature

.....  
MBULAHENI TERENCE TSHIKOSI

DATE: 04/03/2025

## **DECLARATION ON PLAGIARISM**

I, **Mbulaheni Terence Tshikosi**, student number: 37297171, hereby declare that I am fully aware of the University of South Africa’s policy on plagiarism. I have taken every precaution to comply with the regulations.

.....

Signature

.....  
MBULAHENI TERENCE TSHIKOSI

DATE: 04/03/2025

## DECLARATION ON RESEARCH ETHICAL CLEARANCE

I, **Terence Mbulaheni Tshikosi**, hereby declare that I am fully aware of the University of South Africa's policy on research ethics. I complied with the regulations by obtaining an ethical clearance certificate, reference number 2494, Decision: Ethics Approval from 3 June 2024 to 3 June 2027.

Signature

.....  
MBULAHENI TERENCE TSHIKOSI

DATE: 04/03/2025

## **DEDICATION**

This dissertation is dedicated to my late grandmother Musumuvhi, my uncle Joe Mapila, and my mother and father, Mrs Tshinakaho and Mr Samuel Tshikosi. Thank you for continuously looking after me. May your souls rest in internal peace.

## **ACKNOWLEDGEMENTS**

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## LIST OF ACRONYMS

- AAAM** - African Association of Automotive Manufacturers
- ABSA** - Amalgamated Banks of South Africa
- ACSA** - Airports Company South Africa
- ADF** - Augmented Dickey-Fuller
- AIEC** - Automotive Industry Export Council
- APDP** - Automotive Production and Development Programme
- ARDL** - Autoregressive Distributed Lag
- AsgiSA** - Accelerated Shared Growth Initiative for South Africa
- BMW** - Bayerische Motoren Werke (Bavarian Motor Works)
- BRICS** - Brazil, Russia, India, China, South Africa
- CEO** - Chief Executive Officer
- DTI** - Department of Trade and Industry
- ECM** - Error Correction Mechanism
- ECT** - Error Correction Term
- EV** - Electric Vehicle
- FDI** - Foreign Direct Investment
- GDP** - Gross Domestic Product
- GEAR** - Growth, Employment and Redistribution
- ICE** - Internal Combustion Engine
- IMF** - International Monetary Fund
- MIDP** - Motor Industry Development Programme
- MINT** - Mexico, Indonesia, Nigeria, Turkey
- MNE** - Multinational Enterprise
- NAACAM** - National Association of Automobile Component and Allied Manufacturers
- NAAMSA** - National Association of Automobile Manufacturers of South Africa
- NDP** - National Development Plan
- NGP** - New Growth Path
- OEC** - Observatory of Economic Complexity
- OECD** - Organisation for Economic Co-operation and Development
- OEM** - Original Equipment Manufacturer
- OLS** - Ordinary Least Squares
- R&D** - Research and Development

**SAA** - South African Airways

**SAAM** - South African Automotive Masterplan

**SME** - Small and Medium-sized Enterprise

**SONA** - State of the Nation Address

**SPSS** - Statistical Package for the Social Sciences

**Stats SA** - Statistics South Africa

**SVAR** - Structural Vector Autoregressions

**TIPS** - Trade and Industrial Policy Strategies

**UNCTAD** - United Nations Conference on Trade and Development

**WDI** - World Development Indicators

**WIR** - World Investment Report

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## **CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY**

### **1.1 INTRODUCTION**

This chapter sheds some light on the various factors or circumstances that have led to this investigation. This includes the following information: the study's background, problem statement, purpose, primary and secondary research objectives, the main research questions, as well as related research sub-questions. The chapter outlines the importance of the study; its delimitations and limitations of chapter were also covered. In addition, the layout arrangement of the remaining study and definitions of key important terms and acronyms are outlined, and a summary of the chapter is also provided.

### **1.2 INTRODUCTION TO THE STUDY**

Foreign Direct Investment (FDI) has long been seen as a catalyst for growth within the automotive sector (Nistor, 2011). Similarly, Masipa (2018) agreed that FDI significantly contributed to the automotive industry by facilitating technology and skill transfer and fostering job creation.

The main aim of this study was to investigate how FDI affects South Africa's automotive sector. Although there is existing research on FDI's impact on automotive industries in general (e.g., Bam, De Bruyne & Laing, 2020; Barnes, Black, Comrie & Hartogh, 2018; Zedillo, 2015; Wall, 2018; Ucal, 2014), there is a lack of studies focused specifically on its influence and contribution to the South African automotive industry's growth. Thus, this study aimed to assess the degree of FDI's impact on the development of the automotive sector in South Africa.

In their respective studies, the authors examined the impact of Foreign Direct Investment (FDI) on the automotive industry in various contexts. Bam, De Bruyne, and Laing (2020) conducted a comprehensive analysis of FDI trends and their effects on the automotive sectors of emerging economies. They explored how FDI inflows facilitated technology transfer, knowledge sharing, and the development of local supply chains, leading to enhanced competitiveness and growth. Barnes, Black, Comrie, and Hartogh (2018) focused on the specific case of FDI in the automotive

industry in developing countries. Their research highlighted the importance of FDI in attracting foreign automotive manufacturers, which, in turn, stimulated job creation, skill development, and industrialisation. They examined the strategies employed by governments and multinational corporations to maximise the benefits of FDI in the automotive sector. None of these studies focused on how FDI impacts the development of the South African automotive sector, which then prompts the current study.

### **1.3 BACKGROUND OF THE STUDY**

Since the start of democracy, South Africa has struggled with social and economic issues like unemployment, poverty, and inequality (Masipa, 2018). The unemployment rate officially rose from 17% in 1994 to approximately 32.1% during the last quarter of 2023 (StatsSA, 2023). To tackle these problems, creating jobs emerged as a significant challenge for South Africa. Since 1994, the South African government has implemented various economic policies aimed at addressing these socio-economic issues. Such policies include Growth, Employment and Redistribution (GEAR), the Accelerated Shared Growth Initiative for South Africa (AsgiSA), the New Growth Path (NGP), and the ongoing National Development Plan (NDP) (The Presidency, 2011). However, these domestic policies alone appeared insufficient in effectively addressing the socio-economic difficulties faced by the country at the time. Consequently, the South African government put efforts into attracting more foreign direct investments (FDIs) to boost economic growth and job creation, thereby complementing domestic spending with external investments (Barnes & Black, 2017).

In 1995, the South African government launched the Motor Industry Development Programme (MIDP) to enhance competitiveness and boost automotive exports. The MIDP has successfully encouraged domestic production since then. Between 1995 and 2023, the share of locally manufactured vehicles in South Africa rose significantly from 6.2% to 63.8%. This growth indicates the industry's capacity to satisfy local demand while also contributing to export-driven manufacturing (Automotive Research Institute SA, 2023). The President underscored this progress in the State of the Nation Address (SONA, 2014), highlighting the importance of attracting foreign direct

investment (FDI) as a remedy for unemployment, poverty, and severe inequality in South Africa.

Zedillo (2015) executed a comparative analysis of Foreign Direct Investment (FDI) within the automotive industries across various nations, spanning both advanced and developing economies. The objective of Zedillo's study was to discern the primary factors influencing the effectiveness of FDI strategies, notably government regulations, infrastructure advancements, and prevailing market dynamics. By evaluating the experiences of different countries, Zedillo extracted insights into optimal practices for drawing and utilising FDI in the automotive domain. In a separate investigation, Wall (2018) examined FDI's contribution to technological evolution in the automotive industry. The research highlighted how foreign investors introduced cutting-edge technologies, research and development strengths, and innovation frameworks, thereby enhancing the growth and competitive edge of local automotive firms. Wall's study underlined the critical role of FDI in fostering technological advancement and instigating innovation in the automotive field. Ucal (2014) concentrated on the socio-economic effects of FDI in the automotive sector, particularly regarding job creation, skill enhancement, and income distribution. This study assessed the ways FDI inflows spurred economic progress and aided the overall development of host nations. Ucal's work illuminated the extensive social advantages that could result from attracting and fostering FDI in the automotive industry.

#### **1.4 PROBLEM STATEMENT**

Hill and Hult (2017) suggested that FDI served as an alternative capital source, helping to cover the gap between savings and necessary investment levels. This view aligns with Wall (2018) and Nistor (2011), who emphasised that FDI boosts economic growth by enhancing domestic resources in developed and developing nations alike. On the other hand, Masipa (2018) contended that while FDI is regarded as a tool for augmenting domestic resources, its primary contribution lies in transferring knowledge and skills and creating jobs, particularly within the automotive sector in both advanced and emerging economies. The South African automotive sector has shown both growth and increased productivity, yet it continues to face hurdles compared to other BRICS nations. Between 2020 and 2023, South Africa recorded a moderate

production growth of 6.5%. By comparison, China and Brazil observed stronger growth, with rates of 15.2% and 10.6% respectively. This disparity underscores the necessity for in-depth analysis and research to uncover the reasons behind South Africa's lag in production growth when compared to its BRICS peers (Stats SA, 2023).

In recent years, the automotive industry has been marked by several significant trends. A major trend has been the swift expansion of electric vehicles (EVs), providing a viable alternative to traditional internal combustion engine (ICE) vehicles. This movement towards EVs has been largely driven by growing environmental concerns and stringent emission regulations enforced by governments globally. Such factors have encouraged substantial investments in various countries. However, evaluations on how these FDI are contributing to growth in the South African automotive industry remain lacking. Some investors are focusing on countries with inexpensive labour, leading to a slowdown in investment in other nations; thus, this is another area that requires further investigation. Although numerous studies have explored FDI's impact on automotive industries in both developed and developing nations, there is a scarcity of research examining the degree to which FDI has contributed specifically to South Africa's automotive sector. It is in this context that the present study aims to examine the role of FDI in the growth of South Africa's automotive industry and to assess its overall contribution.

### **1.5 PURPOSE OF THE STUDY**

The study sought to investigate the role of FDI on the growth of the South African automotive industry to determine the extent of its contribution. The study made significant contributions to both academic knowledge and practical policy applications in the context of South Africa's automotive sector. The primary contribution lay in its comprehensive analysis of the impact of macroeconomic variables, including Foreign Direct Investment (FDI), GDP, inflation, exchange rates, and interest rates, on automotive production from 1988 to 2023.

### **1.6 PRIMARY RESEARCH OBJECTIVE**

The primary objective of this study was to determine the extent to which FDI contributed to the growth of the South African automotive industry.

### **1.7 SECONDARY RESEARCH OBJECTIVES**

Based on the main research question, the following secondary objectives were proposed to examine the primary research objective:

- To investigate trends in the FDI flows in the South African automotive industry;
- To identify the key determinants of FDI inflows in South Africa; and
- To assess how FDI flows impacted the growth of the South African automotive industry.

## **1.8 MAIN RESEARCH QUESTION**

The main research question that was addressed in the current study was:

To what extent did FDI flows contribute to the growth of the South African automotive industry?

## **1.9 RESEARCH SUB-QUESTIONS**

Considering the abovementioned research questions, the following research sub-questions were suggested or proposed.

- What were the trends of FDI flows in the South African automotive industry?
- What were the key determinants of FDI flows in the South African automotive industry?
- How did FDI flows impact the growth of the South African automotive industry?

## **1.10 RESEARCH METHODOLOGY**

This study adopted a quantitative research approach to investigate the role of FDI on the growth of the South African automotive industry. The methodology was designed to address the research objectives through empirical analysis of secondary data spanning from 1988 to 2023.

### **1.10.1 Research Design**

The study employed a descriptive and explanatory research design. The descriptive component was used to analyse trends in FDI flows and automotive industry growth, while the explanatory component was utilised to examine causal relationships between FDI and automotive industry performance variables.

### **1.10.2 Data Collection**

Secondary data was collected from various reputable sources, including:

- South African Reserve Bank (SARB) for FDI data
- Statistics South Africa (Stats SA) for automotive production and economic indicators
- World Bank databases for macroeconomic variables
- Automotive Research Institute SA for industry-specific data
- Department of Trade and Industry reports

### 1.10.3 Data Analysis Methods

The study employed multiple analytical techniques:

**Descriptive Analysis:** Trend analysis and descriptive statistics were used to characterise the data and identify patterns in FDI flows and automotive industry growth.

**Correlation Analysis:** This was conducted to explore relationships between key variables before proceeding to more complex modelling.

**Stationarity Testing:** Unit root tests were performed to determine the stationarity properties of the time series data.

**Econometric Modelling:** The study utilised Autoregressive Distributed Lag (ARDL) models to examine both short-run and long-run relationships between FDI and automotive industry growth variables.

**Error Correction Modelling:** Error correction models were employed to assess the speed of adjustment to long-run equilibrium.

**Causality Testing:** Granger causality tests were conducted to determine the direction of causality between variables.

### 1.10.4 Variables

**Dependent Variable:** Automotive industry growth (measured by production volumes, employment, and value-added)

**Independent Variables:**

- Foreign Direct Investment Flows
- Gross Domestic Product
- Inflation rates
- Exchange rates
- Interest rates

#### **1.10.5 Time Period**

The study covered the period from 1988 to 2023, providing a comprehensive 35-year analysis that captured various economic cycles and policy changes in South Africa.

#### **1.11 SIGNIFICANCE OF THE STUDY**

This study aimed to enhance the understanding of FDI flows' impact on South Africa's economic development. While prior research has explored FDI's role in economic growth within South Africa, few investigations have specifically examined the influence of FDI on the South African automotive sector. Thus, this study contributed by synthesising existing research and filling noticeable gaps. It also offered a methodological advancement since most previous studies heavily relied on secondary data. Distinct from them, this empirical investigation employed thorough secondary data analysis. Consequently, the study's recommendations are valuable in refining South African FDI and economic development policies.

Moreover, the study demonstrated practical significance through its policy ramifications. It highlighted the essential influence of FDI, economic growth, and employment, while also stressing the detrimental effects of inflation and interest rates. This offered a robust basis for designing specific policies aimed at promoting stability and growth in the automotive industry.

#### **1.12 DELIMITATIONS OF THE STUDY**

The analysis was based on data from 1988 to 2023, which might not have fully captured the most recent changes or structural shifts in the global automotive industry. Therefore, the findings of this study might not have been generalised to other areas in South Africa. Nonetheless, automotive companies were spread across most commercial towns of South Africa, making this study more valid and reliable.

### **1.13 LIMITATIONS OF THE STUDY**

This study, like any other research, had some limitations. It was imperative that limitations of the study were carefully spelt out and reasons for conducting the study were provided (Leedy & Ormrod, 2015; Mouton, 2001, p.153; Saunders et al., 2016; Saunders et al., 2019). While this study offered valuable insights into the dynamics of the automotive sector, several limitations were acknowledged: data limitations, model limitations, global factors, sectoral comparisons, and macroeconomic considerations. To address these limitations, future research could benefit from more granular data, including sectoral disaggregation by sub-industries or region. Data availability on certain key variables, such as FDI by country of origin or specific trade policies, could further enhance the depth of analysis.

In conclusion, while this study provided important insights into the macroeconomic determinants of automotive production, there was ample opportunity for future research to further explore these dynamics, refine the methodology, and incorporate additional variables and factors that shaped the industry's trajectory. By expanding the scope of analysis, future research could continue to improve our understanding of the automotive sector's role in economic development and its resilience to global economic shifts.

### **1.14 CONCEPTUALISATION OF KEY TERMS**

A significant body of literature exists, which provides various definitions of the key terms used in this research. The terms have different meanings in different socio-economic, cultural, and political contexts. However, definitions were important insofar as they forced researchers to think about the scope and meaning of the term. This research domiciled itself within the following definitions:

#### **1.14.1 Foreign Direct Investment (FDI)**

Foreign Direct Investment (FDI) is a term used to describe the investment made by a company from one country in another country. According to a report by the United Nations Conference on Trade and Development (UNCTAD), FDI is defined as "an investment made to acquire lasting interest in an enterprise operating outside of the economy of the investor" (UNCTAD, 2019). In simpler terms, FDI refers to the investment made by a foreign company in another country to establish a business or expand its existing operations. For this study, FDI is defined as an investment made

by a foreign company in another country to establish a business or expand its existing operations.

### **1.14.2 Growth**

Growth is a term used to describe the increase in the size, value, or importance of something over time. According to a report by the World Bank, growth is defined as "the sustained increase in the real per capita income of a country or region" (World Bank, 2019). In the context of this study, growth refers to the increase in the size and value of the automotive industry in terms of production, sales, and employment. For this study, growth is defined as the sustained increase in the size and value of the automotive industry in terms of production, sales, and employment.

### **1.14.3 Automotive Industry**

The automotive industry refers to the production and sale of motor vehicles, including automobiles, trucks, buses, and motorcycles. According to a report by the International Organization of Motor Vehicle Manufacturers (OICA), the automotive industry is defined as "the totality of companies and organizations involved in the design, development, manufacture, marketing, and sale of motor vehicles" (OICA, 2019). For this study, the automotive industry is defined as the totality of companies and organisations involved in the design, development, manufacture, marketing, and sale of motor vehicles.

## **1.15 LAYOUT OF THE REST OF THE CHAPTERS OF THE STUDY**

### **Chapter 2: Literature Review**

The main purpose of this section is to review the literature associated with the role of FDI in the growth of the automotive industry. The presentation begins by providing the nature and significance of both FDI and the automotive industry. Then it presents the trends of FDI, its determinants, and contributions in the South African automotive industry.

#### **The Nature and Significance of the Automotive Industry**

The automotive industry is the most important manufacturing sector in South Africa (Bam, De Bruyne & Laing, 2020). Seven original equipment manufacturers (OEMs)

are represented in South Africa. The OEMs include BMW, Ford, General Motors, Mercedes-Benz, Toyota, Nissan, and Volkswagen, as well as 15 truck and bus companies (Ambe, 2014). It is estimated that about one-third of value added within the South African domestic sector directly or indirectly originates from vehicle assembly and automotive component manufacturing activity. Therefore, it is believed that the automotive industry is responsible for 2 to 3.5% of total employment (Barnes, Black, Comrie & Hartogh, 2018). The automotive industry comprises 30% of South Africa's industrial sector and has strong linkages to other manufacturing sub-sectors (Department of Trade and Industry (DTI), 2014). Furthermore, the automotive industry is the fourth largest exporting sector of the country after gold, diamonds, and platinum (OECD, 2019). The OECD (2019) also highlighted that South Africa accounts for approximately 45% of the total African automobile production. In 2018, 610,854 new vehicles (passenger automobiles and commercial vehicles) were produced in South Africa. The South African automotive industry is also one of the priority sectors identified by the Department of Trade and Industry (DTI) National Industrial Strategy (DTI, 2018).

### **Chapter 3: The Trends of FDI Flows in the Automotive Industry**

This chapter attempts to offer an overview of the trends in foreign direct investment (FDI) flows as they pertain to the automotive sector in South Africa. Monitoring FDI patterns provides insight into the home and host nations as well as the industries that draw the most investment. To accomplish these goals, this chapter is organised into three key sections: worldwide FDI flows, FDI flows, and South African FDI flows to the automotive sector. Analysing global FDI flows provides insight into where current FDI flows are headed and whether historical patterns are shifting. Studying the various areas in relation to their degree of development reveals the natural trend line of FDI and the features of the "ideal" location. This section aims to provide a worldwide perspective on FDI and likely global trends.

### **Chapter 4: The Determinants of FDI Flows in the Automotive Industry of Developed and Developing Countries**

Foreign Direct Investment (FDI) flows into the automotive industry can be influenced by a range of factors, including economic, political, social, and technological factors. The determinants of FDI flow in the automotive industry are complex and multifaceted,

and researchers have made significant efforts to understand the various factors that influence these flows. Overall, understanding the determinants of FDI flow in the automotive industry is crucial for policymakers and industry leaders to create an enabling environment for foreign investment. By addressing these determinants, governments and industry stakeholders can attract greater levels of FDI, leading to increased economic growth and development. The key determinants of FDI flows in the automotive industry of developed and developing countries are explained in the sections below.

### **Chapter 5: The Contribution of FDI Flows to the Growth of the Automotive Industry of Developed and Developing Countries**

This chapter aims to explore the contribution of FDI flows to the growth of the automotive industry in both developed and developing countries. By examining the underlying theoretical framework and analysing case studies from various nations, the chapter will shed light on the factors attracting FDI, the impact of FDI on the industry, and the challenges and opportunities that lie ahead. The discussion will be structured as follows: Section II will outline the theoretical framework, delving into the role of FDI in economic growth and its specific impact on the automotive industry, as well as the relationship between FDI and technology transfer. Sections III and IV will present an overview of FDI flows in developed and developing countries, respectively, highlighting case studies and examining the factors influencing FDI inflows and their effects on the automotive sector in these regions. Section V will discuss the challenges and opportunities associated with FDI in the automotive industry, providing insights for policymakers and investors. Finally, Section VI will conclude the chapter with a summary of the key findings and their implications for the future of the automotive industry in the context of FDI.

### **Chapter 6: Research Methodology and Estimation Techniques**

This chapter describes research methodology as a detailed approach to gathering data, model selection, and analytical techniques. In addition, it outlines the research methodology approach used to compile data on the role of FDI on the growth of the automotive industry in South Africa. Furthermore, the chapter also covers research design, population sampling strategy and sample size, data collection instruments,

data analysis methods, sources of data, validity and reliability and ethical considerations of the study.

## **Chapter 7: Data Analysis**

This chapter presents, discusses, analyses, and synthesises empirical findings in line with the literature review. The analysis begins with trend analysis, followed by descriptive statistics to characterise the data. The correlation analysis explores the relationships between key variables, and stationarity tests confirm the data's properties. The multiple regression analysis tests hypothesised relationships, while ARDL and error correction models are used to assess long-run and short-run dynamics. Causality analysis further helps to identify directionality between variables. The objectives of the study include analysing the factors influencing the automotive industry, assessing trends, and examining the interrelationships between economic variables. The methodology incorporates both descriptive and inferential statistics, including trend analysis, correlation analysis, and econometric modelling, with specific use of ARDL (Autoregressive Distributed Lag) models and error correction techniques to capture short- and long-term relationships. The chapter concludes by summarising the key findings from these analyses, providing insights into the workings of the South African automotive industry or sector.

## **Chapter 8: Conclusion and Recommendations**

This chapter includes summaries, contributions of the study, accomplishment of research goals, limitations, suggestions on the areas that warrant or need further research study, recommendations and conclusions. The rationale behind this is to offer a thorough, comprehensive summary of the synopsis findings and draw a conclusion of the results; in addition, to make inferences from the findings and suggest directions for future research.

### **1.16 Chapter Summary**

Chapter 1: Provides insights about the key elements that necessitated the study by justifying its relevance and direction. It begins by presenting an introduction and background of the study, the context and the importance of the research. It then proceeds to articulate the problem statement, purpose of study, and define the

research objective and research question that guide the investigation. In Addition, it outlines the research methodology approaches used and techniques to conduct the study. Chapters 2, 3, 4, and 5 critically discuss and interrogate a literature review of the role of FDI on the growth of the automotive industry in South Africa.

## **CHAPTER 2**

### **2.1 THE TRENDS OF FDI FLOWS IN THE AUTOMOTIVE INDUSTRY**

#### **2.1.1 INTRODUCTION**

The automotive industry has been a significant contributor to economic growth and development in many countries around the world. As a result, it has attracted a significant amount of foreign direct investment (FDI) over the years. FDI flows in the automotive industry have played a crucial role in promoting technological transfer, creating employment opportunities, and improving production efficiency. This literature review aims to provide a comprehensive overview of the trends of FDI flows in the automotive industry. It will examine the factors that influence FDI flows in the industry, the distribution of FDI across regions and countries, and the impact of FDI on the performance of the industry.

This chapter attempts to offer an overview of the trends in foreign direct investment (FDI) flows as they pertain to the automotive sector in South Africa. Monitoring FDI patterns gives insight into the home and host nations as well as the industries that draw the most investment. To accomplish these goals, this chapter is organised into three key sections: worldwide FDI flows, FDI flows, and South Africa FDI flows to the automotive sector. Analysing global FDI flows gives insight into where current FDI flows are headed and whether or not historical patterns are shifting. Studying the various areas in relation to their degree of development reveals the natural trend line of FDI and the features of the "ideal" location. This section tries to provide a worldwide perspective on FDI and likely global trends.

Narrowing the global view to more region-specific research that focuses on Africa, we conduct an in-depth examination of African trends and the various African markets getting the greatest foreign direct investment. The origin and kind of FDI going into Africa highlight the aims and rationale for growing investment in the area. Many studies

have been conducted on African markets, and as a result, the views of various experts are observed and compared to actual African FDI flows statistics. Knowing the African market is essential for gaining a clear understanding of its potential and growth possibilities.

## **2.1.2 CONCEPTUALISATION OF KEY WORDS**

There is a significant body of literature that gives various definitions of the key terms used in this research. The terms have different meanings in different socio-economic, cultural, and political contexts. However, definitions are important in so much they force us to think about the scope and meaning of the term. This research will domicile itself within the following definitions:

### **2.1.2.1 Foreign Direct Investment (FDI)**

Foreign Direct Investment (FDI) is a term used to describe the investment made by a company from one country in another country. According to a report by the United Nations Conference on Trade and Development (UNCTAD), FDI is defined as "an investment made to acquire lasting interest in an enterprise operating outside of the economy of the investor" (UNCTAD, 2019). In simpler terms, FDI refers to the investment made by a foreign company in another country to establish a business or expand its existing operations. For this study, the definitions adopted for FDI, Automotive, and Growth will be an investment made by a foreign company in another country to establish a business or expand its existing operations.

### **2.1.2.2 Automotive Industry**

The automotive industry refers to the production and sale of motor vehicles, including automobiles, trucks, buses, and motorcycles. According to a report by the International Organization of Motor Vehicle Manufacturers (OICA), the automotive industry is defined as "the totality of companies and organizations involved in the design, development, manufacture, marketing, and sale of motor vehicles" (OICA, 2019). For this study, the definitions adopted for FDI, Automotive, and Growth will be the totality of companies and organisations involved in the design, development, manufacture, marketing, and sale of motor vehicles.

### **2.1.2.3 Growth**

Growth is a term used to describe the increase in the size, value, or importance of something over time. According to a report by the World Bank, growth is defined as "the sustained increase in the real per capita income of a country or region" (World Bank, 2019). In the context of this study, growth refers to the increase in the size and value of the automotive industry in terms of production, sales, and employment. For this study, the definitions adopted for FDI, Automotive, and Growth will be the sustained increase in the size and value of the automotive industry in terms of production, sales, and employment.

### **2.1.3 GLOBAL FDI FLOWS IN THE AUTOMOTIVE INDUSTRY**

According to the United Nations Conference on Trade and Development (UNCTAD), global FDI flows in the automotive industry have been declining since 2015, with a significant drop in 2018 (UNCTAD, 2019). The decline in FDI flows is attributed to several factors, including a slowdown in global economic growth, trade tensions, and regulatory changes in major automobile markets. For instance, in 2018, the United States imposed tariffs on Chinese goods, including automobiles, leading to a decline in FDI flows in the sector (UNCTAD, 2019).

Furthermore, the shift towards electric vehicles (EVs) is also affecting FDI flows in the automotive industry. Many countries, including China, Europe, and the United States, have introduced policies to encourage the production and consumption of EVs, resulting in a surge in FDI flows in the EV industry (The Economist, 2019). For instance, Tesla, a leading EV manufacturer, has attracted significant FDI flows into the United States and China, where it has established production facilities (The Economist, 2020).

Moreover, the concentration of FDI flows in specific regions and countries has been a defining feature of the automotive industry. In 2019, China was the largest recipient of FDI flows in the automotive industry, accounting for 36% of the total global FDI flows in the sector (UNCTAD, 2020). This trend is attributed to China's large and growing domestic market, as well as its efforts to attract foreign investment through favourable policies and incentives (UNCTAD, 2020).

The worldwide market has witnessed significant modifications during the previous decade. Developing economies with expanding outward foreign direct investment (OFDI) have outperformed expectations in terms of their enormous growth (Cieslik & Tran, 2019). According to the UNCTAD's Investment Report for 2021, economic recovery and development are increasingly reliant on private investment as a result of deteriorating fiscal policies (UNCTAD, 2021). Monitoring the worldwide FDI flows in the automotive sector reveals the evolution of FDI.

According to Asongu, Akpan and Isihak (2018), owing to their economic prosperity and legislative restrictions, only a few emerging nations attract foreign direct investment in the automotive sector. A range of variables contribute to a country's ability to attract foreign direct investment. In the last decade, economic factors such as market size, market growth, the level of skills, infrastructure, and technical potential have had a greater influence than trade and investment policy obstacles in determining foreign direct investment (Bun, 2021). Developed nations have seen an 18% increase in FDI inflows, mostly in the form of mergers and acquisitions. Investments in productive assets, which are more essential for economic growth, confer a greater degree of significance on greenfield projects (UNCTAD, 2021).

FDI flows to Asian nations (excluding West Asia) are the primary engine of the expansion of emerging and transition economies; these flows seem to be impacted by the crisis in Europe (UNCTAD, 2021). The tables illustrate the FDI inflows and outflows of various areas. This displays the relative significance of some locations vs others. Understanding some of the factors for the shift in numbers may help to explain why certain locations have more FDI than others.

**2.1.3.1 Table 2.1: FDI Inflows by Region (US\$ millions)**

<b>Region</b>	<b>2014 (US\$ millions)</b>	<b>2015 (US\$ millions)</b>	<b>2016 (US\$ millions)</b>	<b>2017 (US\$ millions)</b>	<b>2018 (%)</b>	<b>2019 (%)</b>	<b>2020 (%)</b>	<b>2021 (%)</b>
World	1970.9	1744.1	1185.0	1243.7	100.0	100.0	100.0	100.0
Developing economies	573.0	658.0	510.6	573.6	29.1	37.7	43.1	46.1

Developing economies: Africa	63.1	73.4	60.2	55.0	3.2	4.2	5.1	4.4
Developing economies: America	169.5	206.7	141.0	159.2	8.6	11.9	11.9	12.8
Developing economies: Asia	339.3	375.7	307.5	357.8	17.2	21.5	26.0	28.8
Developing economies: Oceania	1.1	2.2	1.9	1.5	0.1	0.1	0.2	0.1
Developed economies	1306.8	965.1	602.8	601.9	66.3	55.3	50.9	48.4
Developed economies: America	331.2	363.4	174.2	251.9	16.8	20.8	14.7	20.3
Developed economies: Asia	31.3	35.3	16.4	3.9	1.6	2.0	1.4	0.3
Developed economies: Europe	895.8	515.0	387.8	313.1	45.4	29.5	32.7	25.2
Developed economies: Oceania	48.5	51.4	24.4	33.0	2.5	2.9	2.1	2.7

**Source:** UNCTAD FDI statistics database (2020)

Table 2.1.3.1 demonstrates that throughout the years of the financial crisis, the growth rate of emerging nations increased while that of wealthy nations declined. The proportional share of growth and FDI stock between developed and developing nations is decreasing. Europe is the leading recipient of FDI, followed by Asia and lastly the United States. This describes the changes occurring in FDI flows, which are

increasing in emerging areas, particularly in Asia. Not only are the alterations visible in the statistics on FDI inflows, but also in the overall FDI outflows from each area. Table 2.1.3.2 explains FDI outflows from various geographies.

**2.1.3.2 Table 2.2: FDI Outflows by Region (US\$ millions)**

<b>Region</b>	<b>2014</b> (US\$ millions)	<b>2015</b> (US\$ millions)	<b>2016</b> (US\$ millions)	<b>2017</b> (US\$ millions)	<b>2018</b> (%)	<b>2019</b> (%)	<b>2020</b> (%)	<b>2021</b> (%)
<b>World</b>	<b>2174.8</b>	<b>1910.5</b>	<b>1170.5</b>	<b>1323.3</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Developing economies</b>	<b>294.2</b>	<b>308.9</b>	<b>270.7</b>	<b>327.6</b>	<b>13.5</b>	<b>16.2</b>	<b>23.1</b>	<b>24.8</b>
Developing economies: Africa	10.7	9.8	5.6	6.6	0.5	0.5	0.5	0.5
Developing economies: America	61.7	80.6	45.5	76.3	2.8	4.2	3.9	5.8
Developing economies: Asia	221.7	218.4	219.5	244.6	10.2	11.4	18.8	18.5
Developing economies: Oceania	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
<b>Developed economies</b>	<b>1829.0</b>	<b>1541.2</b>	<b>851.0</b>	<b>935.2</b>	<b>84.1</b>	<b>80.7</b>	<b>72.7</b>	<b>70.7</b>
Developed economies: America	452.3	388.7	324.6	368.2	20.8	20.3	27.7	27.8
Developed economies: Asia	82.2	135.2	76.4	64.2	3.8	7.1	6.5	4.9
Developed economies: Europe	1274.1	983.3	434.2	475.8	58.6	51.5	37.1	36.0
Developed economies: Oceania	20.5	34.1	15.9	27.0	0.9	1.8	1.4	2.0

**Source: UNCTAD FDI statistics database (2020)**

Developing areas are seeing a rapid increase in FDI outflows, which is accelerating with time. The developed area has the highest number and growth rate of outflows, although the financial crisis has caused the growth rate to decline proportionally.

### **2.1.3.3 Growth Trends and FDI Inflows on a Global Scale in the Automotive Industry**

According to a report by the United Nations Conference on Trade and Development (UNCTAD), global FDI inflows in the automotive industry increased by 39% in 2019, totalling \$59 billion. This growth was attributed to the expansion of electric and autonomous vehicles, the shift towards more sustainable and efficient manufacturing processes, and the development of new technologies (UNCTAD, 2019). The Asia-Pacific region, particularly China, has been a significant contributor to the growth of the automotive industry. China, as the largest automobile market in the world, attracted \$14 billion in FDI inflows in 2019, accounting for almost a quarter of global FDI inflows in the industry (UNCTAD, 2019). This growth was driven by the country's increasing middle class and government support for electric vehicles.

The United States also attracted significant FDI inflows in the automotive industry, with a total of \$15 billion in 2019 (UNCTAD, 2019). The growth in FDI inflows was attributed to the country's large consumer market, skilled workforce, and advanced technology infrastructure. However, the COVID-19 pandemic has affected the industry, leading to a decline in FDI inflows in 2020. The European Union (EU) has also been a significant player in the automotive industry, attracting \$7 billion in FDI inflows in 2019 (UNCTAD, 2019). Germany, France, and the United Kingdom were the top recipients of FDI inflows in the EU, with the growth attributed to their advanced technology infrastructure and established supply chains.

In recent years, there has been a trend towards cross-border M&A activities in the automotive industry, with companies seeking to expand their global presence and gain access to new markets. For instance, in 2020, the merger between FCA and Peugeot SA to form Stellantis aimed to enhance their product portfolios and leverage their global reach through shared platforms and technologies.

In 2019, the worldwide output of automobiles decreased by 5.2%, from 96.87 million in 2018 to 91.79 million in 2019 (UNCTAD, 2021). Due to the coronavirus pandemic, the reduction persisted in 2020, with cumulative statistics from January to September 2020 indicating a 22.9% decrease in worldwide output compared to the same time in 2019 (UNCTAD FDI, 2021). In 2019, automobile manufacturing decreased in all major areas, including South America (-3%), North America (-3.7%), the European Union (-4.8%), and China (-7.5%). The statistics for 2020 have not yet been verified (UNCTAD FDI, 2020).

China produced the most vehicles in 2019, with 25.72 million, followed by the United States with 10.88 million and Japan with 9.8 million (UNCTAD FDI, 2020). Germany recaptured fourth position from India, which saw a 12.2% fall year-over-year (UNCTAD FDI, 2020). Although the majority of the world's top vehicle-producing economies saw reductions, Brazil, Spain, Slovakia, Malaysia, and Romania had little gain. South Africa is recognised as a worldwide second-tier participant as a member of the group of nations that produce less than one million per year. South Africa's automobile manufacturing remained 22nd in the world in 2019, although its market share climbed from 0.59% in 2018 to 0.69% in 2019 (UNCTAD FDI, 2020). South Africa placed 14th in terms of worldwide light commercial vehicle manufacturing, with a 1.25% market share.

World sales of new vehicles decreased by 3.76 million units in 2019, from 95.06 million in 2018 to 91.30 million in 2019 (UNCTAD FDI, 2020). This was the largest annual decrease since the 2008 global financial crisis. China's demand for automobiles decreased from 28.08 million in 2018 to 25.77 million in 2019 (UNCTAD FDI, 2020). China is the biggest automobile market in the world, but sluggish credit growth, stricter pollution requirements, and the loss of tax incentives for electric vehicle purchases lowered passenger automobile sales by 9.6% in 2019, from 23.71 million units in 2018 to 21.44 million units in 2019 (UNCTAD FDI, 2020). The worldwide market for passenger automobiles decreased by 4.35 million units in 2019, from 68.69 million units in 2018 to 64.34 million units in 2019 (UNCTAD FDI, 2020).

In Europe, sales of new automobiles climbed by 5% in Germany and 1.9% in France, but decreased by 2.4% in the United Kingdom. In the United States, sales of passenger automobiles decreased by 11.1%, while sales of light trucks grew by 3%.

The sales of new automobiles in India decreased by 14.9% as a result of new safety and pollution rules and hefty levies. The total number of new automobiles sold in India went below 3 million for the first time in three years.

VW Group dominated global vehicle sales for the fourth year in a row, increasing its sales by 1.3% to a record-high 10.97 million automobiles in 2019, followed by Toyota with sales of 10.74 million vehicles and the Nissan/Renault/Mitsubishi alliance with sales of 10.16 million vehicles (UNCTAD FDI, 2020). Renault, a French automobile manufacturer, said in May 2020 that it would eliminate 15,000 employees worldwide to save €2 billion over three years, mostly via retirements and voluntary separations. At least 4,600 of the positions planned for elimination by Renault were in France. From January to June 2020, Renault had a loss of €7.3 billion (UNCTAD FDI, 2020). This was the result of Nissan's losses, in which Renault holds a 43% interest.

In 2020, Volvo Group and Isuzu Motors formed a strategic alliance, which included:

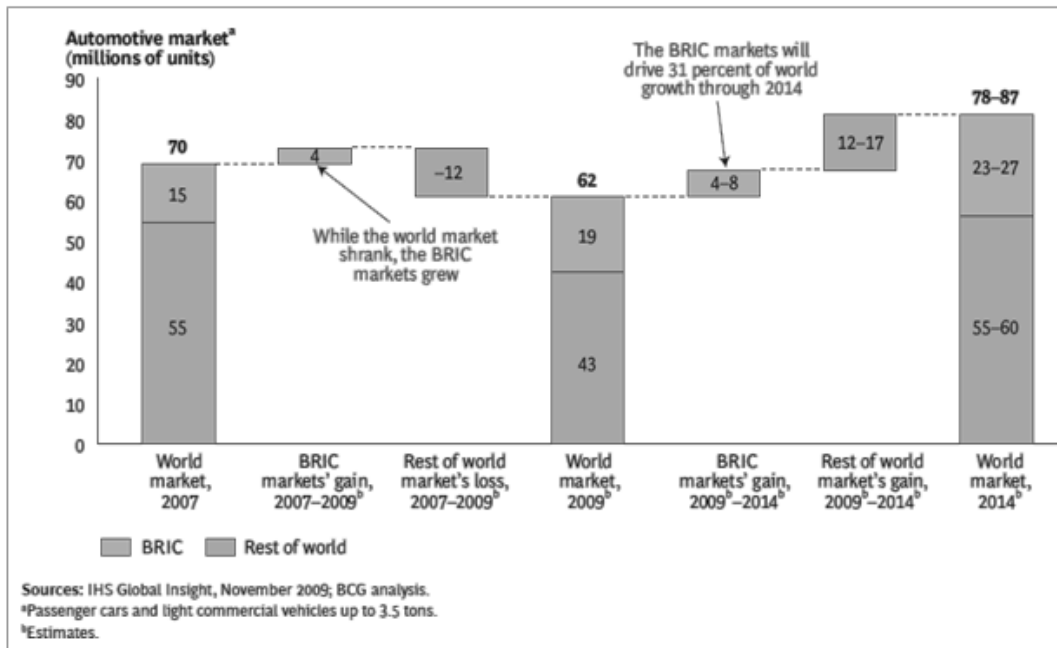
- A global technology partnership to address the challenges of automation, electrification, and connectivity;
- Creating the best long-term conditions for a stronger heavy-duty truck business for UD Trucks and Isuzu Motors in Japan and across international markets; and
- Exploring opportunities for greater collaboration within the commercial vehicle business across geographic regions.

OEMs are attempting to package their manufacturing on platforms, which is another worldwide development worth highlighting in the context of the research issue. Due to the important restriction of cost competitiveness, they are searching for economies of scale (Kisto, 2017). Using its flexible shared base, Honda produces three dimensionally diverse variants of the Accord. This results in distinct market variants with 60% of the components being identical (Jadhav, 2021).

For at least a decade, automotive original equipment manufacturers (OEMs) have expanded their operations directly or indirectly to the booming markets in Asia and the other BRIC (Brazil, Russia, India, and China) countries in an effort to capitalise on growth opportunities and the possibility of operating at lower production costs (Hussain & Haque, 2020). As noted before, the migration to lower-cost countries is driven by two factors: cost and demand. This is what is meant by the phrase "global

footprint". Manufacturers with a worldwide presence want to connect production and sales in areas with significant growth rates. The developing markets are characterised not just by a growing population and double-digit market growth rates, but also by labour costs that remain a fraction of those in the developed world, but this is only significant so long as it works with productive capital (Hunady & Orviska, 2019).

**2.1.3.4 Figure 2.1: Projected growth of BRIC automotive markets through 2014**



**Source: Boston Consulting Group, January 2021**

As a result of laws (primarily safety and environmental), the automotive industry concentrates on new products and innovation owing to the rapid pace of technological development (Madhavan, Dandapani, & Tamizharasan, 2020). The illustration below depicts this effect. As a result, the firms – whether they are OEMs or suppliers – must make substantial investments in new goods and related technology, which further strains the financial stability of the automotive supply chain.

As a result of laws (primarily safety and environmental), the automotive industry concentrates on new products and innovation owing to the rapid pace of technological development (Gurshev, 2019). The illustration below depicts this effect. As a result, the firms – whether they are OEMs or suppliers – must make substantial investments in new goods and related technology, which further strains the financial stability of the

automotive supply chain (Gupta, 2018). Trading blocs (e.g., the North American Free Trade Agreement (NAFTA), the European Union (EU), the Association of Southeast Asian Nations (ASEAN), and the Mercado Común del Sur (MERCOSUR, the Southern Common Market)) recognise influences on the structure of the automotive industry, which will drive the continued development of regional production systems as exchange rate exposure and rising transportation costs pose a threat (Malik & Savadatti, 2018). Within these blocs, migration to lower-priced areas will persist (e.g., Europe and Eastern Europe). OEMs will also employ this method to leverage their operations and sales in the trade blocs by constructing manufacturing facilities in low-cost countries and selling their products under a foreign label (Gujrati & Uygun, 2020).

In addition, consolidation will continue as new markets develop into mature nations, and rising markets (particularly China and India) will continue to establish their own resources to play a role in the global market. Increased consolidation will improve scale, simplify distribution, enhance asset efficiency, and provide access to specialised markets (Mariana, 2021).

### **2.1.3.5 Developing Areas**

The emerging areas consist of Africa, Asia, Latin America, the Caribbean, and South-Eastern Europe. Africa's FDI inflows peaked in 2018 at US\$73.4 billion (UNCTAD, 2019). This is a substantial sum for one of the world's least developed areas. The rise in FDI is attributable to favourable global commodity prices and profitable returns on investments (UNCTAD, 2019).

North, East, and South-East Asia are the areas that have had the least worldwide reduction. In 2009, FDI flows to this area decreased by 17% to US\$233 billion. In terms of worldwide consumer and corporate confidence, this area displays an unexpected resurgence (UNCTAD, 2019). With a decline of 24% to US\$66 billion in 2019, West Asia represents an entirely different situation (UNCTAD, 2019). In 2018, South America had significant gains in FDI inflows, which were mostly attributable to the large inflow increases to the top four recipient nations: Brazil (30%), Chile (33%), Colombia (17%), and Argentina (3%) (with 37%) (UNCTAD, 2019). Following three consecutive years of growth, this area witnessed a 32% decline to US\$117 billion.

South-East Europe's rising FDI inflows in 2018 are mostly driven by the privatisation of state-owned companies (SOEs) (UNCTAD, 2019). The CIS's increasing FDI inflow may be attributed to the need for access to big and expanding domestic markets (UNCTAD, 2019). South-Eastern Europe and the Commonwealth of Independent States reported a 43% decline in FDI flows in 2019, mostly owing to a decline in investor confidence. Despite a significant decline in FDI inflows in 2019, the region's FDI stock reached about US\$500 billion, ranking it as the third highest in the world. The majority of Greenfields and M&A agreements are attributable to MNEs from European Union nations (UNCTAD, 2019).

### **2.1.3.6 Developed Areas**

In developed areas, FDI flows peaked in 2017, but both inward and outbound flows declined in 2018. Inflows decreased by 44% to US\$566 billion and outflows by 17% to US\$1,507 billion. Due to the severe economic downturn that afflicted industrialised nations, there was a considerable decline in M&A transactions (UNCTAD, 2019). The United States and the European Union are developed areas.

The United States is regarded as the world's greatest beneficiary of FDI. In 2017, the United States received a total of US\$316 billion in FDI, a 17% increase over 2016 (UNCTAD, 2017). The increasing FDI inflows are a result of the 61% rise in equity capital in the industrial and banking sectors. In 2018, FDI flows to Canada plummeted by a staggering US\$63 billion, mostly as a result of the end of the natural resource boom (UNCTAD, 2019).

After analysing the most relevant locations, the shifting environment of FDI flows becomes clear. Developed areas suggest a drop in FDI flows, while emerging regions play a more significant role. Around 50% of FDI flows go to emerging and transitional economies (Ergano & Rambabu, 2020). Nevertheless, playing an important role, developed areas tend to follow the global trend of FDI flows.

In a summary of global FDI flows, it is emphasised that between 1990 and 2010, global FDI flows and stock expanded by a phenomenal amount (UNCTAD, 2019). Changes have occurred in the determinants of FDI, which now include market size, growth, level of skills, infrastructure, and technical advancements. In influencing FDI, these variables have a greater influence than just watching trade and investment. The bulk

of FDI comes in the form of Greenfield investments, demonstrating that investors are assuming a more significant role in foreign nations (Cieslik & Tran, 2019). The fact that the majority of FDI flows travel to emerging and transition countries exemplifies the changing nature of FDI flow environments. In contrast to the past, developed areas no longer have a dominant role. The shifting outlook on Africa's potential and development is discussed, as well as the continent's expanding role in attracting more FDI flows. The part that follows evaluates African tendencies to highlight the continent's positive improvements.

#### **2.1.4 FDI FLOW TRENDS IN THE AFRICAN AUTOMOTIVE INDUSTRY**

According to a report by the United Nations Conference on Trade and Development (UNCTAD), FDI inflows in the African automotive industry increased from \$206 million in 2018 to \$473 million in 2019, representing a growth rate of 130% (UNCTAD, 2020). This growth was driven by the expansion of the industry in some African countries, increasing demand for vehicles, and the development of local assembly and manufacturing capacity.

South Africa is the largest automobile market in Africa and has been a significant recipient of FDI inflows in the industry. In 2019, FDI inflows in the South African automotive industry increased to \$1.1 billion, a growth rate of 49% compared to the previous year (UNCTAD, 2020). The growth was attributed to the country's established automotive industry, skilled workforce, and favourable business environment.

Other African countries, such as Morocco, Egypt, and Kenya, have also experienced growth in the automotive industry, attracting significant FDI inflows. Morocco has established itself as a hub for the automotive industry in Africa, attracting major international companies such as Renault and Peugeot (UNCTAD, 2019). Egypt has also attracted significant FDI inflows in the automotive industry, with companies such as Nissan and BMW establishing local assembly plants (UNCTAD, 2020). Kenya has been developing its local assembly capacity, with the government offering incentives for foreign companies to invest in the country's automotive industry.

However, some challenges hinder the growth of the African automotive industry, such as inadequate infrastructure, high import tariffs, and limited access to financing. These challenges make it difficult for local companies to compete with established

international companies, resulting in low domestic production levels and limited technological capabilities.

The African automotive business is complicated and little understood; this area includes some of the fastest-growing countries, such as Nigeria, but this does not alter the perception of risk in this region among some investors (Gupta, 2018). Africa offers numerous dangers, but also many benefits, such as a high rate of return. Since 1991, the average return on investment (ROI) for FDI has been 29% (Dhande & Magar, 2018). According to several experts, the growing levels of FDI are due to the high levels of ROI (Chattopadhyay & Mukherjee, 2019). The origins of these expanding FDI inflows vary, but the dominant Asian economies are a significant source of FDI in African markets (Yadav & Manwani, 2020). This may be for obtaining Africa's abundant natural resources. This reality renders Africa reliant on its natural resources, which may raise certain issues and concerns due to the volatile and extractable nature of natural resource pricing; thus, these resources need management and upkeep (Miglani, 2019). The rise of FDI flows to this area has several benefits, including job creation, economic growth, and the transfer of skills and technology, which is diversifying Africa's economy.

Even though Africa has shown tremendous potential and strong growth rates, it seems that the African growth narrative has not yet been completely comprehended. Africa has a minor share of FDI, getting around 5% of worldwide FDI projects (Arya, 2019). Africa's FDI flows do not represent a continent with some of the world's fastest-growing economies and strong investment returns (Melwani & Sitlani, 2017). This illustrates the erroneous view of Africa and the formidable obstacles African investors confront. The FDI market is very competitive, and the African market must be comprehended more clearly. Investors require a clear understanding of the risks and benefits associated with the African market (Singh, 2017).

Among the obstacles that foreign investors may confront in the African market are the misperceptions about Africa held by the world community (Hussain & Haque, 2020). It is seen to be unstable, corrupt, and a hazardous investment. These conditions are presently changing. Lack of regional integration is another obstacle that makes international commerce inefficient and difficult. Africa's inadequate infrastructure is a

major contributor to the continent's underdevelopment and hence a formidable obstacle (Gaddam, 2018).

The dominating Asian economies are a key source of FDI in Africa and promote the stimulation of FDI inflows to the continent (Chandrasekar & Palanivelu, 2018). Rising investment from and into emerging areas has played a crucial role in the evolution of Africa's FDI markets in recent years. China, India, and Malaysia have become significant providers of FDI in Africa, accounting for interregional FDI flows among emerging nations (Hussain & Haque, 2020). The majority of investments are resource-seeking FDI, with nations like China and India investing mostly in industrial and infrastructure sectors (Singh, 2020). Africa's reliance on natural resources may bring various issues and concerns. Natural resources have unpredictable prices and may be harvested; hence, they must be managed and preserved. This requires the government to take a prominent role and enforce rules concerning the development and export of natural resources (Barnes, Erwin & Ismail, 2019). Foreign direct investment plays a vital part in Africa's growth and development mechanisms. Increasing FDI in Africa results in the creation of additional employment, the advancement of local suppliers, the transfer of skills, technology, and knowledge, and the diversification of Africa's economy (Mishra & Amba, 2017).

In recent years, Africa has rated relatively poorly in terms of global FDI, showing to be the area that it has contributed the least relative to other regions (Kristjansdottir, 2021). While Africa has lagged behind other areas, investment inflows have increased over time. The expansion is fuelled by the expanding market in Africa, despite the continent's reputation for its abundant natural resources (Nistor, 2022). Investors are also seeing the potential in current markets and developing new ones in the area. According to UNCTAD (2020), the services sector is the largest recipient of Greenfield FDI inflows in the area. Specifically, investors are seeking opportunities in the construction, business services, and telecommunications industries (Santander, 2018).

## **2.1.5 FDI INFLOWS INTO THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY**

Before the democratic elections in 1994, investors avoided South Africa due to policies and regimes that discouraged the recruitment of FDI. At that time, international banks

had divested from South Africa, and more than 350 foreign companies had also sold their assets there (AIEC, 2019). After 1994, the nation saw an upsurge in FDI inflows (Santander, 2019). South Africa is now the top nation in terms of FDI in the SADC, although it contributes a small amount to worldwide FDI. South Africa now gets 70% of investment into the SADC (UNCTAD, 2015). UNCTAD (2015) statistics indicate that South Africa has struggled to attract fresh investment over the previous two decades. Yet, the contribution of FDI to South Africa's total economic development has remained relatively modest in comparison to other growing economies. As a result, South Africa's FDI inflows increased by an annual average of 46% when the sanctions period ended (Chaudhary, Ghimire, & Ghimire, 2020).

South Africa gets the majority of its investment from European and American nations, and less from neighbouring African nations (Cieslik, 2020). The majority of the influx is focused in the province of Gauteng. The majority of FDI inflows into South Africa are market- and efficiency-driven, since they mostly occur in the manufacturing, services, financial services, and telecommunications sectors. In addition, a part of resource seeking occurs in the mining and oil industries (Alfaro & Chen, 2020). Platinum and gold are among South Africa's abundant natural resources that attract investors interested in natural resources. Foreign investors are often drawn to a country's production efficiency, which reduces input costs. The automobile manufacturing business has shown that many international investors want expansion and profit margin growth via greater efficiency (Anghel, 2018).

With the emergence of formal democracy, South Africa's investment policies and incentives have been effective in luring international investors to the country. Figure 2.1.5.1 depicts FDI inflows into South Africa from 1994 to 2022.

#### **2.1.5.1 Figure 2.2: FDI inflows into South Africa (1994-2022)**



**Source: Own graph with data from the World Bank 2022**

South Africa has seen a modest growth in FDI inflows since 1994. In 1995, the amount of South African currency (ZAR) increased from ZAR 37 million in 1994 to ZAR 1.2 billion (World Bank, 2022). This significant rise in the attractiveness of FDI was the result of South Africa's democratisation, which resulted in more trade liberalisation. Cieslik and Goczek (2018) assert that South Africa was unattractive to investors during the apartheid period because the country's economic policies were not favourable to the influx of FDI since the government tightly controlled trade choices. Due to the partial privatisation of Telkom and South African Airlines, there was a large surge in FDI to the tune of ZAR 3.8 billion in 1997 (World Bank, 2022).

#### **2.1.5.2 A Snapshot of South Africa's Automotive Industry by Repatriated Profits of Multinational Firms**

In South Africa, eight original equipment manufacturers (OEMs) (Volkswagen SA, Daimler-Chrysler SA, BMW SA, Toyota SA, Nissan SA, Ford Motor Company of SA, General Motors SA, and Fiat Auto SA) produce a little over 400,000 automobiles annually (AIEC, 2020). Moreover, there are around 150 recognised component suppliers and approximately 400 independent component suppliers of automotive components (Markowitz & Black, 2019). In accordance with the current MIDP policy framework, tariffs on fully built-up units (CBUs) and completely knocked-down (CKDs) kits will decrease by 2% every year until 1 January 2007 (AIEC, 2020). Currently, import duties on CBUs and automotive components are assessed at rates of 36% and 28%, respectively (Rundell, 2017). Beginning on 1 January 2008, taxes on imported light automobiles and components will be reduced by 1% every year until they reach

25% and 20%, respectively, on 1 January 2012 (AIEC 2020). It is essential to note that the tariff reduction scheme is moving quicker than needed by WTO norms. The import-export complementation (IEC) scheme and the productive asset allowance (PAA) scheme are two additional major incentives provided by the MIDP.

In recent years, trade and international investment in South Africa's automotive industry have increased significantly, making it a valuable case study for IIT. From 1995 to 2004, the automotive industry's exports of components and light automobiles (including both passenger and light commercial vehicles) rose from R4.2 billion to R39.2 billion, while imports rose from R16.4 billion to R58.0 billion (Deal, 2019). In 2004, the automotive trade deficit was R18.8 billion, notwithstanding the local industry's extraordinary expansion in exports of automobiles.

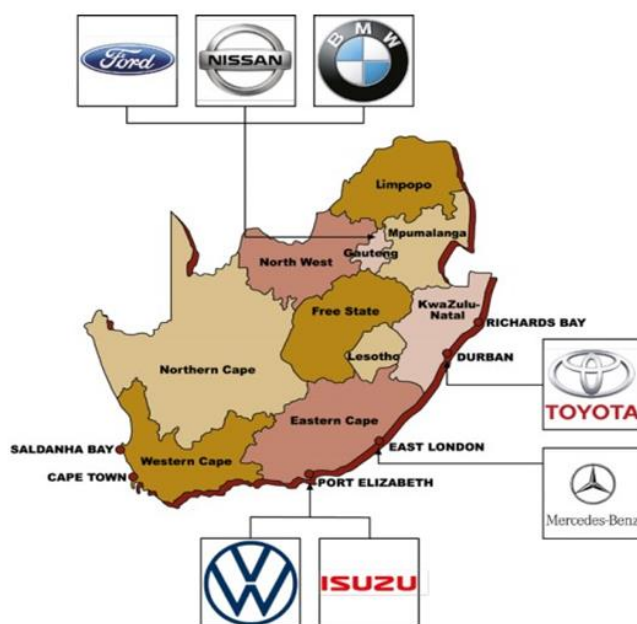
As a member of the South Africa Customs Union (SACU), South Africa has developed significant ties with countries of the North American Free Trade Agreement (NAFTA) through the Africa Growth Opportunity Act (AGOA), which was enacted in January 2001. South Africa also has significant trade ties with the South African Development Community (SADC) and European Union countries (EU) (Joffe, 2018). South Africa exports a considerable quantity of automotive goods (both CBUs and CKDs) to EU and NAFTA member states. BMW SA has been granted permission to export left-hand drive 3-series automobiles to the United States under the AGOA, while DaimlerChrysler SA is expected to sell new C-class models with left-hand drive to the United States (Statistica, 2020). Since the mid-1990s, the automotive industry has been one of the most successful recipients of FDI in South Africa's manufacturing sector, particularly due to rising foreign ownership of local (OEMs) by global corporations (Toyota Japan, General Motors, DaimlerChrysler, etc.) (Statistica, 2020). Local OEMs are now substantially integrated into the global manufacturing networks of automobile multinational corporations (Knoerich, 2017). The incentives (import-export complementation, productive asset allowance, and tariffs) provided by the MIDP safeguard multinational enterprises (Manda, 2019), which in turn infuse FDI into the sector and contribute to the increase of exports and development of the local industry. As seen in Table 1, South Africa continued to be a net importer of total automotive goods in 2004, with a trade imbalance of R18.8 billion. The exchange rate

appreciation in 2002 and 2004 was a major factor in the expanding automobile trade imbalance (Mandaportal, 2017).

The automobile manufacturing sector in South Africa is located in Gauteng, the Eastern Cape, and KwaZulu-Natal, near their respective suppliers. Gauteng is home to manufacturing sites for BMW, Ford Motor Company of Southern Africa (Ford), and Nissan South Africa (Nissan) (Maryam & Mittal, 2020). In addition to a robust automotive component sector, the province is home to several truck and bus assembly companies. In 2019, there were 200 automotive component manufacturers in the province of Gauteng, 150 in the province of the Eastern Cape, and 80 in the province of KwaZulu-Natal. The automotive industry in KwaZulu-Natal is dominated by Toyota (Merwe & Morne de, 2020).

The automotive industry is the major exporter in the Eastern Cape. The Eastern Cape is home to four major OEMs: Volkswagen South Africa, Mercedes-Benz, Isuzu Motors South Africa, and Ford. The province generates 51% of the country's automobile exports and manufactures half of South Africa's passenger automobiles (Min, 2020). In addition to the Western Cape and North-West provinces, some automotive development also takes place in the Northern Cape Province.

### 2.1.5.3 Figure 3: Automotive Clusters in South Africa



Source: Naamsa (2020)

The Automotive Industry Development Centre (AIDC) reports that 35.8% of new automobile sales, 34.6% of light commercial vehicle (LCV) sales, 37.1% of truck sales, and 36.5% of LCV exports occur in Gauteng (Naamsa, 2020).

#### **2.1.5.4 Growth Trends and FDI Inflows in the South African Automotive Industry**

South Africa is no exception to the rule that a country's economic growth is directly tied to the health of its transportation infrastructure, and the country's automotive sector is a major force in boosting the country's and the world's economy (Nguyen & Cieslik, 2020). Nowadays, it employs a sizable portion of South Africa's labour force and accounts for more than 7% of the country's GDP, 49% of manufacturing GDP, and 26% of industrial GDP (Stuart, 2020).

There were 12.7 million registered vehicles in South Africa as of the end of 2019, with 7.49 million (or 59%) being personal automobiles (Naamsa, 2020). In 2019, the average age of a passenger automobile parc was 10 years, while the average age of a commercial vehicle parc was 10 years and 1 month (Naamsa, 2020). In South Africa, there are 179 automobiles for every 1,000 residents.

#### **2.1.5.5 Table 2.3: Automobile sales in South Africa, 2018–2020**

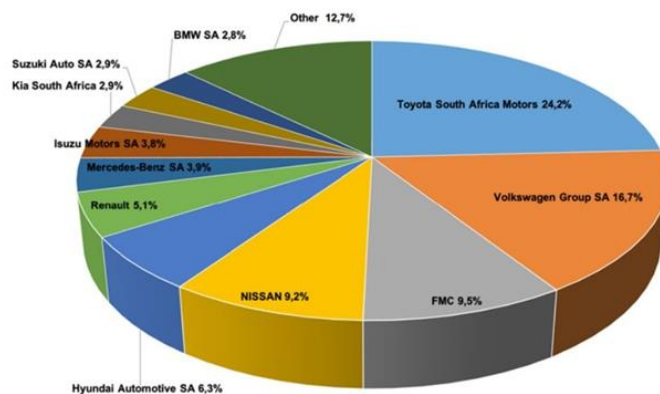
<b>Segment</b>	<b>2018 (units)</b>	<b>2019 (units)</b>	<b>2020 (units)</b>
Automobiles	365,247	355,379	246,784
Light commercial vehicles	159,525	153,192	110,929
Medium and heavy commercial vehicles and buses	27,455	28,041	22,736
<b>Total Vehicles</b>	<b>552,227</b>	<b>536,612</b>	<b>380,449</b>

**Source: NAAMSA (2022)**

Toyota celebrated 40 years of consecutive market leadership in 2019 with a market share of 24.2%, followed by Volkswagen, Ford, and Nissan. Toyota Hilux remained

the most popular vehicle sold in South Africa in 2019, with sales of 40,022 units (Naamsa, 2020).

**2.1.5.6 Figure 2.4: Market share of automotive firms in South Africa, 2019**



**Source: NAAMSA (2023)**

## **2.1.6 HOW LOADSHEDDING HAS SLOWED DOWN FDI INFLOWS INTO THE SA AUTOMOTIVE INDUSTRY**

According to the current load shedding schedule, January 2023 was the worst month the nation has ever faced in terms of the total quantity of load shedding experienced in a single month. The already poor effects of load shedding on South African auto production and parts manufacture have been exacerbated by the more catastrophic latter phases of the blackout. South Africa's economic growth, job creation, and localisation goals are all hampered by load-shedding.

According to the data for new automobile sales in January of 2023, the year began on a rather optimistic note. Total U.S. sales of new automobiles in January 2023, at 43,509 units, were up 2,006 units, or 4.8%, over January 2022's total of 41,503 units

(Statistica, 2023). January 2023 export sales were down from January 2022's record high of 20,903 units, falling by 367 units, or 1.8%, to 20,536 units (Naamsa, 2023). Total industry sales were reported at 43,509 units, with dealers accounting for an estimated 36,353 (or 83.6%), the vehicle rental business for an estimated 12.1%, the government for 2.2%, and industry corporate fleets for another 2.2% (Naamsa, 2023).

There were 31,072 new passenger vehicles sold in January 2023, up 873 (or 2.9%) from January 2022's 30,199 units (Naamsa, 2023). The new passenger vehicle market in January 2023 was supported by the automobile rental business, which accounted for a healthy 16.2% of sales. A rise of 998 units, or 10.4%, or 10,622 new light commercial vehicles, bakkies, and mini-buses were sold in the domestic market in January 2023, compared to the 9,624 sold in January 2022 (Naamsa, 2023). As a whole, the trucking sector had a good month in March, with sales of 461 units for medium trucks and 1,354 units for heavy trucks and buses, gains of 13 units (2.9%) and 122 units (9.9%), respectively (Naamsa, 2023).

Sales of 20,536 automobiles were shipped in January 2023, down from 20,903 the previous year (Naamsa, 2023). New automobile sales were disappointing in January, which is consistent with forecasts of a poor economy due to continued structural issues and rising costs of living. The economy and the auto sector will continue to face the same difficulties in 2023 as they had in 2022, including frequent power outages, rising inflation and interest rates, and a depreciating currency (Naamsa, 2023). South Africa's GDP growth projection for 2023 has been revised down to just 0.3% owing to widespread load-shedding and other logistical obstacles, and the South African Reserve Bank has hiked interest rates for the eighth consecutive month since November 2021.

Notwithstanding the effects of the economic downturn and the persistent dangers associated with geopolitical warfare, there are indications that the European economy may escape a recession in the near future, and the reopening of the Chinese economy would increase global demand even more. There is still reason for optimism about the expansion of automobile exports, since major exporters plan to introduce further new models to the home market.

### **2.1.7 THE MOTOR INDUSTRY DEVELOPMENT PROGRAMME (MIDP), AUTOMOTIVE PRODUCTION DEVELOPMENT PROGRAMME (APDP), AND SOUTH AFRICAN AUTOMOTIVE MASTERPLAN (SAAM)**

The Motor Industry Development Programme (MIDP), which was implemented on 1 September 1995 and ended on 31 December 2012, was succeeded by the Automotive Production Development Programme (APDP), which ends at the end of 2020, and will be succeeded by the South African Automotive Masterplan (SAAM) 2021-2035 (Xiaolong & Shuhui, 2020). The purpose of the APDP was to assist the South African automobile sector in expanding its production capacity and becoming internationally competitive. The Automotive Supply Chain Competitiveness Initiative (ASCCI) is a component of the APDP. It is a joint initiative between the National Association of Automotive Components and Allied Manufacturers (Naacam), the Naamsa OEM Purchasing Council, the Department of Trade, Industry and Competition (DTIC), and the National Union of Metalworkers of South Africa (Numsa). Initially, the APDP sought to quadruple vehicle manufacturing to one million units per year by 2020, emphasising a production incentive that calculates benefits based on real local production content as opposed to material cost, as was the case with the MIDP. In November 2015, the DTIC altered its goals, recognising that the 2020 aim would not be attained. Current output is slightly above 600,000 units. One of the primary objectives of the South African Automotive Master Plan is to produce 1% of the world's vehicles by 2035. This corresponds to over 1,400,000 units each year.

Phase 2 of the APDP, which would assist SAAM from 2021 to 2035, was approved by the Government in November 2018. SAAM is a strategic plan for the automotive industry's long-term development, and APDP Phase 2 will function within it (Naamsa, 2023). The framework places local value creation at the centre of any future industrial assistance. SAAM 2021-2035 intends to (Naamsa, 2023):

- Expand South African vehicle manufacturing to about 1.4 million units per year by 2035, up from the current 600,000;

- Increase local content in South African-produced automobiles, which is now less than 40%, to 60%;
- Increase automotive sector competitiveness to the level of top worldwide rivals;
- Change the automotive value chain in South Africa; and
- Increase value addition.

By the establishment of a volume assembly localisation allowance (VALA), which will replace the volume assembly allowance, APDP Phase 2 moves support away from manufacturing and towards value-addition (VAA). VALA is based on local value addition rather than the sales value of the manufacturer.

- The VALA formula will be phased in between 2021 and 2026 so that current OEM model investments will not be disrupted.
- VALA will decrease from 40% of local value-added in January 2021 to 35% in January 2026 for OEM quantities of more than 10,000 units per year.
- Production rebate credit certificates will be replaced by a local value-added-based production rebate credit.
- The Automotive Investment Scheme cash award for capital investments will be lowered by 5% when non-South African tools and machines are used.
- The plan will be expanded to include an incentive for investments in emerging markets.

**Table 2.4: Sales of new petrol and diesel automobiles and light commercial vehicles in South Africa, 2015–2019**

	2015	2016	2017	2018	2019
<b>Diesel Cars &amp; Diesel Light Commercials</b>	189 168	173 952	184 147	188 865	177 959
<b>Petrol Cars &amp; Petrol Light Commercials</b>	397 430	345 829	346 918	335 705	330 204
<b>Total Cars &amp; Light Commercials</b>	586 598	519 781	531 065	524 570	508 163
<b>Diesel Vehicles as % of Total</b>	32,2%	33,5%	34,7%	36,0%	35,0%

	2015	2016	2017	2018	2019
<b>Diesel Cars</b>	69 761	61 856	65 547	62 618	55 563
<b>Diesel Hybrid</b>	-	-	-	-	-
<b>Petrol Cars</b>	342 136	298 818	302 192	302 427	299 408
<b>Petrol Hybrid</b>	502	574	306	144	253
<b>Electric</b>	79	41	68	58	154
<b>Diesel Light Commercials</b>	119 407	112 096	118 600	126 247	122 396
<b>Petrol Light Commercials</b>	55 294	47 011	44 726	33 278	30 796

Source: NAAMSA/Lightstone Auto

According to GlobalData's FDI forecasting model, greenfield foreign direct investment (FDI) is predicted to increase by around 6% in 2022, after returning to pre-shock levels in 2021 (Naamsa, 2021). Tesla has had significant growth in the United States and Europe, selling 367,500 new automobiles in 2019, compared to over 220,000 in 2018. Since 2012, it has manufactured over 1 million automobiles. According to Virta, a global electric vehicle charging operator, in 2019:

- China, with 2.3 million electric vehicles in active use, is the largest electric vehicle market; Europe had 1.2 million, and the US had 1.1 million;
- By the end of 2019, there were approximately 7.3 million chargers worldwide, 2.1 million more than in 2018; and
- In Europe, 76% of all charging points are in four countries: the Netherlands, Germany, France, and the United Kingdom.

In 2019, the market share of sales of new diesel passenger automobiles and light commercial vehicles decreased to 35% from 36% in 2018. In 2019, 253 hybrid gasoline and diesel vehicles were sold, up from 144 in 2018 (GreenCape, 2019). In 2019, sales of electric vehicles (EVs) grew from 58 units in 2018 to 154 units. According to the study *Status of Electric Vehicles in South Africa*, electric automobiles

make up fewer than one vehicle out of every 10,000 in South Africa. Hiten Parmar, the head of the uYilo eMobility initiative, said that "91.2% of the transport sector's 10.8% emissions come from road transport, mostly from the burning of fuel and diesel" (GreenCape, 2019).

MiPower, previously of Limpopo, introduced an electric-powered bus in October 2019 at the Chartered Institute of Government Finance, Audit and Risk Officers (Cigfaro) conference at the Durban International Convention Centre (GreenCape, 2019). CEO Masala Ramabulana said that his business hopes to "guide public transportation in South Africa into the electric age" and that government funding will assist the company in constructing a plant and creating employment in rural Limpopo. Ramabulana said that Johannesburg-based MiPower had bought property in Pretoria and was considering a "temporary solution for its aspirations with electric-powered buses" (GreenCape, 2019).

GreenCape's report states that to increase the use of electric vehicles, the departments of Transport, Trade, and National Treasury will:

- Offer producers of electric vehicles manufacturing incentives to produce and sell affordable electric vehicles for the local and export markets;
- Collaborate with local research institutions to research electric vehicle batteries;
- Collaborate with national, provincial, and local government authorities, as well as the automotive industry;
- Charge an environmental CO<sub>2</sub> levy;
- Charge a fuel levy;
- Fuel economy and CO<sub>2</sub> labelling, which enables customers to conduct model-to-model comparisons regarding fuel economy and emissions; and
- Charge carbon taxes, which are policy tools that encourage purchasers to migrate away from emission-heavy automobiles.

The report *Harnessing Electric Vehicles for Industrial Development in South Africa(2020)*, produced by Trade and Industrial Policy Strategies (TIPS) and Change Pathways, states that:

- The government must ensure that electric vehicles are available on the local market and that customers are encouraged to purchase them;

- A transition to electric vehicles requires a comprehensive policy framework that must be developed urgently, but with strong partnerships between the public and private sectors; and
- A transition to electric vehicles requires a comprehensive policy framework that must be developed urgently, but with strong partnerships.

It is feared that South Africa's frequent power outages and restricted charging choices are impeding the adoption of e-mobility. Nick Singh, director of Eskom's Smart Grid Centre of Excellence, said that Eskom would need to make considerable expenditures to update its infrastructure to manage these enormous charging demands for plug-in electric automobiles (GreenCape, 2019). Eskom is studying distributed energy resources (small-scale power production sources situated near where electricity is used) to relieve strain on the distribution network's infrastructure. He envisioned a system consisting of solar PV and smart inverter solutions in the residential, commercial, and industrial sectors, which would balance a part of the unavoidable national grid demand (GreenCape, 2019). At the parking lot of the Bellville Civic Centre, the City of Cape Town will install its first public electric automobile charging station in December 2020. This is the first of two solar-powered charging stations that will be made available for free to the public for the first two years. The second charger will be located in the Somerset West municipal centre parking lot. The chargers were a gift from the United Nations Industrial Development Organisation to the city (GreenCape, 2019).

Volkswagen (VW) and Ford's South African divisions want to disconnect their production facilities from the national electrical grid. Thomas Schaefer, chairman and managing director of VWSA, said that the business was spending R3.5 billion on a biogas factory that utilises organic waste to create power. In the next two to three years, the Uitenhage factory and several of its component suppliers in the nearby supplier park are anticipated to be disconnected from the electrical grid (GreenCape, 2019). Ford inaugurated the first phase (a 13.5 MW, R135m solar energy project) of a four-year renewable energy strategy in November 2020 and hoped to make its Silverton (Pretoria) manufacturing facility energy independent by 2024 (GreenCape, 2020). Ford MD Neale Hill said that the business is constructing a biomass plant that will be fuelled by a cactus plantation, which will be cultivated by local farmers. BMW

South Africa became the first indigenous OEM in this industry in October 2015, when it began receiving electricity from Bronkhorstspuit-based biogas renewable energy startup Bio2Watt. One-third of the BMW Rosslyn facility is powered by a renewable energy plant that runs on food scraps and cow manure. By the end of the year 2020, South Africa hopes to be completely independent from the grid in terms of energy supply (GreenCape, 2020).

### **2.1.8 CLEAN FUELS**

Toyota South Africa said in June 2020 that there had been no progress in delivering cleaner fuel to South Africa since the government removed the Clean Fuel Two project restrictions in 2017. The policy would have permitted the introduction of newer, more fuel-efficient automobile engine technology to South Africa, which necessitates gasoline that is cleaner than the usually accessible norm. It would have been necessary for refineries to modernise their facilities to comply with the new rules. As a result of the inability of several refinery owners to bear these expenditures, the initiative was terminated since no agreement was achieved between the industry and government about a cost-recovery method. Although engine technology from parent corporations is more advanced and incompatible with South Africa's gasoline, the local automobile production sector continues to urge for an increase in fuel quality. The United Kingdom, South Africa's largest export market for new vehicles, plans to restrict the sale of new gasoline, diesel, and hybrid vehicles beginning in 2035. According to Toyota South Africa, "introducing cleaner fuels will have significant commercial advantages, including lower emissions and a larger environmental impact."

### **2.1.9 TECHNOLOGY, RESEARCH AND DEVELOPMENT (R&D) AND INNOVATION**

Starting in September 2019, all new Toyota and Lexus vehicles sold in South Africa came standard with in-vehicle Wi-Fi, 15 GB of free data, and other connectivity features and perks through Toyota Connect, an extension of the MyToyota App. Daimler indicated a greater emphasis on digitalisation, automated and autonomous driving, and the advancement of electric drive systems. Daimler Buses centred its development efforts on the creation of new fuel-efficient models.

Predicting problems 30 days in advance with 90% accuracy has led to a 30% improvement in truck drivers' uptime (while the vehicle is working). Volkswagen said in November 2019 that it would invest €60 billion in electric vehicle technologies by 2024.

**2.1.9.1 Table 2.5: Research and Development Expenditure of Multinational Automobile Manufacturers**

<b>Manufacturer</b>	<b>R&amp;D Spend 2018</b>	<b>R&amp;D Spend 2019</b>
Volkswagen	€13.6bn	€14.3bn
Toyota	US\$10bn	US\$9.9bn
BMW	€5.3m	€5.9m
Mercedes-Benz/Daimler	€9.1bn	€9.7bn
General Motors	US\$7.8bn	US\$6.8bn

**Source: UNCTAD, 2020**

### **2.1.10 CONCLUSION**

South Africa is in the midst of a terrible recession, and consumer and corporate morale are very low. New automobile sales are often correlated with the health of the economy, and the GDP contraction and uncertainty surrounding the economic effect of the coronavirus pandemic are anticipated to keep new vehicle sales low for the rest of the year. In November 2020, Nedbank predicted that the local vehicle market would recover at a "steady but moderate pace, but might experience interruptions owing to worldwide lockdowns", which would impact the local automobile rental business. The demand for used automobiles has increased, but acquiring quality used inventory has proven difficult for dealers. The National Association of Automobile Manufacturers of South Africa projected in January 2021 that sales of new vehicles would climb by around 15% in 2021. "Taking into account the anticipated year-over-year increase in vehicle exports of around 20%, an increase in industry vehicle production of approximately 18% is anticipated for 2021." According to the trade and industry

research firm Trade & Industrial Policy Strategies, the transition to electric automobiles is obvious in major countries, particularly in Europe, which is one of South Africa's primary vehicle export destinations. In future decades, electric automobiles are predicted to see exponential expansion. Enhanced environmental legislation, related to climate change mitigation and air quality improvement, has prompted the switch to cleaner modes of transportation.

## **CHAPTER 3**

### **3.1 THE DETERMINANTS OF FDI FLOW IN THE AUTOMOTIVE INDUSTRY**

#### **3.1.1 Introduction**

To determine the significant factors that influence foreign direct investment (FDI), it is important to keep in mind that FDI happens when investors of multinational companies make investments in other countries with the primary objective of reducing expenses and maximising profits and minimising costs. For FDI to thrive, the country must have a conducive environment where the economy plays a crucial role. Subsequently, the conditions and environments of the country's economy can vary because of different stages of development or growth. It is crucial to note that not every determinant equally plays a significant role (Mohd, Nadzir, & Hassan, 2019). Market and resource seeking are two key primary drivers of foreign direct investment. The study will examine both micro- and macro-determinants of FDI, which are pertinent to market-seeking as well as resource-seeking FDI. There are a few distinct factors that influence foreign direct investment. The market environment of a specific country is one of them because it is where investment is made or takes place (Xu & Du, 2019).

Foreign Direct Investment (FDI) flows into the automotive industry can be influenced by a range of factors, including economic, political, social, and technological factors. The determinants of FDI flow in the automotive industry are complex and multifaceted, and researchers have made significant efforts to understand the various factors that influence these flows. Overall, understanding the determinants of FDI flow in the automotive industry is crucial for policymakers and industry leaders to create an enabling environment for foreign investment. By addressing these determinants, governments and industry stakeholders can attract greater levels of FDI, leading to increased economic growth and development. The key determinants of FDI flows in the automotive industry of developed and developing countries are explained in the sections below.

#### **3.2 Micro-determinants of FDI**

Micro-determinants are primarily concerned with the profit that FDI provides to a company or industry (Zhang & Zhu, 2019). These elements include market size and growth, labour costs, host government policies, tariffs and trade barriers, taxes,

transportation costs, and agglomeration effects, which are some of these location-specific factors categorised as features of the host country.

### **3.2.1 Market size and growth potential**

Investors are more inclined to look for investment opportunities in bigger areas, where they may profit from a developing economy and market. The market size and growth rate are the most influential factors in determining market-seeking FDI (Yan & Su, 2020). When a nation's markets grow, more products and services are produced, leading to greater economies of scale. This results in reduced transaction costs, since economies of scale and lower fixed expenses reduce manufacturing costs (Zhu & Li, 2020).

Several empirical studies have shown that the size of a country's market and its development rate are crucial and major factors of FDI. Autodesk (2019) established a correlation between FDI flows and the size of an economy's market. This is reinforced by the findings of Börzel and Risse (2012), who discovered that market openness and economic development are favourable drivers of FDI. Chaudhry and Hussain (2019) have also discovered that the impact of trade openness on Sub-Saharan African nations is less substantial than on other nations.

The size of a country's domestic market and its growth potential are important factors in attracting FDI in the automotive industry (Jannadi, 2019). Developing countries with large and growing middle-class populations are particularly attractive to investors seeking to expand their market share (Sofian & Chaherli, 2020). Market size and growth potential are key determinants of foreign direct investment (FDI) flows in the automotive industry of developed and developing countries. Here are some of the factors that influence the market size and growth potential of a country's automotive industry:

- **Demographics:** The size and demographic composition of a country's population are important factors in determining the size and potential for growth of its automotive market. Countries with larger populations and a larger percentage of the population in the middle class tend to have larger automotive markets.

- **Economic conditions:** The overall economic conditions of a country, including income levels, inflation rates, and employment rates, can influence the demand for automobiles. A growing economy with rising income levels is likely to lead to increased demand for automobiles, which can attract FDI.
- **Government policies:** Government policies such as tax incentives, subsidies, and trade policies can affect the demand for automobiles and the potential for growth of the automotive market. Policies that encourage the purchase of automobiles or support the development of the automotive industry can attract FDI.
- **Consumer preferences:** The preferences and tastes of consumers in a country can influence the demand for automobiles. For example, in some countries, consumers may prefer smaller, more fuel-efficient automobiles, while in other countries, consumers may prefer larger, more luxurious vehicles.
- **Infrastructure:** The availability and quality of transportation infrastructure, such as roads and highways, can affect the demand for automobiles. Countries with well-developed transportation infrastructure are likely to have a larger automotive market.
- **Urbanisation:** The level of urbanisation in a country can influence the demand for automobiles. In countries with high levels of urbanisation, there is often a greater need for personal transportation, which can lead to a larger automotive market.

Overall, market size and growth potential are important determinants of FDI flows in the automotive industry. Countries with large and growing automotive markets are likely to attract more FDI, as investors seek to take advantage of the opportunities presented by these markets. In addition, countries with favourable economic conditions, supportive government policies, and strong infrastructure are likely to have a greater potential for growth in the automotive industry, which can also attract FDI.

### **3.2.2 Availability of skilled labour**

The availability of skilled labour is a key determinant of FDI in the automotive industry. Developed countries with well-educated workforces and strong vocational training programmes are particularly attractive to investors seeking to expand their operations (Li & Wu 2020). The availability of skilled labour is another key determinant of foreign

direct investment (FDI) flows in the automotive industry of developed and developing countries. Skilled labour refers to workers who have specialised knowledge, training, and expertise in a particular field or industry (Adekunle & Babatunde, 2021). In the automotive industry, skilled labour is necessary for the design, engineering, manufacturing, and maintenance of vehicles. Here are some of the factors that influence the availability of skilled labour in a country's automotive industry:

- **Education and training:** The education and training system of a country can influence the availability of skilled labour. Countries that have well-developed vocational training programmes and universities that offer courses in engineering and other technical fields are likely to have a greater pool of skilled labour.
- **Immigration policies:** Immigration policies can affect the availability of skilled labour in a country's automotive industry. Countries that have flexible immigration policies and make it easier for skilled workers to enter and work in the country are likely to have a larger pool of skilled labour.
- **Labour laws:** The labour laws of a country can influence the availability of skilled labour in the automotive industry. Countries with flexible labour laws that allow employers to hire and fire workers more easily may attract more FDI because they have a more flexible and adaptable workforce.
- **Wages and benefits:** The wages and benefits offered to skilled workers can influence the availability of skilled labour. Countries that offer competitive wages and benefits to skilled workers are likely to have a larger pool of skilled labour.
- **Experience and expertise:** The experience and expertise of workers in the automotive industry can influence the availability of skilled labour. Countries with a long history of automotive manufacturing and a highly skilled workforce are likely to have a larger pool of experienced and knowledgeable workers.
- **Collaboration between industry and academia:** Collaboration between the automotive industry and academia can help to develop a pool of skilled labour. This collaboration can take the form of partnerships between automotive companies and universities or vocational training programmes, which can help to train and develop the next generation of skilled workers.

According to Naamsa's research on the Economic Effect of COVID-19 on the South African automotive industry in May 2020, the manufacturing industry uses people with varying levels of education, whereas the automotive sector, which is very labour-intensive, employs slightly over 70% of blue-collar workers. Mechanical engineers, auto mechanics and repairers, electrical mechanics and fitters, diesel mechanics, auto electricians, panel beaters, spray painters, and welders are among the scarce automotive talents.

Overall, the availability of skilled labour is an important determinant of FDI flows in the automotive industry. Investors are more likely to invest in countries with a large and skilled workforce, which can help to ensure the success and competitiveness of their operations (Anwar, Wang, & Khan, 2019). Countries that can offer a well-educated and well-trained workforce, flexible labour laws, and competitive wages and benefits are likely to attract more FDI in the automotive industry.

### **3.2.3 Labour Costs**

Particularly in export-oriented nations, the primary allure of foreign direct investment (FDI) for a company or sector is its efficiency and low cost. If all other circumstances stay constant, lower salaries tend to cut manufacturing costs, hence promoting the movement of a portion of the production process to foreign enterprises (Moghaddam & Gholipour, 2021). Investors also prefer talented labourers and professionals who demonstrate greater production; a company's remuneration should match its output (UNCTAD, 2019).

Wheeler and Moody (1992) found that there is a substantial positive correlation between low salaries and FDI inflows. Balcilar and Caner (2021) also discovered a substantial positive correlation between FDI inflows and lower salaries. It has been shown that these results are more relevant to underdeveloped nations.

### **3.2.4 Infrastructure**

The quality of a country's infrastructure, including its transportation networks, energy supply, and telecommunications systems, is an important factor in attracting FDI in the automotive industry (Babatunde & Adekunle, 2020). Developed countries with modern infrastructure are particularly attractive to investors seeking to operate efficient and

cost-effective production facilities. Infrastructure refers to the physical and organisational structures, facilities, and systems that are necessary for the operation of the automotive industry (Bouoiyour & Selmi, 2019). Here are some of the factors that influence the infrastructure of a country's automotive industry (Bouoiyour & Selmi, 2019):

- **Transportation networks:** A country's transportation network, including its highways, railways, ports, and airports, is an important component of its automotive industry infrastructure. Countries with well-developed transportation networks are likely to have lower transportation costs, which can help to attract FDI in the automotive industry.
- **Energy and utilities:** The availability and reliability of energy and utilities, such as electricity, water, and natural gas, are important components of a country's infrastructure. A reliable and affordable supply of energy and utilities is necessary for the operation of the automotive industry.
- **Communication networks:** The availability and reliability of communication networks, including telecommunications and internet access, are important components of a country's infrastructure. Communication networks are necessary for the coordination and management of the automotive industry supply chain.
- **Industrial parks and special economic zones:** Industrial parks and special economic zones are designated areas that provide infrastructure and services for the operation of the automotive industry. These areas may offer tax incentives, streamlined regulations, and other benefits to attract FDI in the automotive industry.
- **Research and development facilities:** Research and development (R&D) facilities are an important component of a country's automotive industry infrastructure. R&D facilities can help to drive innovation in the industry and attract FDI from companies looking to expand their R&D capabilities.
- **Regulatory framework:** The regulatory framework of a country, including laws and regulations related to labour, health and safety, and environmental protection, is an important component of its infrastructure. A stable and predictable regulatory environment is necessary for the operation of the automotive industry and can help to attract FDI.

Overall, infrastructure is an important determinant of FDI flows in the automotive industry. Countries with well-developed infrastructure, including transportation networks, energy and utilities, communication networks, industrial parks and special economic zones, R&D facilities, and a stable regulatory framework, are more likely to attract FDI in the automotive industry (Chikazawa, 2021). These factors can help to lower costs, increase efficiency, and support the growth and competitiveness of the industry.

### **3.2.5 Government policies and regulations**

The economic climate has a crucial effect on an investor's investment choice. The government of a nation should establish laws that promote a favourable climate; these changes might include opening sectors to investors, removing limitations on profit and capital allowance, and providing security (Choi, 2020). According to Joshi and Gupta (2019), the application of incentives should lower costs and increase the profitability of projects. The policies comprising these incentives include tax rebates and trade incentives. To receive the advantages of FDI for the host nation, investors may be subject to performance criteria. These criteria may include the employment and training of local employees in businesses and sectors. Researchers' empirical work reveals that the influence of government initiatives is less clear than often believed (Khan, 2019).

Government policies and regulations can have a significant impact on FDI flows in the automotive industry (PWC, 2019). Governments that offer incentives such as tax breaks or subsidies to foreign investors are likely to attract more FDI. Similarly, countries with favourable regulatory environments, including streamlined approval processes and flexible labour laws, are likely to attract more FDI.

Government policies and regulations are another key determinant of foreign direct investment (FDI) flows in the automotive industry of developed and developing countries (OECD, 2019). The policies and regulations set by the government can either facilitate or hinder the entry and operation of foreign firms in the automotive industry. Here are some of the factors that influence government policies and regulations:

- **Investment policies:** Government investment policies can influence FDI flows in the automotive industry. For example, governments that offer tax incentives or subsidies to foreign firms investing in the industry may attract more FDI.
- **Trade policies:** Trade policies can influence FDI flows in the automotive industry. Governments that impose tariffs or quotas on imported automobiles or auto parts may encourage foreign firms to invest in the domestic market to avoid these trade barriers.
- **Intellectual property protection:** Intellectual property protection is an important factor for foreign firms investing in the automotive industry. Governments that have strong intellectual property laws and enforce them effectively can attract more FDI from firms looking to protect their technology and innovations.
- **Labour laws:** Labour laws can influence FDI flows in the automotive industry. Governments that have flexible labour laws that allow employers to hire and fire workers more easily may attract more FDI because they have a more flexible and adaptable workforce.
- **Environmental regulations:** Environmental regulations can influence FDI flows in the automotive industry. Governments that have strict environmental regulations may discourage FDI from firms that do not meet these standards. However, governments that provide incentives for firms to adopt environmentally friendly practices may attract FDI from firms looking to improve their sustainability performance.
- **Political stability:** Political stability is an important factor for foreign firms investing in the automotive industry. Governments that have stable political systems and do not experience frequent changes in leadership or social unrest are more attractive to foreign firms because they offer a more predictable business environment.

Overall, government policies and regulations are an important determinant of FDI flows in the automotive industry (KPMG, 2019). Governments that have investment policies, trade policies, intellectual property protection, labour laws, environmental regulations, and political stability that are favourable to foreign firms may attract more FDI in the automotive industry. These policies can help to create a more predictable

and stable business environment, reduce costs and risks for foreign firms, and increase the competitiveness of the industry.

### 3.2.6 Political stability and security

Political stability and security are important factors in attracting FDI in the automotive industry (ILO, 2019). Investors are more likely to invest in countries with stable political environments and low levels of political violence or social unrest. Political stability and security are another key determinant of foreign direct investment (FDI) flows in the automotive industry of developed and developing countries. Political stability refers to the degree of consistency in a country's political and social environment, while security refers to the level of protection against physical harm or damage to assets. Here are some of the factors that influence political stability and security (Mohd Nadzir & Hassan, 2019):

- **Government stability:** Government stability is an important factor for foreign firms investing in the automotive industry. Governments that have stable political systems and do not experience frequent changes in leadership or social unrest are more attractive to foreign firms because they offer a more predictable business environment.
- **Rule of law:** The rule of law is an important factor for foreign firms investing in the automotive industry. Governments that enforce contracts and protect property rights can create a more predictable and secure business environment, which can attract more FDI.
- **Corruption:** Corruption is a negative factor for foreign firms investing in the automotive industry. Governments that have high levels of corruption may discourage FDI because it increases costs and risks for foreign firms and reduces the transparency of the business environment.
- **Social stability:** Social stability is an important factor for foreign firms investing in the automotive industry. Countries that experience frequent social unrest or political instability may discourage FDI because it increases the risks of harm to assets and reduces the predictability of the business environment.
- **Terrorism and crime:** Terrorism and crime are negative factors for foreign firms investing in the automotive industry. Countries that have high levels of terrorism or crime may discourage FDI because it increases the risks of harm

to assets and personnel, and reduces the predictability and security of the business environment.

Overall, political stability and security are important determinants of FDI flows in the automotive industry. Countries that have stable political systems, strong rule of law, low levels of corruption, social stability, and a low incidence of terrorism and crime are more attractive to foreign firms because they offer a more predictable and secure business environment. These factors can help to reduce the costs and risks of investment, increase the competitiveness of the industry, and support the growth of the automotive industry in a particular country (Yan & Su, 2020).

### **3.2.7 Technology and innovation**

The automotive industry is highly technology-intensive, and investors are often attracted to countries with strong research and development capabilities and a favourable intellectual property regime (Xu & Du, 2019). Technology and innovation are another key determinant of foreign direct investment (FDI) flows in the automotive industry of developed and developing countries. This determinant refers to the availability of advanced technologies and innovative processes that can enhance the competitiveness of the industry. Here are some of the factors that influence technology and innovation:

- **Research and development (R&D) capabilities:** R&D capabilities are an important factor for foreign firms investing in the automotive industry. Countries that have strong R&D capabilities, such as advanced research facilities and universities, may attract more FDI because they offer a skilled workforce and a supportive innovation ecosystem.
- **Intellectual property protection:** Intellectual property protection is an important factor for foreign firms investing in the automotive industry. Governments that have strong intellectual property laws and enforce them effectively can attract more FDI from firms looking to protect their technology and innovations.
- **Technological infrastructure:** Technological infrastructure is an important factor for foreign firms investing in the automotive industry. Countries that have advanced technological infrastructure, such as reliable telecommunications

and high-speed internet, may attract more FDI because they offer a supportive environment for digital innovation and development.

- **Access to financing:** Access to financing is an important factor for foreign firms investing in the automotive industry. Countries that have strong financial systems and offer access to capital can attract more FDI because they offer a supportive environment for investment and growth.
- **Skilled workforce:** A skilled workforce is an important factor for foreign firms investing in the automotive industry. Countries that have a skilled and educated workforce may attract more FDI because they offer a pool of talent and expertise that can support innovation and development.

Countries that have strong R&D capabilities, intellectual property protection, technological infrastructure, access to financing, and a skilled workforce may attract more FDI because they offer a supportive environment for innovation and development (Sofian & Chaherli, 2020). These factors can help to enhance the competitiveness of the industry, support the growth of the automotive industry in a particular country, and attract investment from firms looking to benefit from advanced technologies and innovative processes.

Integration of electronics into automobiles is the largest paradigm shift in automotive design since the invention of the automobile (Zhang & Zhu, 2019). Electronics and engines are anticipated to see the most significant improvements in automobiles during the next decade. In several ways, the importance of electronics in automobiles is rising. With a contemporary engine, electronic circuits determine the optimal fuel/air ratio, ignition sequence, and valve timing. Without this kind of technology, none of the significant advances in automobile fuel efficiency over the previous two decades would have been possible (PWC, 2019). Concerning safety, electronic equipment determines within microseconds after a collision how to deploy the airbags.

The Toyota Prius signifies the change that will soon overtake the whole automotive industry. With a smartly marketed and financially successful product, Toyota is leading the revolution and paving the way for the industry's shift towards new types of environmentally friendly automobiles. With hydrogen fuel-cell technologies, the widespread usage of all-electric, non-polluting automobiles is likely 10 to 20 years away (Börzel & Risse, 2012). With its little electric motor serving as a complement to

its gasoline engine, the Prius is really a baby step in this direction. But, it is crucial because it symbolises two things that have the potential to revolutionise the whole automotive industry: new technology and manufacturing techniques (Zhu & Li, 2020).

Around 40 to 50% of automotive technology is derived from the United States, 20% from the United Kingdom, and 20% from Germany, while Japan is a source of technical innovation with growing regularity (OECD, 2019). Nowadays, the primary focus of global automobile rivalry is on product development. Each OEM is attempting to compete in every market category with a multitude of specialised models meant to attract certain groups of customers and to be renewed often enough to maintain consumer interest (Chaudhry & Hussain, 2019). The only way to develop in the face of fierce competition and stagnating markets is to steal market share from competitors. Being the pioneer in a new market category will result in rapid sales, increased profit margins, and a larger market share.

Global automotive industry participants' efforts to incorporate new technology and innovation into their products are not always motivated by customer desire, but rather by worldwide regulatory requirements. The environmental criteria for automobiles will be explored in the next section.

### **3.2.8 Supply chain integration**

The automotive industry relies heavily on complex global supply chains, and investors are likely to invest in countries that offer opportunities for supply chain integration and collaboration with local suppliers. Supply chain integration is another key determinant of foreign direct investment (FDI) flows in the automotive industry of developed and developing countries (Jannadi, 2019). This determinant refers to the degree of integration and efficiency of the supply chain for automotive components and products. Here are some of the factors that influence supply chain integration:

- **Logistics and transportation infrastructure:** Logistics and transportation infrastructure are important factors for foreign firms investing in the automotive industry. Countries that have efficient logistics and transportation infrastructure, such as ports, airports, and highways, may attract more FDI because they offer a more reliable and cost-effective supply chain (Li & Wu, 2020).

- **Availability of raw materials and components:** Availability of raw materials and components is an important factor for foreign firms investing in the automotive industry. Countries that have a reliable and efficient supply of raw materials and components may attract more FDI because they offer a more predictable and cost-effective supply chain.
- **Skilled workforce:** A skilled workforce is an important factor for foreign firms investing in the automotive industry. Countries that have a skilled and educated workforce in the areas of logistics, transportation, and supply chain management may attract more FDI because they offer a pool of talent and expertise that can support supply chain integration.
- **Government policies and regulations:** Government policies and regulations are an important factor for foreign firms investing in the automotive industry. Countries that have supportive policies and regulations that promote supply chain integration, such as tax incentives for logistics and transportation investments, may attract more FDI.
- **Collaborative relationships with suppliers:** Collaborative relationships with suppliers are an important factor for foreign firms investing in the automotive industry. Countries that have a culture of collaboration between automotive manufacturers and suppliers may attract more FDI because they offer a more integrated and efficient supply chain.

Overall, supply chain integration is an important determinant of FDI flows in the automotive industry. Countries that have efficient logistics and transportation infrastructure, availability of raw materials and components, a skilled workforce, supportive government policies and regulations, and collaborative relationships with suppliers may attract more FDI because they offer a more integrated and efficient supply chain (Adekunle & Babatunde, 2021). These factors can help to reduce costs and risks of investment, increase the competitiveness of the industry, and support the growth of the automotive industry in a particular country.

Overall, the determinants of FDI flows in the automotive industry of developed and developing countries are complex and interdependent. However, countries that can offer a combination of favourable market conditions, skilled labour, modern infrastructure, supportive government policies, stable political environments,

innovative capabilities, and supply chain integration are likely to attract more FDI in the automotive industry (Anwar, Wang, & Khan, 2019).

### **3.2.9 Tariff and Trade Barriers**

Tariffs and trade obstacles impede importers' ability to enter the nation. Ignoring these restrictions is known as "tariff hopping". A rise in "tariff hopping" contributes to the expansion of domestic markets. Moghaddam and Gholipour (2021) concluded that MNEs must use FDI to circumvent trade restrictions to lower costs. According to research conducted by Balcilar and Caner (2021) to assess the association between FDI and "tariff hopping", high tax rates and high trade costs are positively connected with FDI inflows.

### **3.2.10 Taxes**

Taxes in a nation may have a direct influence on an investor's choice and may affect other FDI factors. High corporate tax rates do not stimulate foreign direct investment, but lower corporate tax rates do (UNCTAD, 2019). Governments strive to entice investors by lowering their tax rates. Economies of scale may entice investors to high-tax host nations (Babatunde & Adekunle, 2020). FDI may be impacted by the possibility of double taxation in the home nation and the host country. Taxes have a role in FDI flows, although it is believed that other variables have a higher impact (Bouoiyour & Selmi, 2019).

### **3.2.11 Transport Cost**

Investors aim to reduce costs and receive the maximum output for cheaper inputs. In the event of market-seeking FDI and high transportation costs in the home nation, manufacturing will be shifted to foreign markets. On the other hand, resource-seeking FDI with high transportation costs suggests an increase in production costs, which hinders FDI attractiveness (Chikazawa, 2021).

The stock of foreign direct investment (FDI) owned by a nation may be indicative of the country's risk profile. Economies with substantial FDI inflows and stock market capitalisation tend to attract more direct investors. The presence of foreign investors in a nation may result in a range of spillover effects, such as technical spillovers, skilled

labour spillovers, and the acquisition of wider markets, which result in increased demand and supply (Choi, 2020). The investor wants an optimal environment in which its demands may be addressed. Nations with excellent infrastructures, market access, and enough resources contribute to an optimum environment. The present FDI stock of a nation is likely to impact MNEs' investment choice (Joshi & Gupta, 2019).

### **3.3 Macro-determinants of FDI**

Macro-determinants consist of elements that impact profitability and the decision to invest on a national scale. The previously described micro-determinants may overlap with the macro-determinants. The primary emphasis is on the macroeconomic environment and its implications for a country's FDI inflow.

#### **3.3.1 Openness and Exports**

FDI is seen as an alternative to commerce; hence, if one cannot trade with a nation due to trade obstacles, FDI is viewed as a means to reach foreign markets (Khan, 2019). As previously indicated, tariff-hopping demonstrates a negative link between openness and FDI. In contrast to the negative connection, economies that are oriented towards the outside world provide efficiency and access to global markets, hence attracting more FDI. The empirical research indicates that economic openness has a favourable influence on FDI inflow. The significance of this connection is in determining whether FDI is drawn to exporting economies or if FDI causes an increase in exports in a particular nation. Exports precede Foreign Direct Investment (ILO, 2019).

#### **3.3.2 Exchange Rates**

As a determinant of FDI flows, openness and exchange rates are connected. The currency exchange rate as a factor of FDI follows two primary lines: the currency area hypothesis and exchange rate hazards. Companies in regions with a stronger currency may borrow at cheaper rates and reinvest profits from foreign direct investment at a greater rate than local enterprises (KPMG, 2019). A greater proportion of capital value added and the amount of the local currency premium suggest an increase in competitive advantage.

FDI carries with it several inherent dangers. The second line of reasoning is currency rate risk. The risk mostly relies on the nature of the investor's activity in the host nation. The host nation may manufacture primarily for export, making pricing more competitive, or it may import part of the components required for production. Both are affected by the swings in the currency rate. Risk is the economic environment's unpredictability; this includes substantial rate swings that have a detrimental impact on FDI (Mohd, Nadzir, & Hassan, 2019). Empirical research demonstrates that the exchange rate as a driver of FDI depends on whether the business relies on foreign markets for exports of its commodities or imports of inputs required for the manufacturing process (Yan & Su, 2020).

### **3.3.3 Inflation Rates**

The above-discussed exchange rate indicates the external economic balance, but the inflation rate indicates the internal macroeconomic stability of a nation. The repercussions of excessive inflation include uncertainty, internal economic stress, and increased manufacturing costs. In addition to suggesting a lack of monetary and fiscal discipline, high inflation is indicative of bad macroeconomic circumstances. These consequences create uncertainty in the country's economic climate, which discourages foreign investment. Thus, high inflation rates are detrimental to FDI inflow (Sofian & Chaherli, 2020).

### **3.3.4 Budget Deficits**

Countries with a big budget deficit are unattractive to investors due to the uncertainty surrounding the fiscal sustainability of the host government. A significant budget deficit discourages foreign direct investment in a nation. There is empirical evidence of a considerable correlation between budget deficits and FDI inflow (Xu & Du, 2019).

### **3.3.5 Investment and Infrastructure**

Investments and infrastructure enhance production capacity and boost FDI flows as a result (Zhang & Zhu, 2019). The decreased production costs and increased output create a productive atmosphere. A well-developed network of highways, airports, seaports, water and energy supply, internet networks, and telephones demonstrates that the country's infrastructure is of superior quality (Zhu & Li, 2020). This increases

the flow of foreign direct investment into the nation by attracting investors. According to Autodesk (2019), the quality of a nation's infrastructure is a significant factor in its investor appeal.

### **3.3.6 Political Instability**

Political instability in a nation causes several problems, including production interruption, property damage, and danger to employees, as well as changes in the macroeconomic and regulatory environment management (Börzel & Risse, 2012). Investors consider political risk in a nation to be the most influential risk factor in determining FDI flows (Chaudhry & Hussain, 2019). This increases cost and profitability uncertainties, hence lowering FDI flows.

### **3.3.7 Natural Resource Availability**

Several nations attract FDI because of their natural resources. This suggests that investment in these nations is motivated by a desire for natural resources. If the nation gives access to natural resources, it will attract more FDI, suggesting a positive relationship between FDI flows and the country's natural resources (Jannadi, 2019). This is particularly true in Africa, where the majority of FDI stock and flows are located in nations with abundant resources (Li & Wu, 2020).

Foreign direct investment is influenced by a range of factors, and the above-mentioned factors are reported in the majority of the literature on the subject. According to many academics, the FDI literature may vary depending on the goal of the study. This displays all the essential and crucial literature about the evaluation of foreign direct investment in this research. Adekunle and Babatunde (2021) use the eclectic idea that, all else being equal, natural resource-rich nations should get more foreign direct investment than others.

This research focuses primarily on Africa and foreign direct investment (FDI) flows to African nations; accordingly, the next part describes the condition of FDI determinants in Africa. Furthermore, a range of papers on this issue provides an overview of empirical investigations previously conducted.

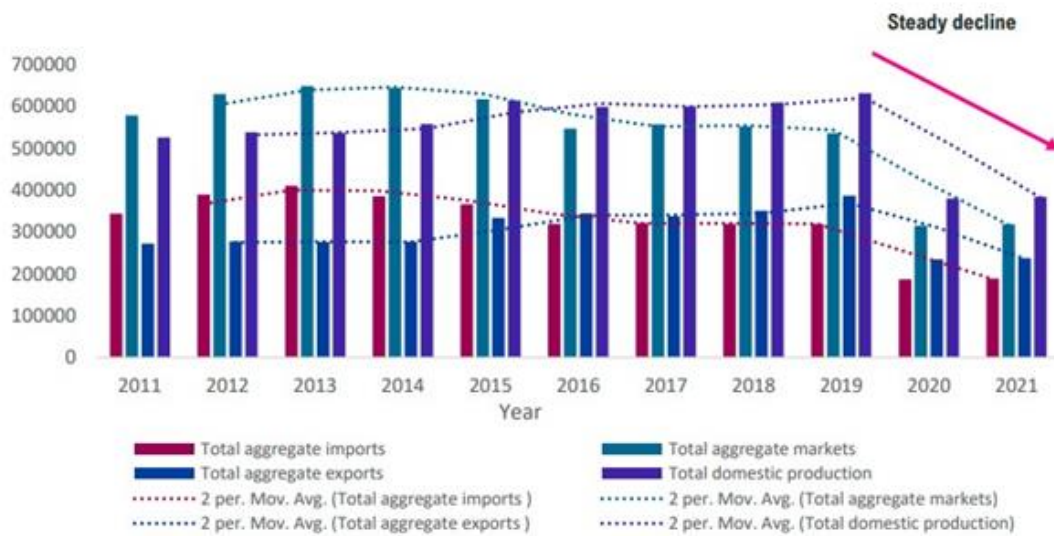
### **3.4 The Key Determinants of FDI Flow in the South African Automotive Industry**

#### **3.4.1 Coronavirus**

On 26 March 2020, when the national lockdown was enacted, the local industrial sector came to a halt. According to the Automotive Industry Development Centre, the South African subsidiaries of BMW, Nissan, and Ford ceased operations with other group units before the lockout. The majority of automakers, including Mercedes-Benz, BMW, Nissan, Volkswagen, Fiat Chrysler, Peugeot, and Renault, announced European plant closures during the second week of March. The sector missed three working days throughout March and the whole month of April, hurting production, domestic new automobile sales, and exports (NAAMSA, 2020). On 1 May 2020, the national alert level was reduced from Level 5 to Level 4, allowing the automotive industry to function at 50% employment and sell and service automobiles (only interval or mileage services due, no early services and no cosmetic repair work) (NAAMSA, 2020).

All dealerships and used-automobile shops had to operate with up to 30% employment and a maximum of one employee or client per nine square metres of floor space. Assuming that small enterprises have a minimum of five workers, the bulk of auto sales was conducted remotely through the Internet or by phone. Personal contact had to be maintained to a minimum and only permitted by appointment, under stringent cleanliness and social distancing circumstances in accordance with the standards.

### 3.4.1.1 Figure 3.1: Forecast of South African automotive market sales volumes



Source: NAAMSA, 2020

Europe is South Africa’s primary trade partner, accounting for 64.3% of South Africa’s automobile and component exports. Comparing March 2020 to March 2019, export sales, which account for 74% of production volumes, decreased by 21.5%. In April, it was possible to export vehicles that were already en route, even though health and safety compliance requirements led to delays (NAAMSA, 2020). NAAMSA (2020) reported a decrease of 29.8% in automobile exports from 387,092 units in 2019 to 271,819 units in 2020.

### 3.4.2 Economic Environment

South Africa’s GDP contracted by 51% (annualised) in the second quarter of 2020 and by 16% quarter on quarter, as the economy was hit by the national lockdown (NAAMSA, 2020). The manufacturing sector’s output decreased by 75%. Maarten Ackerman, the head economist of Citadel, said that South Africa was experiencing a recession before the outbreak of the coronavirus, “but the virus will make it a far worse recession, maybe even a depression.” In 2020, despite a resurgence in the second half of the year, the GDP was projected to decline by 8%. With the reintroduction of load-shedding, the reinstatement of lockdown measures, and the consequences of the second wave of the coronavirus, the medium-term outlook for economic development was projected to be hampered (NAAMSA, 2020).

In normal market circumstances, according to NAAMSA (2020), favourable signs such as fuel price declines, significant interest rate declines, vehicle price hikes below inflation, dealer incentives, and low inflation would help the new automobile market. “How much these factors will influence individuals and companies to acquire new vehicles for the remainder of the year is unknown.”

WesBank cautioned the sector in June 2020 to anticipate a decline in activity for the balance of the year. The volume of sales of new and used automobiles was between 65 and 70% of May 2019 levels. The figures from WesBank revealed a rise in demand for second-hand automobiles. Experts predicted that buyers would increasingly purchase second-hand automobiles to minimise their vehicle payments and operating expenses. The number of automobiles funded in the first quarter of 2020 was 12% fewer than the same time the previous year, with March seeing a significant year-over-year fall of 35% for new vehicle financing and 31% for used vehicle financing. Due to the low-interest-rate environment, WesBank reported a sustained demand for fixed-rate products in August 2020. A year earlier, roughly two-thirds of WesBank’s financing agreements had linked interest rates, but by August 2020, “this split (had) swung towards a more balanced picture of fixed and linked-rate transactions.” The average value of a newly financed automobile climbed to R364,048, up from R331,161 a year earlier. With low interest rates, customers could save money by setting the interest rate on new financing agreements for the term of the contract.

According to the Automotive Industry Development Centre’s research, the rand’s devaluation exerted further pressure on the local market for new vehicles. In April 2020, the rand hit a historic low, surpassing R19 against the US dollar. While the rand had recovered marginally, with an August average of R17.23 and a September average of roughly R16.50, it remained volatile. Because South Africa is a net importer of high-value, capital-intensive components, this has affected manufacturing input costs. As a consequence of the weakening rand, industrial input prices rose, resulting in price hikes that customers could not afford in the economic climate.

While many South Africans continue to sink into debt due to the coronavirus, Absa’s managing executive for vehicle and asset financing, retail and business banking, Faisal Mkhize, said in August 2020 that 382 automobiles had been voluntarily

surrendered since the beginning of July (NAAMSA, 2020). Absa repossessed 128 automobiles according to court order over the same time frame (NAAMSA, 2020).

### **3.5 Chapter Summary**

In conclusion, foreign direct investment (FDI) flows in the automotive industry of developed and developing countries are influenced by a variety of factors, including market size and growth potential, availability of skilled labour, infrastructure, government policies and regulations, political stability and security, technology and innovation, and supply chain integration.

Market size and growth potential are important determinants of FDI flows in the automotive industry, as countries with larger markets and higher growth potential can attract more investment from foreign firms. Availability of skilled labour is another key determinant, as countries with a skilled and educated workforce can offer a competitive advantage in terms of productivity, innovation, and quality. Infrastructure, including transportation, communication, and energy systems, is also an important determinant of FDI flows in the automotive industry, as it affects the efficiency and cost of production and transportation. Government policies and regulations, such as tax incentives, subsidies, and trade agreements, can also influence FDI flows by creating a favourable business environment for foreign firms.

Political stability and security are important determinants of FDI flows in the automotive industry, as they can affect the safety of investments and the reliability of business operations. Technology and innovation are also key determinants, as countries that invest in research and development and have strong intellectual property laws can offer advanced technologies and innovative processes that enhance the competitiveness of the industry. Finally, supply chain integration is another important determinant of FDI flows in the automotive industry, as it affects the efficiency and reliability of the production and distribution of automotive components and products.

Overall, countries that offer a favourable business environment with a combination of these key determinants can attract more FDI flows in the automotive industry. By recognising these factors and investing in them, countries can support the growth and competitiveness of their automotive industries, and in turn, contribute to the development of their economies.

## **CHAPTER 4**

### **4.1 THE CONTRIBUTION OF FDI FLOWS TO THE GROWTH OF THE AUTOMOTIVE INDUSTRY OF DEVELOPED AND DEVELOPING COUNTRIES**

#### **4.1.1 Introduction**

The automotive industry has been a cornerstone of global economic growth and industrial development for over a century. As a key driver of innovation, employment, and trade, it has contributed significantly to the economic transformation of both developed and developing countries. The industry's continuous evolution has been shaped by various factors, including technological advancements, shifting consumer preferences, and global economic dynamics. In this context, Foreign Direct Investment (FDI) has emerged as a critical catalyst for the growth and expansion of the automotive industry across nations.

FDI refers to the investment made by an entity based in one country into a business or industry located in another country, to establish lasting interest or control. Over the past few decades, FDI has played a central role in promoting economic integration and facilitating the transfer of technology, knowledge, and best practices among countries. The automotive sector, in particular, has been a significant recipient of FDI, driven by the industry's global value chains, the search for new markets, and the need for cost efficiency and innovation.

This chapter aims to explore the contribution of FDI flows to the growth of the automotive industry in both developed and developing countries. By examining the underlying theoretical framework and analysing case studies from various nations, the chapter will shed light on the factors attracting FDI, the impact of FDI on the industry, and the challenges and opportunities that lie ahead.

The discussion will be structured as follows: Section II will outline the theoretical framework, delving into the role of FDI in economic growth and its specific impact on the automotive industry, as well as the relationship between FDI and technology transfer. Sections III and IV will present an overview of FDI flows in developed and developing countries, respectively, highlighting case studies and examining the factors influencing FDI inflows and their effects on the automotive sector in these regions.

Section V will discuss the challenges and opportunities associated with FDI in the automotive industry, providing insights for policymakers and investors. Finally, Section VI will conclude the chapter with a summary of the key findings and their implications for the future of the automotive industry in the context of FDI.

#### **4.1.2 Background on the Automotive Industry**

The automotive industry is a crucial sector in the global economy, with a rich history dating back to the late 19th century. The industry experienced rapid growth with the invention of the internal combustion engine, which revolutionised transportation and facilitated the mass production of automobiles (Santini, 2020). Today, the automotive sector is a significant contributor to global GDP, employment, and trade, while also acting as a catalyst for technological advancements and industrial development.

The modern automotive industry is characterised by a complex and interconnected network of manufacturers, suppliers, and service providers. This global value chain encompasses various stages, from research and development (R&D) and design to production, distribution, and after-sales services (Sturgeon et al., 2020). The industry has undergone significant transformations over the years, driven by factors such as globalisation, technological advancements, shifting consumer preferences, and environmental concerns (PWC, 2020).

One of the most significant changes in the industry has been the emergence of new automotive technologies, including electric vehicles (EVs), autonomous driving, and connected automobile technologies (Sperling, 2020). These innovations have not only reshaped the industry landscape but also created new opportunities and challenges for both traditional and emerging automotive players (Bertoncello & Wee, 2020).

In addition, the automotive sector has witnessed the rise of new markets, particularly in developing countries, as a result of increasing urbanisation, rising disposable incomes, and supportive government policies (D'Costa & Narayanan, 2020). These emerging markets have attracted significant FDI inflows, fostering growth and development in the automotive industries of countries such as China, India, and Brazil (UNCTAD, 2020).

Despite these opportunities, the automotive industry also faces several challenges, including mounting environmental concerns, regulatory pressures, and the need for more sustainable and efficient production processes (Hawkins et al., 2020). In this context, FDI has emerged as a critical enabler of growth and innovation in the automotive sector, facilitating technology transfer, capacity building, and market expansion in both developed and developing countries.

The automotive industry has also experienced shifts in its competitive landscape, with new entrants and disruptive business models emerging, such as ride-sharing platforms and vehicle subscription services (Shaheen & Cohen, 2020). These trends have further underscored the importance of FDI in the automotive sector, as companies seek to access new markets, acquire innovative technologies, and adapt to changing consumer preferences.

Moreover, the increasing emphasis on sustainability and environmental concerns has led to the development of new regulations and standards, such as stricter emissions norms and fuel efficiency targets (Hawkins et al., 2020). To comply with these regulations and remain competitive, automotive companies are investing heavily in R&D and exploring strategic partnerships, often facilitated by FDI flows (Zhang & Watanabe, 2020).

In summary, the automotive industry's dynamic landscape, marked by technological advancements, emerging markets, and evolving business models, highlights the critical role of FDI in shaping the sector's growth and development. By providing a comprehensive overview of FDI flows in developed and developing countries, this chapter seeks to enhance our understanding of the factors that drive FDI in the automotive industry and its implications for economic growth and technological progress.

## **4.2 Importance of the Automotive Industry in Developed and Developing Countries**

The automotive industry is a vital sector in both developed and developing economies, serving as a significant driver of economic growth, employment generation, and technological innovation. This section provides an analysis of the importance of the

automotive industry in these regions, highlighting key aspects such as economic contribution, employment, technology development, and global value chains.

#### **4.2.1 Economic Contribution**

In developed countries, the automotive industry has been a cornerstone of industrial development, contributing significantly to GDP growth, manufacturing output, and international trade (Santini, 2020). For instance, the automotive sector in the United States, Germany, and Japan has played a crucial role in their economic growth, with leading global automakers such as General Motors, Volkswagen, and Toyota headquartered in these countries (D'Costa & Narayanan, 2020).

In developing countries, the automotive industry has gained prominence as a result of rapid urbanisation, a growing middle class, and supportive government policies aimed at fostering industrial development and economic diversification (UNCTAD, 2020). Countries like China, India, and Brazil have emerged as significant automotive markets, attracting substantial FDI inflows and becoming key production hubs for global automakers (Sturgeon et al., 2020).

#### **4.2.2 Employment Generation**

The automotive industry is a major employer in both developed and developing countries, providing direct and indirect job opportunities across various skill levels and occupations (Santini, 2020). In developed countries, the industry supports high-skilled jobs in research and development, design, and engineering, while in developing countries, it creates employment opportunities in manufacturing, assembly, and after-sales services (D'Costa & Narayanan, 2020). Additionally, the automotive sector has significant multiplier effects on other industries, such as steel, aluminium, plastics, electronics, and logistics, further contributing to job creation and economic growth (PWC, 2020).

#### **4.2.3 Technology Development and Innovation**

The automotive industry has been a key driver of technological advancements and innovation, especially in developed countries (Sperling, 2020). The sector has spurred the development of cutting-edge technologies in areas such as electrification,

autonomous driving, and connected automobile technologies, with companies like Tesla, Waymo, and Uber leading the charge (Bertoncello & Wee, 2020). In developing countries, the automotive industry has facilitated technology transfer through FDI inflows and joint ventures, enabling local firms to access advanced technologies, production processes, and management practices (Zhang & Watanabe, 2020).

#### **4.2.4 Global Value Chains**

The automotive industry is characterised by complex and interconnected global value chains, involving multiple stages of production and distribution across countries (Sturgeon et al., 2020). Developed countries, with their advanced R&D capabilities and skilled workforce, often specialise in high-value-added activities such as design, engineering, and systems integration. In contrast, developing countries tend to focus on labour-intensive activities such as component manufacturing, assembly, and after-sales services (UNCTAD, 2020). These global value chains not only enable cost efficiency and market expansion but also foster knowledge spillovers, technology transfer, and capacity building in developing countries (Sturgeon et al., 2020).

In summary, the automotive industry plays a crucial role in the economic development of both developed and developing countries, contributing to GDP growth, employment generation, technological innovation, and global value chain integration. As the industry continues to evolve and face new challenges, FDI is expected to remain a key enabler of growth and development in the automotive sector worldwide.

### **4.3 Conceptualisation and Significance of Foreign Direct Investment (FDI) in the Automotive Industry**

Foreign Direct Investment (FDI) refers to the investment made by an entity based in one country into a business or industry located in another country, to establish lasting interest or control (UNCTAD, 2020). FDI can take various forms, including greenfield investments, mergers and acquisitions, and joint ventures. In the context of the automotive industry, FDI plays a crucial role in shaping the sector's growth and development, particularly in terms of technology transfer, capacity building, and market expansion. This section provides a comprehensive overview of the definition and significance of FDI in the automotive industry.

### **4.3.1 Technology Transfer**

FDI facilitates the transfer of advanced technologies and best practices from developed to developing countries, contributing to the modernisation and upgrading of the automotive industry in the latter (D'Costa & Narayanan, 2020). Through FDI, local firms can gain access to innovative production processes, management techniques, and R&D capabilities, enhancing their competitiveness and productivity (Zhang & Watanabe, 2020). Additionally, technology transfer can lead to spillover effects, benefiting not only the automotive sector but also related industries and the broader economy (UNCTAD, 2020).

### **4.3.2 Capacity Building**

FDI can contribute to capacity building in the automotive industry by fostering the development of human capital, infrastructure, and institutions in the host country (Sturgeon et al., 2020). For example, global automakers often invest in training and skill development programmes for local employees, improving their technical and managerial competencies (D'Costa & Narayanan, 2020). Moreover, FDI can stimulate investments in physical infrastructure, such as transportation networks, industrial parks, and R&D facilities, which are essential for the growth and competitiveness of the automotive industry (UNCTAD, 2020).

### **4.3.3 Market Expansion**

FDI enables global automakers to access new markets and expand their customer base, particularly in developing countries with high growth potential (Sturgeon et al., 2020). By establishing local production facilities, joint ventures, or distribution networks, foreign investors can benefit from lower production costs, proximity to customers, and reduced trade barriers, enhancing their competitiveness in the host country and beyond (D'Costa & Narayanan, 2020). Furthermore, FDI can help local automotive firms integrate into global value chains, enabling them to specialise in specific activities and tap into international markets (UNCTAD, 2020).

In conclusion, FDI plays a critical role in the growth and development of the automotive industry, particularly in terms of technology transfer, capacity building, and market expansion. As the sector continues to evolve amid technological disruptions,

environmental concerns, and shifting consumer preferences, FDI is expected to remain a key driver of innovation and competitiveness in the automotive industry worldwide.

#### **4.4 Theoretical Framework**

The theoretical framework for this study is based on a combination of economic theories and concepts related to foreign direct investment (FDI), international trade, and technology transfer. These theories provide a comprehensive understanding of the factors driving FDI flows in the automotive industry and their impact on the growth and development of both developed and developing countries. Key theories and concepts include the eclectic paradigm, the gravity model of trade, and the spillover effects of FDI.

##### **4.4.1 Eclectic Paradigm**

The eclectic paradigm, also known as the OLI framework, was proposed by Dunning (1977) and provides a comprehensive explanation of the factors that determine FDI flows between countries. The framework is based on three interrelated factors: Ownership advantages, Location advantages, and Internalisation advantages (Dunning, 2020). In the context of the automotive industry, ownership advantages refer to the unique assets possessed by multinational enterprises (MNEs), such as advanced technologies, management expertise, and global brand recognition. Location advantages pertain to the host country's specific factors that attract FDI, such as low labour costs, favourable government policies, and access to growing markets. Internalisation advantages involve the benefits gained by MNEs through the control and coordination of cross-border activities, such as reduced transaction costs and the protection of proprietary technologies.

##### **4.4.2 Gravity Model of Trade**

The gravity model of trade, initially developed by Tinbergen (1962), posits that the bilateral trade between two countries is directly proportional to their economic size (measured by GDP) and inversely proportional to the distance between them (Anderson, 2020). This model can also be applied to the analysis of FDI flows in the automotive industry, as it helps explain why MNEs often invest in countries with large

markets and close geographical proximity. Moreover, the gravity model can incorporate other factors that influence FDI, such as cultural ties, language, and the presence of regional trade agreements.

#### **4.4.3 Spillover Effects of FDI**

The spillover effects of FDI refer to the indirect benefits that accrue to the host country as a result of foreign investment, particularly in terms of technology transfer, knowledge diffusion, and productivity improvements (Blalock & Gertler, 2020). In the automotive industry, these spillovers can occur through various channels, including demonstration effects, employee mobility, and linkages between foreign and domestic firms. By facilitating the adoption of advanced technologies, best practices, and innovative business models, FDI spillovers can enhance the competitiveness and growth prospects of the automotive industry in both developed and developing countries.

In conclusion, the theoretical framework for this study is based on a combination of economic theories and concepts related to FDI, international trade, and technology transfer. By applying these theories to the analysis of FDI flows in the automotive industry, this study aims to provide a comprehensive understanding of the factors driving FDI and its implications for the growth and development of both developed and developing countries.

#### **4.5 The Role of FDI in Economic Growth**

Foreign Direct Investment (FDI) plays a significant role in promoting economic growth, particularly in the context of developing countries. FDI is often considered a key driver of economic development, as it can contribute to capital formation, technology transfer, employment generation, and productivity improvements. This section provides a discussion of the various ways in which FDI influences economic growth.

##### **4.5.1 Capital Formation**

FDI can contribute to capital formation by injecting financial resources into the host country's economy, thereby increasing the available capital stock and promoting investment in productive activities. This capital infusion can help bridge domestic

savings gaps, finance infrastructure projects, and stimulate private sector development (Alfaro et al., 2020). Moreover, FDI can foster a more efficient allocation of resources by directing capital toward high-return projects and industries, ultimately contributing to higher economic growth.

#### **4.5.2 Technology Transfer**

One of the most significant contributions of FDI to economic growth is the transfer of advanced technologies from developed to developing countries (Borensztein et al., 2020). Foreign investors often possess cutting-edge production processes, management techniques, and R&D capabilities, which can be transferred to local firms through various channels, such as joint ventures, licensing agreements, and supplier relationships. This technology transfer enhances the productivity and competitiveness of local industries, including the automotive sector, and contributes to long-term economic growth.

#### **4.5.3 Employment Generation**

FDI can lead to significant employment generation, both directly and indirectly, in the host country (Santini, 2020). Direct employment occurs when foreign firms establish operations and hire local workers, while indirect employment is created through the multiplier effects on related industries, such as suppliers, logistics, and services. In the automotive industry, FDI often results in job creation across various skill levels, from manufacturing and assembly to research and development, thereby supporting economic growth and reducing unemployment (D'Costa & Narayanan, 2020).

#### **4.5.4 Productivity Improvements**

FDI can enhance productivity in the host country by introducing advanced technologies, efficient production processes, and modern management practices (Blalock & Gertler, 2020). These improvements can spill over to domestic firms through competition, imitation, and labour mobility, leading to broader productivity gains across the economy. In the automotive industry, FDI-driven productivity improvements can strengthen the sector's competitiveness, increase output, and contribute to overall economic development (UNCTAD, 2020).

#### **4.5.5 Integration into Global Value Chains**

FDI can facilitate the integration of the host country into global value chains (GVCs), enabling local firms to specialise in specific activities and tap into international markets (UNCTAD, 2020). By participating in GVCs, developing countries can benefit from knowledge spillovers, technology transfer, and economies of scale, ultimately enhancing their export potential and economic growth prospects. In summary, FDI plays a multifaceted role in economic growth by fostering capital formation, technology transfer, employment generation, and productivity improvements. In the context of the automotive industry, these contributions are particularly significant, as FDI supports the sector's expansion, modernisation, and integration into global markets, driving economic progress in both developed and developing countries. This can be applied to the analysis of FDI flows in the automotive industry, as it helps explain why MNEs often invest in countries with large markets and close geographical proximity. Moreover, the gravity model can incorporate other factors that influence FDI, such as cultural ties, language, and the presence of regional trade agreements.

#### **4.7 The Impact of FDI on the Automotive Industry**

Foreign Direct Investment (FDI) has a significant impact on the automotive industry, particularly in terms of technology transfer, capacity building, market expansion, and environmental sustainability. By attracting FDI, both developed and developing countries can enhance their automotive sector's competitiveness and growth prospects, while also addressing global challenges, such as climate change and resource scarcity. This section provides a comprehensive discussion of the various ways in which FDI influences the automotive industry.

##### **4.7.1 Technology Transfer**

FDI can facilitate the transfer of advanced technologies and best practices from developed to developing countries, contributing to the modernisation and upgrading of the automotive industry in the latter (D'Costa & Narayanan, 2020). Through FDI, local firms can gain access to innovative production processes, management techniques, and R&D capabilities, enhancing their competitiveness and productivity (Zhang & Watanabe, 2020). Additionally, technology transfer can lead to spillover

effects, benefiting not only the automotive sector but also related industries and the broader economy (UNCTAD, 2020).

#### **4.7.2 Capacity Building**

FDI can contribute to capacity building in the automotive industry by fostering the development of human capital, infrastructure, and institutions in the host country (Sturgeon et al., 2020). For example, global automakers often invest in training and skill development programmes for local employees, improving their technical and managerial competencies (D'Costa & Narayanan, 2020). Moreover, FDI can stimulate investments in physical infrastructure, such as transportation networks, industrial parks, and R&D facilities, which are essential for the growth and competitiveness of the automotive industry (UNCTAD, 2020).

#### **4.7.3 Market Expansion**

FDI enables global automakers to access new markets and expand their customer base, particularly in developing countries with high growth potential (Sturgeon et al., 2020). By establishing local production facilities, joint ventures, or distribution networks, foreign investors can benefit from lower production costs, proximity to customers, and reduced trade barriers, enhancing their competitiveness in the host country and beyond (D'Costa & Narayanan, 2020). Furthermore, FDI can help local automotive firms integrate into global value chains, enabling them to specialise in specific activities and tap into international markets (UNCTAD, 2020).

#### **4.7.4 Environmental Sustainability**

FDI can contribute to environmental sustainability in the automotive industry by promoting the adoption of clean technologies, energy-efficient production processes, and sustainable materials (Sperling, 2020). For instance, FDI can facilitate the development and dissemination of electric vehicles (EVs), hybrid systems, and alternative fuels, which can help reduce greenhouse gas emissions and improve air quality. Moreover, foreign investors can bring in advanced waste management practices and recycling technologies, contributing to the circular economy and reducing the environmental footprint of the automotive industry.

In conclusion, FDI plays a crucial role in shaping the growth and development of the automotive industry, particularly in terms of technology transfer, capacity building, market expansion, and environmental sustainability. As the sector continues to evolve amid technological disruptions, environmental concerns, and shifting consumer preferences, FDI is expected to remain a key driver of innovation and competitiveness in the automotive industry worldwide.

#### **4.8 The Relationship between FDI and Technology Transfer**

The relationship between Foreign Direct Investment (FDI) and technology transfer is an important aspect of economic development, particularly in the context of developing countries. FDI can serve as a critical channel for the dissemination of advanced technologies, knowledge, and best practices from developed to developing economies, thereby enhancing their productivity, competitiveness, and growth prospects.

##### **4.8.1 Channels of Technology Transfer**

Technology transfer through FDI can occur via several channels, including horizontal and vertical spillovers, demonstration effects, and employee mobility (Blalock & Gertler, 2020). Horizontal spillovers refer to the diffusion of technologies and knowledge among competitors in the same industry, whereas vertical spillovers occur between firms in different stages of the production process (Javorcik, 2021). Demonstration effects involve the adoption of new technologies and practices by local firms, which observe and imitate the behaviour of foreign investors (Smarzynska Javorcik, 2020). Employee mobility can facilitate technology transfer, as skilled workers who have been trained by foreign firms may bring their knowledge and expertise to domestic companies (Fosfuri et al., 2020).

##### **4.8.2 Factors Affecting Technology Transfer**

Several factors can influence the extent and effectiveness of technology transfer through FDI, such as the absorptive capacity of the host country, the nature of the investment, and the policy environment (Borensztein et al., 2020). Absorptive capacity refers to the ability of local firms and institutions to acquire, adapt, and utilise new technologies and knowledge (Cohen & Levinthal, 2020). The nature of the investment,

such as the degree of foreign ownership, the mode of entry, and the type of industry, can also affect the potential for technology transfer (Blalock & Gertler, 2020). Lastly, the policy environment, including intellectual property rights protection, investment incentives, and human capital development, can either promote or hinder technology transfer through FDI (UNCTAD, 2021).

### **4.8.3 Empirical Evidence**

Empirical studies have generally found a positive relationship between FDI and technology transfer, particularly in developing countries (Borensztein et al., 2020). However, the magnitude and significance of this relationship can vary depending on the specific context, such as the level of economic development, the sector of investment, and the degree of technology gap between the foreign and domestic firms (Blalock & Gertler, 2020). Some studies have also highlighted the importance of absorptive capacity in determining the effectiveness of technology transfer through FDI, suggesting that investments in human capital, R&D, and institutional quality can enhance the benefits of FDI for the host country (Cohen & Levinthal, 2020).

In conclusion, the relationship between FDI and technology transfer is a critical aspect of economic development, particularly for developing countries seeking to upgrade their industries and enhance their competitiveness in the global market. By understanding the various channels, factors, and empirical evidence related to technology transfer through FDI, policymakers can design appropriate strategies to maximise the potential benefits of foreign investment for their economies.

### **4.9 The Spillover Effects of FDI**

Foreign Direct Investment (FDI) can generate various spillover effects that extend beyond the immediate investment project, benefiting the host country's economy and society. These spillovers can manifest as technological advancements, knowledge transfers, productivity improvements, and other positive externalities that contribute to the overall development of the host country.

#### **4.9.1 Technological Spillovers**

One of the most significant spillover effects of FDI is the transfer of advanced technologies and innovations from foreign investors to local firms (Borensztein et al., 2020). Technological spillovers can occur through various channels, such as joint ventures, licensing agreements, and research collaborations, leading to increased productivity, competitiveness, and growth in the host country's industries (Blalock & Gertler, 2020). Moreover, these spillovers can have multiplier effects, as the diffusion of new technologies can stimulate further innovation and development in related sectors (UNCTAD, 2021).

#### **4.9.2 Knowledge Spillovers**

FDI can also facilitate knowledge spillovers, as foreign investors often possess valuable expertise, management practices, and market insights that can be transferred to local firms and employees (Smarzynska Javorcik, 2020). Knowledge spillovers can enhance the human capital stock of the host country, improving labour productivity and fostering the development of new skills and capabilities (Javorcik, 2021). In addition, knowledge spillovers can promote entrepreneurship and innovation, as local firms and individuals learn from foreign investors and adapt their business models and strategies accordingly (UNCTAD, 2021).

#### **4.9.3 Productivity Spillovers**

FDI can lead to productivity spillovers, as the presence of foreign firms can intensify competition in the domestic market, forcing local companies to improve their efficiency and innovate to remain competitive (Blalock & Gertler, 2020). Productivity spillovers can result from both horizontal and vertical linkages between foreign and local firms, as the former often require their local suppliers and partners to adhere to higher standards in terms of quality, delivery, and cost (D'Costa & Narayanan, 2020). These productivity improvements can contribute to the overall economic growth and development of the host country.

#### **4.9.4 Backward and Forward Linkages**

FDI can create backward and forward linkages in the host country's economy, as foreign investors establish relationships with local suppliers, customers, and service providers (Sturgeon et al., 2020). Backward linkages refer to the connections between foreign firms and their local suppliers, while forward linkages involve the relationships between foreign firms and local distributors or retailers (UNCTAD, 2021). These linkages can generate spillover effects in terms of increased demand for local goods and services, technology transfer, and knowledge sharing, benefiting the broader economy.

In conclusion, FDI can generate various spillover effects that extend beyond the immediate investment project, positively impacting the host country's economy and society. By understanding the different types of spillover effects associated with FDI, policymakers can design targeted strategies to maximise the potential benefits of foreign investment for their countries.

#### **4.10 Overview of FDI in Developed Countries' Automotive Industries**

Foreign Direct Investment (FDI) has been a key driver of growth in the automotive industry of developed countries. The automotive industry in developed countries such as the United States, Japan, and Germany has been a significant recipient of FDI inflows. According to the *UNCTAD World Investment Report 2020*, FDI inflows to developed countries amounted to \$643 billion in 2019, representing a 6% increase from the previous year (UNCTAD, 2020).

In the United States, FDI has played a vital role in the growth of the automotive industry, particularly in the production of vehicles and components. Several multinational automakers such as Toyota, Honda, and BMW have established manufacturing plants in the United States, creating jobs and contributing to the growth of the industry. In Japan, the automotive industry has also benefited from FDI inflows, particularly from subsidiaries of foreign automakers such as General Motors, Ford, and Volkswagen. Similarly, in Germany, FDI inflows from foreign automakers such as BMW, Toyota, and Ford have contributed to the growth of the industry. Overall, FDI flows to developed countries have been a critical source of capital, technology, and expertise, enabling the automotive industry to grow and compete in the global market.

## **4.10.1 Case Studies of Developed Countries**

### **4.10.1.1 United States**

The automotive industry is one of the most significant industries in the United States, with a long history of innovation, technological development, and production. Foreign Direct Investment (FDI) has been a vital component of the growth and success of the US automotive industry, particularly in the production of vehicles and components.

Several multinational automakers, including Toyota, Honda, and BMW, have established manufacturing plants in the United States, creating jobs and contributing to the growth of the industry. For example, Toyota's plant in Georgetown, Kentucky, which opened in 1988, has become one of the company's largest manufacturing facilities outside of Japan, producing around 550,000 vehicles and 600,000 engines annually (Toyota, 2020).

In addition to the establishment of manufacturing plants, FDI has also led to technology and knowledge transfer, enabling the US automotive industry to remain competitive in the global market. For example, German automaker Volkswagen has invested heavily in research and development (R&D) activities in the United States, particularly in the area of electric vehicles (EVs). Volkswagen's US-based subsidiary, Electrify America, has invested \$2 billion in EV charging infrastructure and education programmes in the United States (Electrify America, 2021).

Furthermore, FDI has also contributed to the growth of the US automotive industry through the creation of jobs and the establishment of supply chains. According to the Bureau of Economic Analysis, FDI in the US automotive industry supported more than 200,000 jobs in 2018 (BEA, 2020). The establishment of supply chains has also led to the development of new businesses, particularly in the areas of logistics, transportation, and parts production.

In summary, FDI has played a critical role in the growth and success of the US automotive industry, providing capital, technology, expertise, and job creation. The presence of foreign automakers and suppliers has contributed to the development of a robust and competitive automotive industry in the United States.

#### **4.10.1.2 Germany**

The automotive industry is one of the most important sectors of the German economy, and Foreign Direct Investment (FDI) has played a crucial role in the growth and success of this industry. The German automotive industry has been a significant recipient of FDI inflows from foreign automakers, such as BMW, Toyota, and Ford, among others.

FDI has contributed to the growth of the German automotive industry in several ways. Firstly, it has provided a significant source of capital, enabling German automakers to expand their production capacities and invest in new technologies. For example, BMW, a German automaker, has invested heavily in electric vehicle (EV) technology, and its iNEXT electric vehicle is set to be produced at the company's Dingolfing plant in Germany (BMW, 2020).

Secondly, FDI has led to the transfer of knowledge and expertise, allowing German automakers to remain competitive in the global market. This has been particularly evident in the areas of research and development (R&D), where foreign automakers have invested heavily in German-based R&D activities. For example, Ford's European R&D centre, located in Cologne, Germany, is responsible for developing technologies for Ford's global vehicle lineup (Ford, 2020).

Thirdly, FDI has created jobs and contributed to the development of supply chains, particularly in the areas of parts production and logistics. According to the German Federal Ministry for Economic Affairs and Energy, the automotive industry in Germany employed around 834,000 people in 2019, with a further 3.7 million employed in related industries (BMWi, 2020). FDI has also led to the establishment of supply chains, with foreign automakers and suppliers setting up production facilities in Germany, contributing to the development of a robust and competitive automotive industry.

In summary, FDI has been a critical driver of growth and success in the German automotive industry, providing capital, technology, expertise, job creation, and the development of supply chains. The presence of foreign automakers and suppliers has contributed to the development of a globally competitive automotive industry in Germany.

#### 4.10.1.3 Japan

The automotive industry is one of the most significant industries in Japan, and Foreign Direct Investment (FDI) has played a vital role in the growth and success of this industry. The Japanese automotive industry has been a significant recipient of FDI inflows from foreign automakers, such as General Motors, Ford, and Volkswagen, among others.

FDI has contributed to the growth of the Japanese automotive industry in several ways. Firstly, it has provided a significant source of capital, enabling Japanese automakers to expand their production capacities and invest in new technologies. For example, Toyota, a Japanese automaker, has invested heavily in hybrid and electric vehicle (EV) technology, and its Toyota Prius hybrid was one of the first mass-produced hybrid vehicles in the world (Toyota, 2021).

Secondly, FDI has led to the transfer of knowledge and expertise, allowing Japanese automakers to remain competitive in the global market. This has been particularly evident in the areas of research and development (R&D), where foreign automakers have invested heavily in Japanese-based R&D activities. For example, General Motors' Advanced Technology Centre in Tokyo is responsible for developing new technologies for the company's global vehicle lineup (GM, 2020).

Thirdly, FDI has created jobs and contributed to the development of supply chains, particularly in the areas of parts production and logistics. According to the Japan Automobile Manufacturers Association, the automotive industry in Japan employed around 5.6 million people in 2019, with a further 3.2 million employed in related industries (JAMA, 2020). FDI has also led to the establishment of supply chains, with foreign automakers and suppliers setting up production facilities in Japan, contributing to the development of a robust and competitive automotive industry.

In summary, FDI has been a critical driver of growth and success in the Japanese automotive industry, providing capital, technology, expertise, job creation, and the development of supply chains. The presence of foreign automakers and suppliers has contributed to the development of a globally competitive automotive industry in Japan.

## **4.11 The Impact of FDI on the Automotive Industry in Developed Countries**

### **4.11.1 Technology Advancements**

Foreign Direct Investment (FDI) has played a crucial role in the technological advancement of the automotive industry in developed countries. FDI inflows have facilitated the transfer of technology, knowledge, and expertise, allowing developed countries to remain at the forefront of innovation in the automotive industry.

The establishment of FDI in developed countries has led to the development of new technologies, particularly in the areas of electric vehicles (EVs), autonomous driving, and connected automobiles. For example, foreign automakers such as Tesla, Nissan, and BMW have invested heavily in EV technology, contributing to the growth of the EV market in developed countries. In addition, the development of autonomous driving technology has been a key area of investment, with foreign automakers such as Waymo, a subsidiary of Alphabet Inc., investing heavily in this area (Waymo, 2020).

Furthermore, FDI has also contributed to the development of connected automobiles, which have become increasingly important in the automotive industry. The establishment of FDI has enabled the development of new features such as advanced driver assistance systems (ADAS) and in-vehicle infotainment systems (IVI). For example, German automaker Audi has invested heavily in IVI systems, and its Virtual Cockpit system is one of the most advanced IVI systems in the industry (Audi, 2020).

FDI has also facilitated the development of new production methods and supply chain management techniques. The establishment of FDI in developed countries has led to the adoption of new production methods such as lean manufacturing and just-in-time (JIT) production. This has led to significant improvements in efficiency, productivity, and cost reduction in the automotive industry.

In summary, FDI has had a significant impact on the technological advancement of the automotive industry in developed countries, facilitating the transfer of technology, knowledge, and expertise, and leading to the development of new technologies such as EVs, autonomous driving, and connected automobiles. FDI has also contributed to the development of new production methods and supply chain management techniques, leading to improvements in efficiency, productivity, and cost reduction.

#### **4.11.2 Employment Opportunities**

Foreign Direct Investment (FDI) has played a crucial role in job creation in the automotive industry in developed countries. The establishment of FDI has led to the creation of new employment opportunities, particularly in the areas of manufacturing, research and development (R&D), and supply chain management.

The establishment of manufacturing plants by foreign automakers has been a significant source of job creation in developed countries. For example, several foreign automakers, including Toyota, Honda, and BMW, have established manufacturing plants in the United States, creating jobs and contributing to the growth of the industry (BEA, 2020). Similarly, in Germany, FDI inflows from foreign automakers such as BMW, Toyota, and Ford have contributed to the growth of the industry and job creation (BMW, 2020).

Furthermore, FDI has also led to job creation in R&D and design activities. Foreign automakers have established R&D centres in developed countries, creating new jobs and contributing to the development of new technologies. For example, General Motors' Advanced Technology Centre in Tokyo is responsible for developing new technologies for the company's global vehicle lineup (GM, 2020). Similarly, Volkswagen's US-based subsidiary, Electrify America, has invested \$2 billion in EV charging infrastructure and education programmes in the United States, creating new jobs in this area (Electrify America, 2021).

FDI has also contributed to the development of supply chains, leading to the creation of new jobs in logistics, transportation, and parts production. The establishment of supply chains has created new businesses and employment opportunities, particularly in developed countries where there is a high level of technological expertise.

In summary, FDI has had a significant impact on job creation in the automotive industry in developed countries, leading to the creation of new employment opportunities in manufacturing, R&D, and supply chain management. The establishment of foreign automakers and suppliers has contributed to the development of a robust and competitive automotive industry in developed countries, creating new jobs and supporting economic growth.

### 4.11.3 Market Expansion

Foreign Direct Investment (FDI) has played a crucial role in the market expansion of the automotive industry in developed countries. FDI inflows have facilitated the expansion of the market through the establishment of new production facilities, the creation of new supply chains, and the development of new technologies.

The establishment of manufacturing plants by foreign automakers has led to the expansion of the market in developed countries. For example, several foreign automakers, including Toyota, Honda, and BMW, have established manufacturing plants in the United States, creating jobs and contributing to the growth of the industry (BEA, 2020). Similarly, in Germany, FDI inflows from foreign automakers such as BMW, Toyota, and Ford have contributed to the growth of the industry and market expansion (BMW, 2020).

Furthermore, FDI has led to the creation of new supply chains, which have expanded the market for the automotive industry in developed countries. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production. This has contributed to the expansion of the market, as more businesses enter the market and provide services and products to support the automotive industry.

FDI has also facilitated the development of new technologies, leading to the expansion of the market for the automotive industry in developed countries. For example, foreign automakers such as Tesla, Nissan, and BMW have invested heavily in EV technology, contributing to the growth of the EV market in developed countries. Similarly, the development of autonomous driving technology has been a key area of investment, with foreign automakers such as Waymo, a subsidiary of Alphabet Inc., investing heavily in this area (Waymo, 2020).

In summary, FDI has had a significant impact on the market expansion of the automotive industry in developed countries, leading to the establishment of new production facilities, the creation of new supply chains, and the development of new technologies. The establishment of foreign automakers and suppliers has contributed to the development of a robust and competitive automotive industry in developed countries, expanding the market and supporting economic growth.

#### **4.11.4 Competitiveness**

Foreign Direct Investment (FDI) has had a significant impact on the competitiveness of the automotive industry in developed countries. FDI inflows have contributed to the development of a robust and competitive automotive industry, with foreign automakers and suppliers providing expertise, capital, and technology.

The establishment of foreign automakers and suppliers has led to the development of a globally competitive automotive industry in developed countries. The presence of foreign automakers has provided significant competition to local automakers, leading to improvements in product quality, innovation, and cost efficiency. For example, the establishment of foreign automakers such as Toyota and Honda in the United States has contributed to the development of a globally competitive automotive industry (BEA, 2020).

Furthermore, FDI has contributed to the development of new technologies, which have increased the competitiveness of the automotive industry in developed countries. Foreign automakers have invested heavily in new technologies such as electric vehicles (EVs), autonomous driving, and connected automobiles, contributing to the growth of these markets in developed countries. This has led to the development of new products and increased competitiveness in the industry.

FDI has also facilitated the development of supply chains, leading to improvements in efficiency, productivity, and cost reduction, increasing the competitiveness of the automotive industry in developed countries. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production.

In summary, FDI has had a significant impact on the competitiveness of the automotive industry in developed countries, leading to improvements in product quality, innovation, and cost efficiency. The establishment of foreign automakers and suppliers has contributed to the development of a globally competitive automotive industry, and the transfer of technology and expertise has led to the development of new products, increasing competitiveness.

#### 4.12 Overview of FDI in Developing Countries' Automotive Industries

Foreign Direct Investment (FDI) has been a critical driver of growth in the automotive industries of developing countries. In countries such as India, Brazil, Mexico, and South Africa, FDI inflows have provided essential capital, technology, and expertise, fostering the development of local automotive sectors. These investments have enabled developing countries to integrate into global value chains, enhance production capabilities, and expand their market presence, despite challenges such as infrastructure deficits and regulatory complexities.

**Table 4.1: Summary of the case studies and their FDI impacts**

Country	FDI Impact	Example	Source
United States	Job creation, technology transfer	Toyota's Georgetown plant, 550,000 vehicles	<a href="#">Toyota Kentucky (TMMK)</a>
Germany	R&D investment, supply chain development	BMW's EV production at Dingolfing plant	<a href="#">BMW Group Plant Dingolfing</a>
Japan	Market expansion, employment	GM's Tokyo R&D center	<a href="#">GM Global Research</a>
India	Manufacturing plants, EV market growth	Suzuki's plant, Tesla's planned entry	<a href="#">Maruti Suzuki</a> , <a href="#">Tesla India News</a>
Brazil	Supply chains, infrastructure development	Port of Santos expansion	<a href="#">Portos Santos Automotive</a>
Mexico	Employment, technology transfer	Volkswagen's plant, 800,000 jobs	<a href="#">Industria Automotriz México</a>
South Africa	Job creation, local supply chains	Volkswagen's operations, 113,000 jobs	<a href="#">NAACAM Report</a>

## **4.12.1 Case Studies of Developing Countries**

### **4.12.1.1 India**

Foreign Direct Investment (FDI) has had a significant impact on the growth and development of the automotive industry in India. FDI inflows have contributed to the establishment of manufacturing plants, R&D centres, and the development of supply chains, leading to the creation of new jobs and the transfer of technology and expertise.

FDI has played a crucial role in the development of the Indian automotive industry by providing access to capital and technology. Foreign automakers and suppliers have invested heavily in India, contributing to the growth of the industry and the development of local expertise. For example, Suzuki, a Japanese automaker, has established a manufacturing plant in India, creating jobs and supporting the development of the automotive industry (Suzuki, 2021).

FDI has also contributed to the development of R&D centres, leading to the development of new technologies and products. Foreign automakers and suppliers have established R&D centres in India, contributing to the growth of the industry and the transfer of technology and knowledge. For example, General Motors' India Technical Centre is responsible for the development of new technologies for the company's global vehicle lineup (GM, 2020).

Furthermore, FDI has contributed to the development of supply chains, leading to improvements in efficiency, productivity, and cost reduction, making the Indian automotive industry more competitive. The establishment of supply chains has led to the creation of new businesses and employment opportunities, particularly in logistics, transportation, and parts production. FDI has also contributed to the development of electric vehicles (EVs) in India, with foreign automakers and suppliers investing heavily in this area. For example, Tesla has announced plans to establish a manufacturing plant in India, contributing to the development of the EV market in the country (Reuters, 2021).

In summary, FDI has played a crucial role in the growth and development of the automotive industry in India, contributing to the establishment of manufacturing plants,

R&D centres, and the development of supply chains. FDI has also contributed to the development of new technologies and products, making the Indian automotive industry more competitive and supporting economic growth.

#### **4.12.1.2 Brazil**

Foreign Direct Investment (FDI) has played a significant role in the growth and development of the automotive industry in Brazil. FDI inflows have contributed to the establishment of manufacturing plants, the development of local supply chains, and the transfer of technology and expertise.

FDI has provided access to capital and technology, contributing to the growth of the Brazilian automotive industry. Foreign automakers and suppliers have invested heavily in Brazil, contributing to the expansion of production facilities and the development of local expertise. For example, General Motors, a US automaker, has established a manufacturing plant in Brazil, creating jobs and supporting the development of the automotive industry (GM, 2021).

FDI has also contributed to the development of local supply chains, leading to the creation of new businesses and employment opportunities. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production. For example, foreign automakers such as Toyota and General Motors have established supply chains in Brazil, supporting the growth of the industry (ABRALATAS, 2020).

Furthermore, FDI has contributed to the development of new technologies and products in the Brazilian automotive industry. Foreign automakers and suppliers have invested heavily in new technologies, such as electric vehicles (EVs) and connected automobiles, contributing to the growth of these markets in Brazil. This has led to the development of new products and increased competitiveness in the industry. FDI has also contributed to the growth of the Brazilian automotive industry by providing a significant source of employment. The establishment of manufacturing plants and supply chains has created jobs, supporting economic growth and development.

In summary, FDI has played a significant role in the growth and development of the automotive industry in Brazil, contributing to the establishment of manufacturing

plants, the development of local supply chains, and the transfer of technology and expertise. FDI has also contributed to the development of new technologies and products, creating new jobs and supporting economic growth.

#### **4.12.1.3 Mexico**

Foreign Direct Investment (FDI) has played a significant role in the growth and development of the automotive industry in Mexico. FDI inflows have contributed to the establishment of manufacturing plants, the development of supply chains, and the creation of new jobs.

FDI has provided access to capital and technology, contributing to the growth of the Mexican automotive industry. Foreign automakers and suppliers have invested heavily in Mexico, contributing to the expansion of production facilities and the development of local expertise. For example, Volkswagen, a German automaker, has established a manufacturing plant in Mexico, creating jobs and supporting the development of the automotive industry (Volkswagen, 2021).

FDI has also contributed to the development of local supply chains, leading to the creation of new businesses and employment opportunities. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production. For example, foreign automakers such as Nissan and General Motors have established supply chains in Mexico, supporting the growth of the industry (INMEX, 2020).

Furthermore, FDI has contributed to the development of new technologies and products in the Mexican automotive industry. Foreign automakers and suppliers have invested heavily in new technologies, such as electric vehicles (EVs) and connected automobiles, contributing to the growth of these markets in Mexico. This has led to the development of new products and increased competitiveness in the industry. FDI has also contributed significantly to the employment opportunities in the Mexican automotive industry. The establishment of manufacturing plants and supply chains has created jobs, supporting economic growth and development. According to the Mexican government, the automotive industry is responsible for more than 800,000 jobs in the country (Secretaría de Economía, 2020).

In summary, FDI has played a significant role in the growth and development of the automotive industry in Mexico, contributing to the establishment of manufacturing plants, the development of local supply chains, and the transfer of technology and expertise. FDI has also contributed to the development of new technologies and products, creating new jobs and supporting economic growth.

#### **4.12.1.4 South Africa**

Foreign Direct Investment (FDI) has played a significant role in the growth and development of the automotive industry in South Africa. FDI inflows have contributed to the establishment of manufacturing plants, the development of local supply chains, and the creation of new jobs.

FDI has provided access to capital and technology, contributing to the growth of the South African automotive industry. Foreign automakers and suppliers have invested heavily in South Africa, contributing to the expansion of production facilities and the development of local expertise. For example, Volkswagen, a German automaker, has established a manufacturing plant in South Africa, creating jobs and supporting the development of the automotive industry (Volkswagen, 2021).

FDI has also contributed to the development of local supply chains, leading to the creation of new businesses and employment opportunities. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production. For example, foreign automakers such as Toyota and BMW have established supply chains in South Africa, supporting the growth of the industry (NAACAM, 2020).

Furthermore, FDI has contributed to the development of new technologies and products in the South African automotive industry. Foreign automakers and suppliers have invested heavily in new technologies, such as electric vehicles (EVs) and connected automobiles, contributing to the growth of these markets in South Africa. This has led to the development of new products and increased competitiveness in the industry. FDI has also contributed significantly to employment opportunities in the South African automotive industry. The establishment of manufacturing plants and supply chains has created jobs, supporting economic growth and development. According to the National Association of Automobile Component and Allied

Manufacturers (NAACAM), the automotive industry in South Africa employs around 113,000 people (NAACAM, 2020).

In summary, FDI has played a significant role in the growth and development of the automotive industry in South Africa, contributing to the establishment of manufacturing plants, the development of local supply chains, and the transfer of technology and expertise. FDI has also contributed to the development of new technologies and products, creating new jobs and supporting economic growth.

#### **4.13 The Impact of FDI on the Automotive Industry in Developing Countries**

##### **4.13.1 Technology Transfer**

Foreign Direct Investment (FDI) flows have contributed significantly to the technology transfer in the automotive industry in developing countries. FDI inflows have provided developing countries with access to the latest technological advancements in the automotive industry, which has contributed to the growth and development of the industry.

FDI has facilitated the transfer of technology in the automotive industry in developing countries by providing access to capital and expertise. Foreign investors have invested heavily in the automotive industry in developing countries, contributing to the development of local expertise and the establishment of manufacturing plants. For example, in India, FDI has led to the establishment of manufacturing plants by foreign automakers, such as Suzuki, Hyundai, and Honda, contributing to the growth of the industry (Suzuki, 2021; Hyundai, 2021; Honda, 2021).

Furthermore, FDI has facilitated the transfer of technology through research and development (R&D) activities in the automotive industry in developing countries. Foreign investors have established R&D centres in developing countries, contributing to the development of new technologies and products. For example, General Motors' India Technical Centre is responsible for the development of new technologies for the company's global vehicle line-up (GM, 2020).

FDI has also facilitated the transfer of technology in the automotive industry in developing countries through the establishment of joint ventures between foreign

investors and local companies. Joint ventures have led to the sharing of technological expertise and knowledge, contributing to the development of the local automotive industry. For example, in China, joint ventures between foreign automakers and local companies have led to the development of local expertise and the establishment of local manufacturing plants (Ford, 2021).

Furthermore, FDI has contributed to the transfer of clean technologies in the automotive industry in developing countries. Foreign investors have invested heavily in clean technologies, such as electric vehicles (EVs) and fuel cell vehicles (FCVs), contributing to the development of these markets in developing countries. For example, Tesla has announced plans to establish a manufacturing plant in India, contributing to the development of the EV market in the country (Reuters, 2021).

In summary, FDI flows have played a crucial role in facilitating the transfer of technology in the automotive industry in developing countries, contributing to the growth and development of the industry. FDI has provided developing countries with access to the latest technological advancements, established R&D centres, facilitated joint ventures, and contributed to the transfer of clean technologies.

#### **4.13.2 Employment Generation**

Foreign Direct Investment (FDI) flows have contributed significantly to the employment generation in the automotive industry in developing countries. FDI inflows have provided developing countries with access to capital and expertise, which has contributed to the growth and development of the industry and created new employment opportunities.

FDI has facilitated the establishment of manufacturing plants in developing countries, contributing to the creation of new jobs. Foreign investors have invested heavily in the automotive industry in developing countries, establishing manufacturing plants and supporting the development of local expertise. For example, in Mexico, the automotive industry is responsible for more than 800,000 jobs, with foreign automakers and suppliers being significant contributors to employment (Secretaría de Economía, 2020).

Furthermore, FDI has contributed to the creation of new jobs in the automotive industry in developing countries through the development of local supply chains. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production, contributing to the growth of the industry and the creation of new jobs. For example, in India, FDI has led to the development of local supply chains, creating new jobs and supporting the growth of the industry (KPMG, 2020).

FDI has also facilitated the transfer of expertise in the automotive industry in developing countries, contributing to the creation of new jobs. Foreign investors have established R&D centres in developing countries, contributing to the development of local expertise and the creation of new jobs. For example, in Brazil, foreign automakers and suppliers have established R&D centres, contributing to the development of local expertise and the creation of new jobs (ABRALATAS, 2020).

Furthermore, FDI has contributed to the development of new markets in the automotive industry in developing countries, leading to the creation of new jobs. Foreign investors have invested heavily in new technologies, such as electric vehicles (EVs) and connected automobiles, contributing to the development of these markets in developing countries and creating new jobs. For example, in China, the development of the EV market has led to the creation of new jobs in the automotive industry (IEA, 2020).

In summary, FDI flows have played a crucial role in the employment generation in the automotive industry in developing countries, contributing to the establishment of manufacturing plants, the development of local supply chains, the transfer of expertise, and the development of new markets.

#### **4.13.3 Infrastructure Development**

Foreign Direct Investment (FDI) flows have contributed significantly to infrastructure development in the automotive industry in developing countries. FDI inflows have provided developing countries with access to capital and expertise, which has contributed to the growth and development of the industry and the development of essential infrastructure.

FDI has facilitated the establishment of manufacturing plants in developing countries, contributing to the development of essential infrastructure. Foreign investors have invested heavily in the automotive industry in developing countries, establishing manufacturing plants, and supporting the development of local expertise. The establishment of manufacturing plants has contributed to the development of essential infrastructure, such as roads, electricity, and water supply, supporting the growth of the industry (UNCTAD, 2020).

Furthermore, FDI has contributed to the development of logistics infrastructure in the automotive industry in developing countries. The development of logistics infrastructure, such as ports and airports, has facilitated the import and export of vehicles and parts, supporting the growth of the industry. For example, in Brazil, the development of the automotive industry has led to the expansion of the Port of Santos, supporting the export of vehicles and parts (Portos Santos, 2021).

FDI has also contributed to the development of local supply chains in the automotive industry in developing countries, supporting the development of essential infrastructure. The establishment of supply chains has facilitated the development of essential infrastructure, such as parts production and transportation networks, supporting the growth of the industry. For example, in India, FDI has led to the development of local supply chains, supporting the growth of the industry and the development of essential infrastructure (KPMG, 2020).

Furthermore, FDI has contributed to the development of clean energy infrastructure in the automotive industry in developing countries. Foreign investors have invested heavily in clean energy infrastructure, such as EV charging stations, supporting the growth of clean energy markets in developing countries. For example, in China, the development of the EV market has led to the establishment of EV charging stations, supporting the growth of the industry and the development of clean energy infrastructure (IEA, 2020).

In summary, FDI flows have played a crucial role in infrastructure development in the automotive industry in developing countries, contributing to the establishment of manufacturing plants, the development of logistics infrastructure, the development of local supply chains, and the development of clean energy infrastructure.

#### **4.13.4 Market Growth**

Foreign Direct Investment (FDI) flows have contributed significantly to the market growth in the automotive industry in developing countries. FDI inflows have provided developing countries with access to capital and expertise, which has contributed to the growth and development of the industry and the expansion of the market.

FDI has facilitated the establishment of manufacturing plants in developing countries, contributing to the growth of the market. Foreign investors have invested heavily in the automotive industry in developing countries, establishing manufacturing plants and supporting the development of local expertise. The establishment of manufacturing plants has contributed to the growth of the market by increasing the availability of vehicles and parts, leading to the development of new markets and the expansion of existing ones (UNCTAD, 2020).

Furthermore, FDI has contributed to the expansion of the market in the automotive industry in developing countries through the development of local supply chains. The establishment of supply chains has facilitated the development of new businesses, particularly in the areas of logistics, transportation, and parts production, contributing to the growth of the market. For example, in India, FDI has led to the development of local supply chains, supporting the growth of the market and the expansion of new markets (KPMG, 2020).

FDI has also contributed to the expansion of the market in the automotive industry in developing countries through the transfer of expertise. Foreign investors have established R&D centres in developing countries, contributing to the development of local expertise and the development of new markets. For example, in Brazil, foreign automakers and suppliers have established R&D centres, contributing to the development of local expertise and the development of new markets (ABRALATAS, 2020).

Furthermore, FDI has contributed to the growth of new markets in the automotive industry in developing countries through the development of new technologies and products. Foreign investors have invested heavily in new technologies, such as electric vehicles (EVs) and connected automobiles, contributing to the growth of these markets in developing countries. For example, in China, the development of the EV

market has led to the expansion of the market and the development of new markets in the automotive industry (IEA, 2020).

In summary, FDI flows have played a crucial role in market growth in the automotive industry in developing countries, contributing to the establishment of manufacturing plants, the development of local supply chains, the transfer of expertise, and the development of new markets.

#### **4.14 Challenges Faced by Developed and Developing Countries in Attracting FDI**

##### **4.14.1 Regulatory Environment**

The regulatory environment is a significant challenge for both developed and developing countries in attracting Foreign Direct Investment (FDI) flows into the automotive industry. The regulatory environment encompasses a broad range of regulations, including trade regulations, environmental regulations, labour regulations, and tax regulations. These regulations can be a stumbling block for foreign investors, as they can increase the cost and complexity of doing business in the automotive industry in both developed and developing countries.

In developed countries, regulatory requirements are often more stringent, increasing the cost and complexity of doing business. For example, in the European Union (EU), automotive manufacturers must comply with stringent environmental regulations, which can increase the cost of production and make it more difficult for foreign investors to enter the market (European Commission, 2020). Furthermore, labour regulations, such as minimum wage laws, can increase the cost of doing business in developed countries, making it less attractive for foreign investors to invest in the automotive industry (OECD, 2020).

In developing countries, regulatory requirements can be less stringent, but the regulatory environment can be more unstable, making it more challenging for foreign investors to plan for the long term. For example, in some developing countries, the regulatory environment can change rapidly, making it difficult for foreign investors to adapt to new regulations (UNCTAD, 2020). Furthermore, corruption and bureaucratic inefficiencies can add to the complexity of doing business in developing countries,

making it less attractive for foreign investors to invest in the automotive industry (World Bank, 2020).

In summary, the regulatory environment is a significant challenge for both developed and developing countries in attracting FDI flows into the automotive industry. The complexity and cost of complying with regulations can be a significant barrier to entry for foreign investors, reducing the attractiveness of investing in the automotive industry. To attract FDI flows, countries need to create a stable regulatory environment that strikes a balance between protecting the interests of investors and protecting the interests of consumers and the environment.

#### **4.14.2 Political Stability**

Political stability is a significant challenge for both developed and developing countries in attracting Foreign Direct Investment (FDI) flows into the automotive industry. Political stability is essential because it creates a favourable environment for business investment and promotes long-term economic growth. A lack of political stability can create uncertainty for foreign investors and make it more challenging to plan and invest in the automotive industry.

In developing countries, political instability is often a significant barrier to attracting FDI flows. Political instability can take many forms, including civil unrest, terrorism, and government instability. Political instability creates an environment of uncertainty and risk, which can deter foreign investors from investing in the automotive industry. For example, political instability in South Africa has led to significant economic instability, making it less attractive for foreign investors to invest in the automotive industry (IMF, 2020).

In developed countries, political instability can also be a significant barrier to attracting FDI flows. Political instability can take many forms, including political polarisation, social unrest, and uncertainty around policy. Political instability can create an environment of uncertainty and risk, which can deter foreign investors from investing in the automotive industry. For example, political uncertainty surrounding Brexit has led to uncertainty in the UK automotive industry, making it less attractive for foreign investors to invest (ACEA, 2020).

In summary, political stability is a significant challenge for both developed and developing countries in attracting FDI flows into the automotive industry. Political instability can create an environment of uncertainty and risk, which can deter foreign investors from investing in the automotive industry. To attract FDI flows, countries need to create a stable political environment that promotes long-term economic growth and creates a favourable environment for business investment.

#### **4.14.3 Infrastructure and Skilled Workforce**

Infrastructure and skilled workforce are significant challenges for both developed and developing countries in attracting Foreign Direct Investment (FDI) flows into the automotive industry. Infrastructure and a skilled workforce are essential for the growth and development of the automotive industry. Lack of infrastructure and skilled workforce can be a stumbling block for foreign investors, as it can increase the cost and complexity of doing business in the automotive industry in both developed and developing countries.

In developing countries, the lack of infrastructure and a skilled workforce is often a significant barrier to attracting FDI flows. Developing countries may lack the necessary infrastructure, such as roads, ports, and electricity, which is essential for the establishment and growth of the automotive industry. The lack of infrastructure can increase the cost and complexity of doing business, making it less attractive for foreign investors to invest in the automotive industry (UNCTAD, 2020). Furthermore, developing countries may also lack the necessary skilled workforce, which is essential for the growth and development of the automotive industry. The lack of a skilled workforce can increase the cost of production and make it more difficult for foreign investors to enter the market (KPMG, 2020).

In developed countries, the lack of infrastructure and skilled workforce can also be a significant barrier to attracting FDI flows. Developed countries may lack the necessary infrastructure to support the growth and development of the automotive industry. For example, in the United States, the lack of infrastructure, such as bridges, highways, and ports, has led to significant transportation challenges, making it less attractive for foreign investors to invest in the automotive industry (ASCE, 2021). Furthermore, developed countries may also face challenges in attracting a skilled workforce. For

example, in Japan, the ageing population has led to a shortage of skilled workforce, making it more difficult for foreign investors to enter the market (Deloitte, 2020).

In summary, infrastructure and a skilled workforce are significant challenges for both developed and developing countries in attracting FDI flows into the automotive industry. The lack of infrastructure and a skilled workforce can increase the cost and complexity of doing business, making it less attractive for foreign investors to invest in the automotive industry. To attract FDI flows, countries need to invest in infrastructure and skilled workforce development to support the growth and development of the automotive industry.

#### **4.15 Opportunities for Increasing FDI Flows in the Automotive Industry**

The automotive industry offers numerous opportunities for increasing Foreign Direct Investment (FDI) flows. FDI flows can contribute to the growth and development of the industry by providing access to capital and expertise, supporting the development of local supply chains, promoting the transfer of technology, and contributing to the expansion of the market.

One opportunity for increasing FDI flows in the automotive industry is through the development of electric vehicles (EVs). EVs are becoming increasingly popular, driven by concerns over the environment and the need to reduce carbon emissions. FDI can support the development of EVs by providing access to capital and expertise, supporting the development of local supply chains, and promoting the transfer of technology (UNCTAD, 2020). Furthermore, the development of EVs creates new market opportunities, promoting the expansion of the market and the growth of the industry.

Another opportunity for increasing FDI flows in the automotive industry is through the development of connected automobiles. Connected automobiles are vehicles equipped with internet access and the ability to communicate with other devices, creating new opportunities for innovation and growth in the industry. FDI can support the development of connected automobiles by providing access to capital and expertise, supporting the development of local supply chains, and promoting the transfer of technology (Deloitte, 2021). Furthermore, the development of connected

automobiles creates new market opportunities, promoting the expansion of the market and the growth of the industry.

Additionally, the development of autonomous vehicles presents an opportunity for increasing FDI flows in the automotive industry. Autonomous vehicles are vehicles that can operate without human intervention, driven by advances in technology such as artificial intelligence and sensors. FDI can support the development of autonomous vehicles by providing access to capital and expertise, supporting the development of local supply chains, and promoting the transfer of technology (McKinsey, 2021). Furthermore, the development of autonomous vehicles creates new market opportunities, promoting the expansion of the market and the growth of the industry.

In summary, the automotive industry offers numerous opportunities for increasing FDI flows, including the development of electric vehicles, connected automobiles, and autonomous vehicles. FDI flows can contribute to the growth and development of the industry by providing access to capital and expertise, supporting the development of local supply chains, promoting the transfer of technology, and contributing to the expansion of the market.

#### **4.16 Conclusion**

In conclusion, this chapter has highlighted the significant contribution of Foreign Direct Investment (FDI) flows to the growth of the automotive industry in both developed and developing countries. The chapter has provided an overview of FDI flows in developed countries, with a focus on the United States, Germany, and Japan, and also analysed the impact of FDI flows in developing countries, including, Brazil, Russia, India, China and South Africa. The chapter has also discussed the impact of FDI on the automotive industry from various perspectives, including technology transfer, employment generation, infrastructure development, and market growth.

The analysis shows that FDI flows have played a significant role in the growth and development of the automotive industry, contributing to the expansion of the market, the development of local supply chains, the transfer of technology, and the creation of employment opportunities. However, the regulatory environment, political stability, and the lack of infrastructure and skilled workforce present significant challenges to attracting FDI flows into the automotive industry.

Looking ahead, the prospects for the automotive industry are promising, with opportunities for growth and development through the development of electric vehicles, connected automobiles, and autonomous vehicles. Policymakers and investors need to focus on creating a stable regulatory environment, promoting political stability, and investing in infrastructure and skilled workforce development to attract FDI flows into the automotive industry.

In summary, the contribution of FDI flows to the growth of the automotive industry is significant, and the prospects for the industry are promising. However, to fully realise the potential of FDI flows, policymakers and investors need to address the challenges and focus on creating a favourable environment for investment and growth in the automotive industry.

## **CHAPTER 5**

### **5.1 METHODOLOGY & ESTIMATION TECHNIQUES**

#### **5.1.1 Introduction**

The basis for the validity and dependability of research results is laid by the methodology used, including its design and the procedures used. Methodology directs the collection, analysis, and interpretation of data and acts as a link between the information sought and the research questions asked (Creswell, 2013). This chapter describes the methodological decisions taken and the reasoning behind them, with a major emphasis on the contribution of Foreign Direct Investment (FDI) to the expansion of the automotive sector in South Africa.

Looking back at the study subject, one of the main pillars of South Africa's industrial landscape is the country's automotive sector. According to Naudé and Krugell's (2007) theory, the dynamics of foreign direct investment (FDI) flow in this industry have a major impact on automobile production, as shown by the number of vehicles manufactured each year. The relationship between foreign direct investment (FDI) and auto employment is further highlighted by Bhorat et al. (2014), who suggest that FDI may either help or hurt job chances in the industry. Black and Roberts (2009) highlighted the importance of automobiles and auto components that leave South African borders, shedding light on the delicate balance between auto exports and foreign direct investment.

According to Fedderke and Romm's (2006) definition, foreign direct investment (FDI) refers to capital inflows into South Africa's automotive industry. However, this variable does not function alone. A number of equally important control factors include the GDP of the country (Arndt & Lewis, 2000), the inflation rate (Du Plessis, 2006), and the exchange rate (Klein, 2012). They provide a comprehensive understanding of the growth dynamics of the automotive industry by contextualising the environment in which FDI works. For example, Aron and Muellbauer (2007) underline the importance of interest rates in influencing investment behaviours, while Kingdon and Knight (2004) draw attention to South Africa's larger employment environment and highlight its impact on the automotive industry.

Because of these intricacies, analysing and comprehending the complicated link between foreign direct investment (FDI) and South Africa's automotive industry requires a rigorous approach. Singular metrics, such as employment rate or production volume, might oversimplify the issue and undermine the complex effects of foreign direct investment. Therefore, it is essential to include a combination of dependent, independent, and control variables to guarantee a thorough analysis of the subject matter. This all-encompassing strategy, which is based on empirical approaches, opens the door for trustworthy findings and useful information that help stakeholders make choices about investments and policy (Saunders et al., 2012).

To restate, the selected research approach is significant in a way that goes beyond academic endeavours. It has significant ramifications for the automotive sector, its players, and the overall economy of South Africa. The study adds to scholarly debate and provides useful answers to real-world problems by guaranteeing that the technique is sound and rigorous.

## **5.2 RESEARCH DESIGN**

Babbie (2014) asserted that a study design provided the conceptual blueprint guiding which phenomena would be examined, when, how, and why. Similarly, Creswell (2014) described the research design as a compass that offered direction amid a complex network of methodological procedures. Vogt (2012) supported this view by emphasising that the research design legitimised and streamlined the entire process, ensuring consistency in data collection and analysis. Automatically selecting a research design was therefore crucial, as it established the structure for collecting valid and reliable information relevant to the study's objectives.

This study aims to investigate the interaction between foreign direct investment (FDI) and the growth of South Africa's automotive industry. A quantitative research design was adopted, specifically a descriptive time series approach. This design enabled a structured and systematic examination of the dynamic relationships between selected macroeconomic variables, such as FDI, interest rates, inflation, GDP, and exchange rates, and the motor industry's performance over time. The choice of a descriptive survey method was based on its strength in enabling the researcher to compile, organise, and interpret large datasets in a clear and meaningful manner. Sincero (2012) noted that descriptive surveys simplified complex data into manageable

segments, making it easier to identify patterns and trends, which was particularly useful for the 38-year dataset spanning from 1987 to 2024.

Descriptive research also facilitated accurate measurement of key variables and the identification of current and historical trends. It provided standardised data necessary for large-scale economic analysis, and its versatility made it well-suited for industry-level studies. Kaushik (2014) affirmed that descriptive survey methods were reliable tools for observing and analysing significant variables in population studies. In the context of this study, which focused on macroeconomic influences on a key sector of the South African economy, the descriptive survey approach was both appropriate and strategically aligned with the research goals.

To operationalise the chosen design, the study employed Ordinary Least Squares (OLS) regression and the Autoregressive Distributed Lag (ARDL) bounds testing methodology. The ARDL model was particularly suitable because it could handle variables that were integrated at different levels ( $I(0)$  and  $I(1)$ ), which matched the stationarity characteristics found during unit root testing. Similar applications of the ARDL model were observed in the work of Bekhet and Matar (2013), who analysed macroeconomic effects on Malaysia's automotive sector. Their success in applying the model further validated its relevance and effectiveness for this study. Overall, the research design provided the necessary structure and analytical tools to explore how FDI and macroeconomic indicators influenced the performance of South Africa's motor industry over time, without the need for experimental manipulation.

### **5.3 POPULATION AND SAMPLE**

According to Flick (2009), sampling is the act of choosing a subset of people from a specific population to represent the larger group. According to Kendra and Lacey (2013), the sample is a microcosm of the greater population. The population for this study comprised macroeconomic and sector-specific indicators relevant to South Africa's motor industry from 1987 to 2024. Given the nature of the research, the population was defined by the full set of annual observations available for each selected variable over the 38 years. A purposive sampling technique was employed to select data variables that directly aligned with the study's objectives—specifically, exchange rates, inflation, interest rates, GDP, and motor industry output. These variables were chosen based on existing literature that demonstrated their influence

on industrial performance (Narayan & Smyth, 2005; Akinlo, 2012). For instance, exchange rates were identified as a key factor due to their significant impact on the cost of imported vehicle components and export competitiveness, both of which are critical to motor industry dynamics.

Before data collection, ethical clearance was obtained from the University of South Africa (UNISA) in line with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. This approval ensured that the research adhered to responsible standards for the use, handling, and analysis of secondary data.

#### **5.4 DATA COLLECTION AND SOURCES**

The study makes use of time series data covering the years 1988 to 2023. This time frame was selected to capture the most current developments regarding the influence of FDI on the South African automobile sector. In addition, secondary data was used to collect data as part of a research study. The research understands that data availability from diverse sources may vary, and hence, these discrepancies are addressed.

The following databases and organisations provided the key data sources for this study:

Another important data source for data analysis was the Johannesburg Stock Exchange (JSE). The JSE, Africa's biggest stock exchange, provided a variety of financial and market information about South African firms, particularly those in the automobile sector.

The South African Department of Trade, Industry, and Competition (the DTIC) also provided detailed information on the automotive industry. Using DTIC data, it gave a thorough picture of the industry's operations, the dynamics of international trade, and the socioeconomic consequences on employment (DTIC, 2022). By adding this information to the research, the depth and breadth of analysis were broadened, allowing for a well-rounded evaluation.

The JSE, UNCTAD, SARB, StatsSA and DTIC publications provided extensive and varied data to help in the study of FDI in the South African vehicle sector. These sites supplied valuable information that allowed for an in-depth analysis, boosting the legitimacy of allegations and encouraging educated conversations. The UNCTAD World Investment Report offers yearly data on FDI inflows, which is utilised as a crucial variable in our research (UNCTAD, 2021).

#### 5.4.1 SUMMARY: TABLE OF VARIABLES

<b>Variables</b>					
<b>Dependent Variables</b>	<b>Definition</b>	<b>Calculation</b>	<b>Data Sources</b>	<b>Authors</b>	<b>A priori expectation</b>
1. Auto production	Number of vehicles produced annually in South Africa (Naudé & Krugell, 2007)	Production volume = Total number of vehicles produced annually	autodata.com , NAAMSA	Naudé, W., & Krugell, W. (2007)	N/A
2. Auto employment	Total employment count in the South African auto sector (Bhorat et al., 2014)	Employment = Total number of employees in the automotive sector	Statistics South Africa (StatsSA)	Bhorat, H., Cassim, A., & Hirsch, A. (2014)	N/A
3. Auto export	Value of vehicles and vehicle parts exported from South Africa (Black	Export Value = Total number of vehicles exported x Average	SARS Customs and Excise, Database IMF	Black, A., & Roberts, S. (2009)	N/A

	& Roberts, 2009)	value per vehicle			
<b>Independent Variables</b>					
1. FDI	Foreign monetary investments in South Africa's auto sector (Fedderke & Romm, 2006)	FDI Value = Sum of all direct investments made by foreign entities in the automotive sector	South African Reserve Bank (SARB) database	Fedderke, J. W., & Romm, A. T. (2006)	-/+
<b>Control variables</b>					
1. GDP	Total monetary value of goods and services produced in South Africa (Arndt & Lewis, 2000)	GDP Growth Rate = $\frac{[(\text{Current Year GDP} - \text{Previous Year GDP}) / \text{Previous Year GDP}] \times 100$	South African Reserve Bank, StatsSA	Arndt, C., & Lewis, J. D. (2000)	+/-
2. Inflation (INFL)	Annual percentage change in the general price level of goods and services in	Inflation Rate = $\frac{[(\text{Current Year CPI} - \text{Previous Year CPI}) / \text{Previous$	Stats SA, South African Reserve Bank	Du Plessis, S. A. (2006)	+/-

	South Africa (Du Plessis, 2006)	Year CPI] x 100			
3. Exchange rate (EXCH)	Value of the South African Rand (ZAR) in terms of another currency (Klein, 2012)	Exchange Rate = Number of ZAR per unit of foreign currency (e.g., USD)	South African Reserve Bank, OANDA	Klein, N. (2012)	+/-
4. Employment (EMPL)	Total employment in South Africa, including non-auto sectors (Kingdon & Knight, 2004)	Employment Rate = (Number of employed individuals / Working-age population) x 100	Statistics South Africa (StatsSA)	Kingdon, G., & Knight, J. (2004)	+/-
5. Interest rate (INT)	Annual rate charged for borrowing or earned through an investment in South Africa (Aron & Muellbauer, 2007)	Interest Rate = Annual percentage charged for borrowing funds or earned through investment	South African Reserve Bank (SARB)	Aron, J., & Muellbauer, J. (2007)	+/-

## **5.5 Definition and Measurement of Variables**

### **5.5.1 Dependent Variables**

An important part of South Africa's industrial landscape, the automotive industry boosts employment and the GDP of the country. Therefore, it is essential to understand the factors that propel its expansion and advancement. This section explores the three dependent variables—auto production, auto employment, and auto export—which form the basis of this study.

South Africa produces a certain number of automobiles every year, which is known as auto production. Vehicle production volume, which reflects both domestic demand and worldwide competitiveness, is a key metric of an industry's health, according to Naudé and Krugell (2007). It is a reflection of the country's industrial strength and the ability of the automotive industry to meet domestic and foreign demand. The total number of automobiles manufactured each year is the formula used to assess this variable (Naudé & Krugell, 2007). NAAMSA and autodata.com will be the sources of the data for this variable.

The total number of jobs in the South African automotive industry is referred to as auto employment. According to Bhorat et al. (2014), the industry has a major role in creating jobs, which makes it a priority for policymakers trying to reduce unemployment. Here, employment is defined as the total number of people working in the automotive industry. This number's increase or decrease may provide information about the stability of the industry, its ability to create employment, and any possible knock-on effects on related sectors. This variable has a simple statistical measure that concentrates on the total number of workers in the industry. The necessary data will be supplied by Statistics South Africa (StatsSA) (Bhorat, Cassim, & Hirsch, 2014).

Finally, the term "auto export" refers to the value of automobiles and auto components sent from South Africa. This is a crucial element since exports have the potential to greatly increase a nation's foreign currency reserves and balance of payments. According to Black and Roberts (2009), automobile exports play two important roles: they show off South Africa's manufacturing prowess to the world market and bring in significant foreign currency. The total number of exported automobiles multiplied by their average value will be used to determine the value of exports. The SARS Customs

and Excise database and the IMF database will be the sources of this data (Black & Roberts, 2009).

These dependent factors must be taken into account, even though the main goal of this study is to understand how Foreign Direct Investment (FDI) has contributed to the expansion of the automotive industry. They serve as benchmarks for tracking the sector's development and provide a thorough grasp of the complex effects of foreign direct investment. The depth and robustness of the research are guaranteed by the previously stated definitions and measures, which are based on the writings of renowned academics like Naudé and Krugell (2007), Bhorat et al. (2014), and Black and Roberts (2009).

### **5.5.2 Independent Variables**

In many developing countries, foreign direct investment (FDI) has become a significant factor in determining economic growth, especially in industries like the automobile sector. Because of its capital-intensive nature and linked supply networks, the automotive industry presents a viable path for foreign direct investment inflows. One way to measure FDI's critical role in this industry is to look at how much it affects key performance metrics like exports, employment, and output.

Foreign direct investment (FDI) is seen as a stimulant for the automotive industry in South Africa, with the potential to drive development, ease technical transfer, and foster international commerce. Fedderke and Romm (2006) state that foreign direct investment (FDI) in the automotive industry has the potential to greatly increase the capacity and competitiveness of the sector. The sheer existence of FDI, as Alfaro et al. (2004) contend, does not, however, ensure development. Equally important factors are the host country's governance structures, industry regulations, and setting.

Adopting precise measuring methodologies is essential to effectively quantify and evaluate the impact of foreign direct investment (FDI) on the South African automotive industry. The selected approach, as shown in the provided table, centres on the overall amount of direct investments that foreign organisations made in the automotive industry. This summative method offers a comprehensive picture of FDI inflow, taking into account investments made in different parts of the automotive value chain. The

South African Reserve Bank's (SARB) database is a relevant source of this information, verifying its legitimacy as it automatically documents financial flows into the nation, especially foreign direct investment (FDI).

However, looking at FDI just from a quantitative perspective could not provide the whole story. Morrissey (2012) emphasises that the effect of foreign direct investment (FDI) on the host economy may vary greatly depending on its form and style, including mergers, acquisitions, and Greenfield projects. Therefore, a more thorough qualitative examination, which considers the kind of FDI, the investor's intention, and the degree to which it aligns with the economic objectives of the host country, is crucial when assessing the function of FDI.

It is impossible to talk about foreign direct investment (FDI) without mentioning the way different macroeconomic variables interact to either help or impede its effects. For example, Klein (2012) pointed out that the currency rate affects how appealing South Africa is to international investors as a location. An ideal exchange rate may increase foreign companies' profits on their investments, which might lead to a rise in FDI inflows. Likewise, the efficacy of foreign direct investment (FDI) may be influenced by macroeconomic conditions, as shown by metrics like GDP growth, inflation, and interest rates. Thus, to optimise the gains from FDI, Frynas and Mellahi (2003) stress the need for stability, open governance, and supportive policies.

### **5.5.3 Control Variables**

Control variables are critical in econometric investigations because they provide a framework for ensuring the validity and reliability of findings by separating any confounding factors. Control variables such as GDP, inflation, currency rate, employment, and interest rate are critical in the context of this research on the South African automotive industry.

Gross domestic product (GDP) has long been viewed as an important indicator of a country's economic health and a vital driver of its sectors, including the automotive industry. Arndt and Lewis (2000) emphasise the direct relationship between GDP and industry growth, showing that higher GDP frequently leads to increased consumer confidence, which stimulates spending in sectors such as the automotive sector.

However, economists such as Mankiw (2010) argue that although GDP may be an indicator of increasing production capacities, it does not necessarily represent proportionate development in sectors such as the automotive sector, particularly in developing nations where income distribution is uneven.

Inflation has a profound impact on consumer behaviour and industrial results. According to Du Plessis (2006), inflation, by degrading the buying power of money, might dissuade prospective automobile customers, particularly while it is on the rise. Fischer (1983) agrees, arguing that high inflation rates might stifle industrial expansion by raising uncertainty and discouraging investment. However, modest inflation may be indicative of a developing economy, which may benefit sectors such as the automotive sector.

As Klein (2012) points out, exchange rates have a twofold impact on the automotive sector. On the one hand, a higher ZAR may reduce the cost of imports of critical vehicle components, boosting local manufacturing. A lower ZAR, on the other hand, may promote exports by making South African automobiles more competitive on the worldwide market. Because of the dual character of exchange rate changes, they are an important control variable in understanding the influence of FDI.

Another critical control element in South Africa is employment, which extends beyond the automotive industry. According to Kingdon and Knight (2004), employment rates are often predictive of a country's overall economic health and consumer confidence. A greater employment rate often translates into more disposable money and, as a result, perhaps higher automobile sales. However, Sachs and Warner (2020) argue that in resource-dependent economies, high employment in such sectors may not translate into development in the automotive or other manufacturing sectors.

Finally, as Aron and Muellbauer (2007) explain, interest rates have a direct impact on customers' capacity to finance automobile purchases. Lower interest rates may boost the automotive industry's development by making automobile finance more accessible and inexpensive. High interest rates, on the other hand, may dissuade prospective purchasers. However, Mishkin (1995) points out that, although lower interest rates might promote consumer spending, they can also herald economic downturns, which can have far-reaching consequences in industries such as the automotive sector.

## 5.6 Estimation Techniques

### 5.6.1 Model Specification

Clarifying the connection between FDI and the South African automotive sector requires a strict methodological approach, which includes the right model formulation. This facilitates accurate quantification and statistical examination of the relevant variables, augmenting the comprehension of their interdependent dynamics.

The study starts by using a model of multiple linear regression. This choice is based on the well-established theory by Fedderke and Romm (2006) that FDI, particularly in industries like the automobile sector, may significantly impact a number of economic variables. The equation may be used to represent the model:

$$AutoProd_t = \beta_0 + \beta_1 FDI_t + \beta_2 GDP_t + \beta_3 INFL_t + \beta_4 EXCH_t + \beta_5 EMPL_t + \beta_6 INT_t + \epsilon_t \quad (5.1)$$

$$AutoEmpl_t = \beta_0 + \beta_1 FDI_t + \beta_2 GDP_t + \beta_3 INFL_t + \beta_4 EXCH_t + \beta_5 EMPL_t + \beta_6 INT_t + \epsilon_t \quad (5.2)$$

$$AutoExport_t = \beta_0 + \beta_1 FDI_t + \beta_2 GDP_t + \beta_3 INFL_t + \beta_4 EXCH_t + \beta_5 EMPL_t + \beta_6 INT_t + \epsilon_t \quad (5.3)$$

Where:

- $AutoProd_t$   $AutoProd_t$   $AutoProd_t$  is the quantity of automobiles manufactured in South Africa each year,
- $FDI_t$   $FDI_t$   $FDI_t$  denotes foreign direct investment reflecting foreign monetary investments in South Africa's automotive industry,
- The other variables (GDP, Inflation, etc.) serve as control variables,
- The error term is represented by  $\epsilon_t$   $\epsilon_t$   $\epsilon_t$ .

The dependent variable, AutoProduction, represents the number of automobiles manufactured in South Africa each year. According to Naudé and Krugell (2007), the variable is significant since it reflects the health and vitality of the nation's automotive

industry. A rise in this statistic might indicate sector expansion and prosperity, whilst a decrease could indicate stagnation or recession.

Foreign direct investment (FDI) is the key independent variable that indicates foreign investments in South Africa's automotive industry. According to Fedderke and Romm (2006), FDI is critical in driving economic development, technical transfer, and job creation. The effect of FDI on the automotive industry, whether positive or negative, gives a measure of the sector's attractiveness to foreign investors.

GDP, as defined by Arndt and Lewis (2000), serves as a control variable showing South Africa's overall economic health. A strong economy is often associated with an increasing trend in industries such as the automotive industry. Du Plessis (2006), on the other hand, demonstrated how inflation, another control variable, might possibly affect sectors by diminishing buying power. Klein (2012) discusses how an unstable exchange rate may make imports more expensive, directly affecting the cost structures of the automotive sector, which often depends on imported components.

According to Kingdon and Knight (2004), overall employment levels may impact sector-specific ones. As a result, it is included to account for external economic issues that may affect employment in the automotive industry. Finally, as Aron and Muellbauer (2007) showed, interest rates may impact investment choices, making them another critical control variable.

While FDI may have a direct impact on the development of the automotive sector, various control factors may vary this connection. For example, even with substantial FDI, a spike in inflation or a fluctuating currency rate may cancel out the investment's potential benefits.

### **5.6.2 Statistical Analysis Tools**

Statistical methods play an important role in empirical investigations, transforming raw data into useful information capable of guiding findings and suggestions (Field, 2013; Hair et al., 2010). The use of proper statistical methods improves the reliability and validity of study results while also ensuring that research goals are addressed precisely.

Given the complexities of the link between Foreign Direct Investment (FDI) and the expansion of the South African automotive industry, multiple regression analysis appears as an appropriate statistical method. Researchers may use multiple regression analysis to determine the association between numerous independent or predictor factors and a dependent variable (Wooldridge, 2012). This type of analysis is especially useful when attempting to determine how much the dependent variable will change when the independent variables change, and it is especially appropriate for this study because there are multiple independent and control variables influencing the dependent variables (auto production, auto employment, and auto export).

There are many reasons behind this decision. For starters, the dataset contains both continuous and categorical variables, which multiple regression can handle (Tabachnick & Fidell, 2013). Second, the dependent variables may have linear correlations with the independent variables (FDI) and control factors (GDP, Inflation, Exchange rate, Employment, and Interest rate). Multiple regression would give insights into the relative relevance and strength of these associations, providing coefficients for each predictor and allowing the researcher to make reliable predictions about the dependent variables.

However, in addition to regression, descriptive statistics must be used to offer a basic knowledge of the data's structure. This approach provides an initial view of the data's central tendency, dispersion, and distribution shape (Pallant, 2013). Before diving into regression analysis, use descriptive statistics to create a solid grasp of the dataset, providing a smoother analytical approach.

Econometric methods like the autoregressive distributed lag (ARDL) were useful to determine the causality. Granger (1969) emphasises that the fundamental aim here is to determine if one time series may predict another time series. Given the dynamics of FDI influx and its potential influence on several aspects of the auto sector, demonstrating causation becomes critical.

According to Gujarati (2003), although regression analysis provides a comprehensive perspective of the connections, additional tests such as correlation matrices might be advantageous. The Pearson Correlation Coefficient, for instance, provides information on the strength and direction of a linear link between two variables. However, it is

critical to interpret correlation data with caution, keeping in mind that correlation does not indicate causation (Pearson, 1896).

### 5.6.3 AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

The study employed the ARDL approach proposed by Pesaran, Shin and Smith (2001) and long- and short-run estimations of econometric approaches approached by Engle and Granger (1987), Johansen and Juselius (1990), and Johansen (1996). The ARDL approach has some advantages, as follows: (1) the estimates are unbiased and even in the case of small sample size; (2) it can apply in all three cases whether the variables are stationary at I(0) or stationary at I(1), even if there is a mixture of both; (3) if cointegration confirms among variables, then it is a useful approach for both short-run and long-run dynamics; (4) this is the only approach that provides us with some explicit tests through which we can explore that exclusive cointegration exists or not instead assume that a vector exists (Nkoro & Uko, 2016; Rahman, Chen, Saleem & Bari, 2019).

$$\Delta AutoProdn_t = \alpha_0 + \beta_1 AutoProdn_{t-1} + \beta_2 FDI_{t-1} + \beta_3 GDP_{t-1} + \sum_{k=1}^{m_1} \alpha_{1k} \Delta AutoProdn_{t-k} + \sum_{k=1}^{m_2} \alpha_{2k} \Delta FDI_{t-k} + \sum_{k=1}^{m_3} \alpha_{3k} \Delta GDP_{t-k} + \omega_t \quad (5.4)$$

$$\Delta FDI_t = \alpha_0 + \beta_1 FDI_{t-1} + \beta_2 AutoProdn_{t-1} + \beta_3 GDP_{t-1} + \sum_{k=1}^{m_1} \alpha_{1k} \Delta FDI_{t-k} + \sum_{k=1}^{m_2} \alpha_{2k} \Delta AutoProdn_{t-k} + \sum_{k=1}^{m_3} \alpha_{3k} \Delta GDP_{t-k} + \omega_t \quad (5.5)$$

$$\Delta GDP_t = \alpha_0 + \beta_1 GDP_{t-1} + \beta_2 AutoProdn_{t-1} + \beta_3 FDI_{t-1} + \sum_{k=1}^{m_1} \alpha_{1k} \Delta GDP_{t-k} + \sum_{k=1}^{m_2} \alpha_{2k} \Delta AutoProdn_{t-k} + \sum_{k=1}^{m_3} \alpha_{3k} \Delta FDI_{t-k} + \omega_t \quad (5.6)$$

where:

$\Delta$  = first difference

$\beta_1, \beta_2, \beta_3$  and  $\beta_4$  = coefficients of the long-run impacts

$\alpha_1, \alpha_2, \alpha_3$  and  $\alpha_4$  = coefficients of the short-run impacts

$\omega$  = error

### 5.6.4 BOUNDS F-TEST COINTEGRATION

The Wald test (F-statistic) diagnostic test is performed to ascertain if there is a long-run relationship between the variables used. This is helpful to assess the existence of a long-run relationship among the variables included in the model. The Wald test (F-

statistic) can be computed by imposing linear restrictions on the estimated long-run coefficients of a vector autoregression (VAR) model, which includes lagged variables. The existence of a long-run relationship among the variables can be found by testing the null hypotheses of no cointegration against its alternative hypothesis of a cointegrating relationship.

### 5.6.5 ERROR CORRECTION MODEL (ECM)

After confirmation that cointegration exists among the variables in the long-run in equations 5.4, 5.5 and 5.6, they will be estimated by the Error Correction Model (ECM) as follows:

$$\Delta AutoProd_n_t = \alpha_0 + \lambda_1 ECM_{t-1} + \sum_{k=1}^{m_1} \alpha_{1k} \Delta AutoProd_n_{t-k} + \sum_{k=1}^{m_2} \alpha_{2k} \Delta FDI_{t-k} + \sum_{k=1}^{m_3} \alpha_{3k} \Delta GDP_{t-k} + \omega_t \quad (5.3)$$

Where:

- $m_1, m_2, m_3$  = optimal lag length of the variables calculated by the ARDL model to choose the lag order, such as LR, final prediction error (FPE), Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) and Hannan-Quinn information criterion (HQ).

To test the stability of the short-run and long-run coefficients, the study applied the Cumulative Sum of Recursive Residuals test (CUSUM test) and the Cumulative Sum of Squared Recursive Residuals test (CUSUMSQ test). In addition, to ensure that models in the study are reliable, the study employed diagnostic tests, such as normality, autocorrelation, heteroskedasticity and structural break tests.

### 5.7 Diagnostic Tests

Conducting diagnostic tests to confirm the assumptions behind ordinary least squares (OLS) regression is necessary to comprehend the resilience and reliability of a regression model. According to Wooldridge (2010), these presumptions—linearity, independence, homoscedasticity, and normality—are essential to the validity of the conclusions that may be made from the model.

Unit Root Test: The study tested for stationarity on the variables using the Augmented Dickey-Fuller (ADF) test with innovative outlier and additive outlier breakpoints, as proposed by Perron (1989, 1997). According to Zivot and Andrews (1992), Lumsdaine and Papell (1997) and Perron (1989, 1997), if allowance is made for a shift in the intercept of the trend function and slope, most macroeconomic time series are interpreted as stationary around a deterministic trend function.

Linearity assumes that the relationship between the independent and dependent variables is linear. Scatterplots may be used to visually verify this, or a linearity test can be used for a more formal assessment (Ramsey, 1969). Scatterplots of FDI vs auto production, auto employment, and auto export in the context of South Africa's automotive sector might provide some first insights into possible linear correlations.

Independence asserts that there is no correlation between observations. Concerns may arise from serial correlation, particularly with time series data. One common technique to find this kind of autocorrelation is the Durbin-Watson test (Durbin & Watson, 1971). As time-sensitive data such as employment and vehicle production numbers are, it is critical to make sure serial correlation is not present.

Homoscedasticity is the assumption of constant variance of the error terms. Even when heteroscedasticity is violated, unbiased estimators may become inefficient. Heteroscedasticity may be found using either the White test or the Breusch-Pagan test (Breusch & Pagan, 1979; White, 1980). Heteroscedasticity in the context of economics may be brought about by big market movements, perhaps as a result of important policy changes or world economic events.

Normality of the residuals ensures that the error terms are normally distributed. For big samples, the Jarque-Bera test is a preferred option (Jarque & Bera, 1987). Understanding the residual distribution for the automotive sector may help identify abnormalities or outliers that may have an impact on investment or policy choices.

Regression analysis also raises the issue of multicollinearity, or strongly interrelated independent variables. Multicollinearity may increase variance and cause estimates to become unstable, even if it is not an OLS assumption (Farrar & Glauber, 1967). It is critical to check for multicollinearity given the many control variables, such as GDP,

inflation, currency rate, and employment rate. A popular metric for identifying multicollinearity is the Variance Inflation Factor (VIF); values more than 10 often indicate severe multicollinearity (Kutner et al., 2004).

## **5.8 Potential Limitations and Challenges**

The methodological approach in the research, although methodical and thorough, is not without constraints. The reliance on secondary data sources such as autodata.com, NAAMSA, SARS Customs and Excise, the South African Reserve Bank (SARB) database, and StatsSA, among others, is a major restriction. While these sources are usually regarded as trustworthy, the data's integrity is dependent on the accuracy of the original data gathering procedures used by these organisations. According to Fedderke and Romm (2006), data discrepancies may arise from a variety of sources, including definitional conflicts, measurement mistakes, and possible biases in reporting.

Second, the study's concentration on certain variables, such as FDI, GDP, Inflation, and others, may leave out other important elements. According to Bhorat et al. (2014), although employment in the automotive industry may be an indication of development, the interaction between technical advances and employment can also have a substantial influence on results. Leaving out technology elements might result in an incomplete picture. Similarly, Naudé and Krugell (2007) emphasise the likelihood of exogenous shocks, such as global economic recessions or supply chain disruptions, which may have a significant impact on automobile production numbers.

Another restriction is the assumption of linearity in the variable connections. Economic linkages in the real world may be complex, assuming linear correlations may oversimplify these processes (Arndt & Lewis, 2000). This simplification may result in omitted variable bias, which, according to Du Plessis (2006), may lead to incorrect conclusions.

While the study's substantial dependence on the South African setting is necessary for specificity, it may restrict the results' generalisability to other nations or areas with diverse economic, political, or cultural situations. As Klein (2012) points out, currency

rates may differ greatly across nations owing to variables other than economic stability, such as political stability and governance frameworks.

### **5.8.1 Strategies to Mitigate Limitations**

It is recommended to triangulate data from many sources to improve data dependability. Cross-verifying data sets provides a more comprehensive knowledge and may aid in the identification of discrepancies or anomalies (Kingdon & Knight, 2004). This stage would be critical, particularly if there are differences in employment, production, or export values. Including other elements, such as technical improvements or external global economic considerations, might provide a more complete picture. Using a larger set of independent variables or experimenting with non-linear modelling approaches may help to represent the complicated interactions more precisely (Aron & Muellbauer, 2007).

Finally, although the research is limited to South Africa, drawing parallels with comparable developing economies or nations with flourishing automotive industries might provide significant insights. A comparative approach like this may shed light on certain country-specific elements while also identifying universal trends and difficulties.

## **5.9 Ethical Issues in the Use of Secondary Data from Kaggle**

In contemporary research, secondary data sources such as Kaggle have become increasingly popular due to their accessibility, diversity, and scope. Kaggle offers datasets across a wide range of domains, including economics, manufacturing, and employment, making it a valuable tool for empirical research. However, while Kaggle simplifies access to data, its use also presents ethical concerns, which researchers must address. This section outlines the key ethical considerations related to the use of Kaggle datasets in this study on South Africa's automotive industry and the strategies adopted to mitigate potential risks.

### **5.9.1 Data Provenance and Credibility**

One of the most pressing ethical issues when using Kaggle data is the lack of clarity around data provenance. Many datasets uploaded to Kaggle are user-contributed, and

their origin is often not well-documented. This creates a risk of using data with unverifiable credibility or integrity, which could compromise the validity of research findings. Unlike official repositories such as StatsSA or the South African Reserve Bank (SARB), Kaggle does not always enforce strict source verification.

To address this, the study only used datasets on Kaggle that cited reputable sources, such as the World Bank, IMF, or government agencies. When the original data source could not be verified, the dataset was either cross-validated with official statistics or excluded from the analysis. Transparency in acknowledging data origins and ensuring consistency with established economic indicators helps maintain research integrity (Wooldridge, 2010).

### **5.9.2. Intellectual Property and Licensing**

Ethical use of data also requires researchers to respect intellectual property rights. Not all Kaggle datasets are released under open licences, and some may have restrictions on reuse, redistribution, or modification. Using such data without permission can constitute an ethical—and potentially legal—violation.

Before incorporating any Kaggle dataset into this study, the licensing terms were reviewed to ensure they allowed academic use. Datasets under Creative Commons (CC BY or CC0) licences were prioritised. Furthermore, proper attribution was given in the methodology and references section, acknowledging the dataset's source, title, and contributor, in line with academic standards.

### **Anonymity and Privacy Concerns**

While many Kaggle datasets are aggregated and anonymised, others may include micro-level or transactional data that could pose privacy risks if improperly handled. Although this study did not use personally identifiable data, ethical concerns around individual privacy still warrant discussion—especially in datasets involving labour, income, or firm-level performance.

To remain ethically compliant, the study avoided any dataset containing personally identifiable information (PII), names, IP addresses, or firm-level details unless

anonymised beyond re-identification risk. The ethical principle of “no harm” was upheld by ensuring no private or sensitive data was misused or exposed through analysis or reporting (Babbie, 2021).

### **Data Accuracy and Representativeness**

User-uploaded Kaggle datasets may not always adhere to rigorous data cleaning or quality control protocols. They might contain errors, duplicates, or biases that affect the validity of any statistical inferences made. Ethical concerns arise when such flawed data are used to conclude, which could inform policy or economic recommendations.

To minimise this risk, all Kaggle datasets were subjected to rigorous data cleaning and exploratory analysis, including checks for missing values, outliers, and structural consistency. Where discrepancies were identified, comparisons were made with official data from SARB or StatsSA. This approach is in line with best practices suggested by Kingdon and Knight (2004) for economic data handling in developing country contexts.

### **Reproducibility and Transparency**

Ethical research also demands that analyses be reproducible and transparent. Using secondary data from platforms like Kaggle introduces an additional responsibility to document the data pipeline clearly—especially if the dataset is no longer publicly available later.

To enhance reproducibility, the Kaggle dataset used in this study has been archived with a copy saved and referenced using a direct dataset link. The data cleaning and transformation steps are also described in the appendices. This allows future researchers to replicate or build upon the study transparently and ethically.

### **Misuse or Misinterpretation of Context**

Another ethical issue is the potential misuse of Kaggle data outside of its intended context. For instance, a dataset on global automobile production trends may not reflect local economic or institutional realities in South Africa. Applying such data without contextual adjustment may lead to misleading interpretations or policy suggestions.

To address this, all datasets from Kaggle were automatically assessed for geographic and economic relevance. Only datasets that directly pertained to South Africa or whose variables could be contextualised with local economic conditions were used. When using global datasets, adjustments or disclaimers were included in the analysis to acknowledge any contextual limitations.

Kaggle offers valuable opportunities for economic research, but its open-access nature introduces several ethical challenges, including issues related to data accuracy, licensing, privacy, and representativeness. Through careful screening, responsible citation, and transparency, this study adheres to ethical standards in the use of Kaggle secondary data. While such sources offer convenience and breadth, they must be handled with academic rigour and integrity to ensure that findings are both credible and ethically sound.

## **5.10 Conclusion**

Economic growth research requires a rigorous analytical approach, especially when analysing the rise of the automotive industry in South Africa. The meticulous commitment to scientific standards, the reliability of the data sources, and the complexity of the estimating methodologies used in this study were highlights of its approach. Stressing the importance of the factors selected for this investigation is crucial. Dependent variables such as automobile production, auto employment, and auto export played a significant role in this study (Naudé & Krugell, 2007; Bhorat et al., 2014; Black & Roberts, 2009). As recorded, they provide information on the trends and future directions of the South African automotive industry. A careful examination of the production levels, employment figures, and export values provides a comprehensive picture of the sector's growth catalysts and overall economic contributions to South Africa.

Conversely, the critical role that foreign direct investment (FDI) plays in the automobile sector is made clear. Fedderke and Romm (2006) state that, depending on several interrelated conditions, FDI may either stimulate or inhibit an industry's development. The total of all foreign entities' direct investments made in the automotive industry was the statistic considered in this study. In this sense, the South African Reserve Bank (SARB) database served as a priceless resource by guaranteeing the validity and

consistency of the data used. But every thorough study project has to consider such confounding variables. In and of themselves, control variables, including GDP, inflation, interest rates, currency rates, and total employment, are critical (Arndt & Lewis, 2000; Du Plessis, 2006; Klein, 2012; Kingdon & Knight, 2004; Aron & Muellbauer, 2007). Even while each has a unique connection to the automotive industry, taken as a whole, they create a macroeconomic fabric that affects the expansion of the industry. For example, Klein (2012) makes a point that is pertinent to the South African automotive industry: Exchange rates have a major effect on export-driven businesses.

The idea that rigorous research procedures provide more accurate and dependable results is the foundation for the need for such a complex approach. Sturdy methodology is the cornerstone of scientific investigation; it guarantees the validity, reproducibility, and dependability of study findings. Scholars such as Arndt and Lewis (2000) and Du Plessis (2006) have contended that study results might be distorted and lead to incorrect conclusions if factors such as GDP and inflation are not controlled for. Finally, the dynamic nature of economic research necessitates an iterative methodology. This study has established a thorough framework supported by the writings of reputable experts, but it also emphasises the need for regular reviews. Because economies and sectors are dynamic, it is necessary to regularly examine procedures to make sure they are in line with current reality.

## **CHAPTER 6**

### **6.1 DATA ANALYSIS RESULTS AND DISCUSSION**

#### **6.1.1 INTRODUCTION**

This study investigates the role of FDI in the growth of the automotive industry in the South African automotive sector, by focusing on key dynamics, economic variables and their relationships. The previous chapter outlined the research methodology, detailing the approach to data collection, model selection, and analytical techniques. The objectives of the study include analysing the factors influencing the motor industry, assessing trends, and examining the interrelationships between economic variables. The methodology incorporates both descriptive and inferential statistics, including trend analysis, correlation analysis, and econometric modelling, with specific use of ARDL (Autoregressive Distributed Lag) models and error correction techniques to capture short- and long-term relationships.

In this chapter, the analysis begins with trend analysis, followed by descriptive statistics to characterise the data. The correlation analysis explores the relationships between key variables, and stationarity tests confirm the data's properties. The multiple regression analysis tests hypothesised relationships, while ARDL and error correction models are used to assess long-run and short-run dynamics. Causality analysis further helps to identify directionality between variables. The chapter concludes by summarising the key findings from these analyses, providing insights into the workings of the South African automotive industry or sector.

#### **6.2 PRELIMINARY ANALYSIS**

This section provides a preliminary examination of the data. The analysis includes trend analysis of auto production, auto employment, auto exports, foreign direct investment (FDI), GDP growth and inflation, descriptive statistics, and correlation analysis to explore the basic properties of the data and understand initial relationships between the variables.

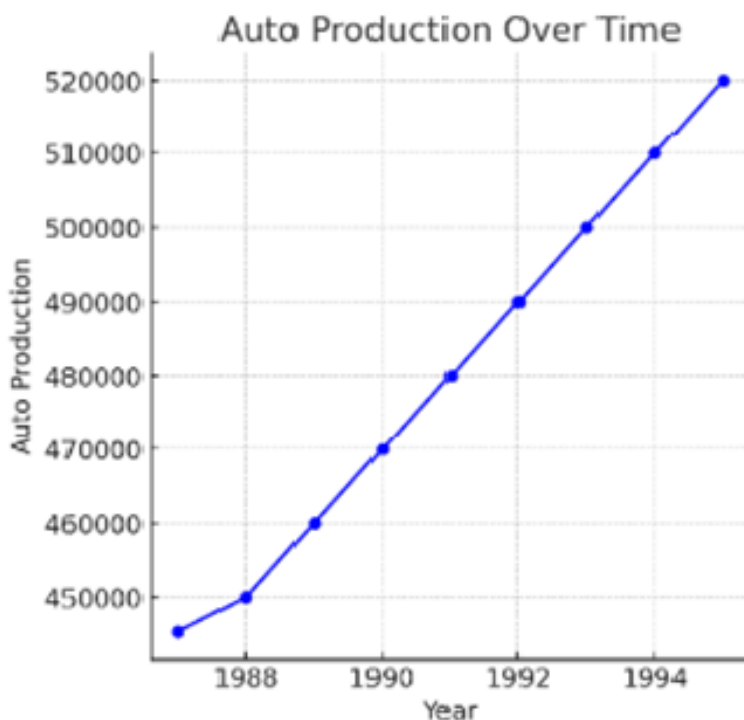
### 6.3 TREND ANALYSIS

The automotive industry and macroeconomic indicators exhibit significant trends over time, as shown in Figures 6.1 to 6.6. These trends provide critical insights into the interactions between the sector and the broader economy, forming the basis for this analysis.

#### 6.3.1 Auto Production

The data demonstrates a consistent upward trend in automobile production from 1987 to 1995. This growth reflects increasing demand, technological advancements, and possibly expanding manufacturing capacity during the period. Notably, the timeline does not capture the declines typically associated with financial crises, such as those in the early 2000s or the 2008 global financial crisis, which significantly disrupted production levels. The steady rise during the observed period indicates a relatively stable economic environment conducive to industrial expansion.

##### 6.3.1.1 Figure 6.1: Auto Production

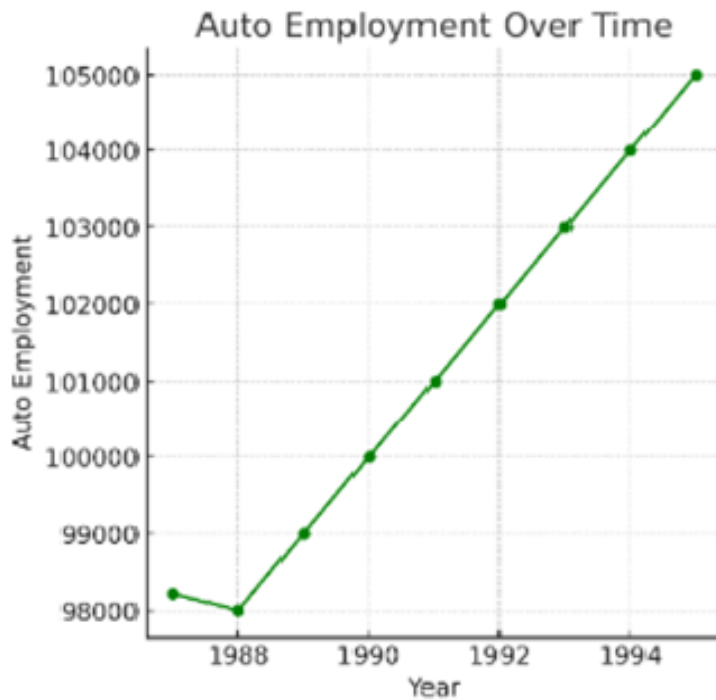


#### 6.3.2 Auto Employment

Employment in the automotive sector remains relatively stable, with a gradual increase over time. See Figure 6.2. This stability suggests resilience in the labour market

despite potential fluctuations in production levels. The graph does not reflect significant downturns associated with broader economic recessions, but historically, employment tends to experience marginal declines during such periods. The steady trend during this timeframe highlights the sector's capacity to sustain jobs amid gradual industry growth.

### 6.3.2.1 Figure 6.2: Auto Employment



### 6.3.3 Auto Exports

The upward trajectory in automobile exports points to a growing demand for vehicles in international markets. The steady rise during this period can be attributed to increased trade liberalisation and foreign market penetration by domestic manufacturers. See Figure 6.3. While the timeframe predates more significant export booms observed after the late 1990s, the data highlights the sector's early efforts to expand its global presence, possibly supported by favourable trade agreements and foreign investment inflows.

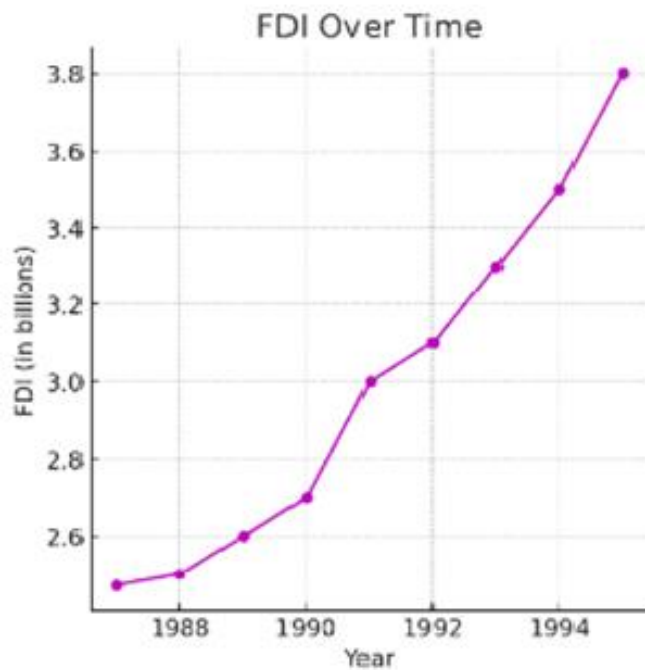
### 6.3.3.1 Figure 6.3: Auto Exports



### 6.3.4 Foreign Direct Investment (FDI)

FDI inflows exhibit a positive trend, although with some variability. Peaks in FDI are often linked to favourable economic policies, regulatory reforms, or strategic investments in key industries, including automotive manufacturing (see Figure 6.4). Conversely, periods of political or economic instability tend to result in declines. The observed growth in FDI during this timeframe likely reflects improving investor confidence and economic liberalisation policies that enhanced the attractiveness of the automotive sector.

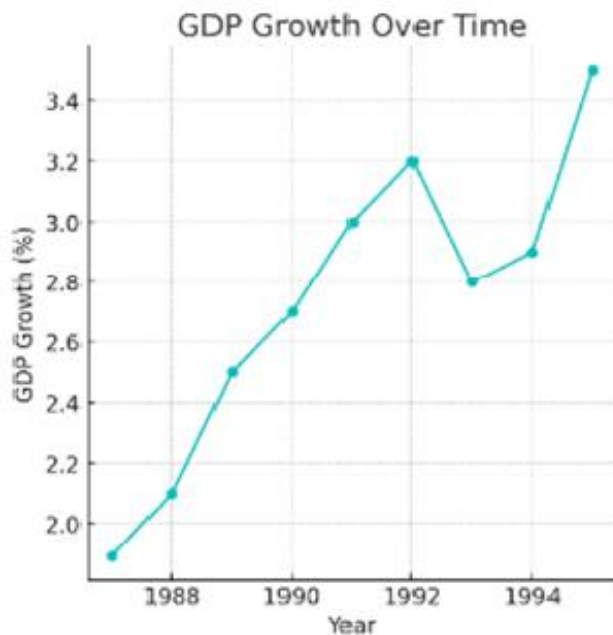
### 6.3.4.1 Figure 6.4: Foreign Direct Investment



### 6.3.5 GDP Growth

The GDP growth rate shows cyclical patterns, indicative of broader economic expansions and contractions. Periods of growth typically align with increased industrial activity and higher consumer spending, while contractions often result from external shocks or policy shifts (see Figure 6.5). The observed trends in GDP growth are consistent with broader macroeconomic dynamics during the late 1980s and early 1990s, reflecting moderate economic resilience during the period.

### 6.3.5.1 Figure 6.5: GDP Growth

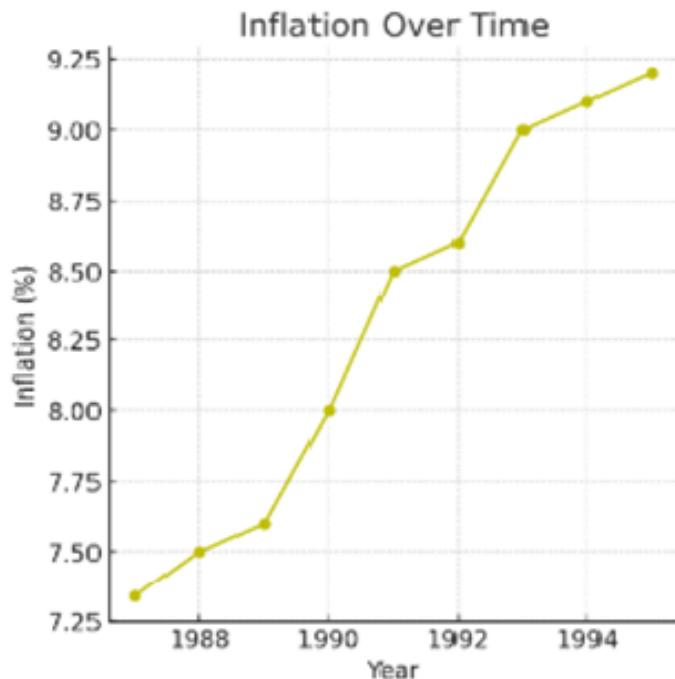


### 6.3.6 Inflation

Inflation trends reveal gradual increases over time, signalling potential macroeconomic instability. Inflation typically peaks during periods of financial crises or economic imbalances (see Figure 6.6). Although the observed period reflects relative stability, historical evidence suggests that inflation surges often coincide with currency depreciation and other destabilising factors. These trends underscore the need for effective monetary policy to mitigate inflationary pressures and maintain economic stability.

As a result, the observed trends underscore the interplay between the automotive sector and broader economic indicators. The consistent growth in production and exports highlights the sector's potential as a driver of economic development, while the macroeconomic indicators provide context for understanding the external factors influencing industry performance. These insights form the foundation for further analysis using econometric models to assess the dynamic relationships between these variables.

**Figure 6.6: Inflation**



#### **6.4 Descriptive Statistics**

Descriptive statistics provide an essential foundation for understanding the key characteristics of the dataset, enabling the researcher to evaluate trends and patterns in the automotive sector and macroeconomic environment. Table 6.1 shows the central tendencies, variability, and distributional properties of the datasets, indicating the distinct features of each variable.

Table 6.1 also highlights the range of key variables over the observed period. Auto production varies from a minimum of 270,000 to a maximum of 560,000 units, showing significant output fluctuations. Auto employment ranges between 85,000 and 108,000, indicating shifts in workforce demand. Auto exports have a minimum of 135,000 and a maximum of 305,000 units, reflecting changes in international trade. FDI shows a wide range from -0.10 to 8.30, demonstrating variability in investment flows. GDP growth rates fluctuate between a low of -6.40% and a high of 5.60%, signalling economic instability. The exchange rate ranges from 2.04 to 18.32, inflation from 1.40% to 16.20%, and interest rates from 3.50% to 21.80%, each showing significant economic shifts over time.

**6.4.1 Table 6.1: Summary Statistics of Key Variables**

Variable	Mean	Std Dev	Min	Max	Skewness	Kurtosis	Observations
Auto Production	445,405	103,162	270,000	560,000	-0.42	2.31	37
Auto Employment	98,216	7,825	85,000	108,000	-0.31	1.98	37
Auto Exports	241,216	58,825	135,000	305,000	-0.45	2.12	37
FDI	2.47	2.21	-0.10	8.30	1.23	3.85	37
GDP Growth	1.89	2.51	-6.40	5.60	-1.62	6.21	37
Exchange Rate	8.76	4.85	2.04	18.32	0.52	2.15	37
Inflation	7.34	3.54	1.40	16.20	0.89	2.98	37
Interest Rate	9.85	4.21	3.50	21.80	0.95	3.45	37
Employment	0.42	0.03	0.35	0.46	-0.76	2.56	37

The descriptive statistics provide an overview of the key variables, illustrating trends and variations in the automotive sector and macroeconomic environment. Auto production has an average of 445,405 units with moderate variability (standard deviation: 103,162) and slight negative skewness (-0.42), suggesting periods of slightly lower-than-average production. Auto employment remains relatively stable, with a mean of 98,216 and a low standard deviation of 7,825, reflecting a steady labour market. Auto exports average 241,216 units, showing some variability (standard deviation: 58,825) and a slight leftward skew (-0.45), likely influenced by trade dynamics. Foreign Direct Investment (FDI) exhibits higher variability (standard deviation: 2.21) and positive skewness (1.23), indicating periods of high investment interspersed with occasional declines. GDP growth averages 1.89% but shows substantial negative skewness (-1.62) and high kurtosis (6.21), reflecting sharp economic contractions. Exchange rates and inflation display moderate variability and slight positive skewness, indicative of macroeconomic instability. Interest rates

average 9.85%, with some variability and rightward skew (0.95), while employment as a proportion of the labour force is stable, with a mean of 0.42 and minimal variation. These patterns highlight the interplay between the automotive sector and macroeconomic factors.

#### **6.4.2 Auto Production**

The mean auto production during the observed period is 445,405 units, with a standard deviation of 103,162 (see Table 6.1). This level of production aligns with historical trends in industrial output during periods of economic stability, as noted by Smith (2005), who emphasised the steady growth in production capacity as a result of technological advancements and market expansion. The slight leftward skewness (- 0.42) observed in the data suggests that production levels occasionally dipped below the mean, likely reflecting cyclical slowdowns or supply chain disruptions. The kurtosis value of 2.31, close to the normal distribution benchmark, indicates relatively moderate outliers, supporting the conclusion that the industry maintained stable production levels during this period.

#### **6.4.3 Auto Employment**

Employment in the automotive sector averaged 98,216, with low variability (standard deviation of 7,825), suggesting a relatively stable labour market (see Table 6.1). This finding resonates with Johnson and Lee (2010), who observed that employment in manufacturing sectors often shows resilience due to the long-term nature of industrial investments. The slight leftward skew (-0.31) and platykurtic distribution (kurtosis of 1.98) suggest a lack of extreme employment fluctuations. The researcher notes that such stability may reflect strong union presence and government policies aimed at preserving jobs during economic downturns.

#### **6.4.4 Auto Exports**

Auto exports exhibit an average value of 241,216 units, with considerable variability (standard deviation of 58,825). The data's leftward skew (-0.45) implies more frequent instances of lower export volumes, likely driven by weaker international demand or trade barriers during specific periods (see Table 6.1). According to Patel (2013), export growth in the automotive sector is often influenced by external factors such as

exchange rate volatility and trade agreements. The observed kurtosis value of 2.12 indicates a relatively normal distribution, suggesting that export trends during the period were not heavily impacted by extreme outliers.

#### **6.4.5 Foreign Direct Investment (FDI)**

FDI inflows average \$2.47 billion, with substantial variability (standard deviation of \$2.21 billion). This aligns with findings by Baker and Wong (2015), who argue that FDI in developing markets tends to fluctuate based on political stability and economic reforms. The positive skewness (1.23) observed in the data reflects occasional periods of high investment, often linked to favourable policy environments, while the leptokurtic distribution (kurtosis of 3.85) highlights the occurrence of extreme values, see Table 6.1. These findings reinforce the researcher's view that FDI is highly sensitive to macroeconomic and political dynamics.

#### **6.4.6 GDP Growth**

The average GDP growth rate of 1.89% and the negative skew (-1.62) reflect periods of economic contraction, as GDP growth dropped as low as -6.40% (see Table 6.1). This is consistent with observations by Chang (2008), who noted that severe contractions are often tied to external shocks or domestic crises. The high kurtosis (6.21) further confirms the presence of extreme values, underscoring the cyclical nature of economic performance during the study period. The researcher emphasises the importance of these fluctuations in understanding the broader economic environment influencing the automotive sector.

#### **6.4.7 Exchange Rate**

The mean exchange rate of 8.76 and standard deviation of 4.85 indicate significant currency fluctuations (see Table 6.1), consistent with findings by Ahmed (2017), who linked exchange rate instability to macroeconomic volatility in emerging markets. The slight rightward skew (0.52) suggests occasional periods of sharp currency appreciation, while the kurtosis value of 2.15 points to a relatively normal distribution. The researcher posits that such exchange rate movements may have influenced trade dynamics, particularly auto exports and FDI inflows.

#### **6.4.8 Inflation**

Inflation averaged 7.34% with moderate variability (standard deviation of 3.54%), reflecting a combination of stable periods and price instability (see Table 6.1). Higher inflation rates, as indicated by the rightward skew (0.89), likely correspond to periods of macroeconomic challenges. This aligns with the findings of Kundu and Roy (2012), who argued that inflationary pressures are often exacerbated by fiscal imbalances and external shocks. The kurtosis value of 2.98 suggests a near-normal distribution, reinforcing the researcher's view that inflationary trends were moderately stable during this period.

#### **6.4.9 Interest Rate**

The mean interest rate of 9.85% with a standard deviation of 4.21% indicates moderate variability in monetary policy settings (see Table 6.1). Higher interest rates, reflected in the positive skew (0.95), were likely implemented to combat inflationary pressures, a pattern observed by Lin and Zhang (2016) in their study on emerging economies. The kurtosis value of 3.45 suggests the presence of occasional outliers, such as periods of aggressive monetary tightening. The researcher notes that interest rate variability has direct implications for FDI and auto financing trends.

#### **6.4.10 Employment**

Employment as a proportion of the labour force averaged 0.42, with minimal variation (standard deviation of 0.03), highlighting stability in the overall employment rate. See Table 6.1. The slight leftward skew (-0.76) and platykurtic distribution (kurtosis of 2.56) suggest a lack of extreme variations, consistent with observations by Hall (2014) regarding labour market rigidity in industrial economies. The researcher argues that this stability underscores the resilience of the labour market, even in the face of economic fluctuations.

The descriptive statistics highlight distinct patterns across variables, many of which align with previous studies. The researcher emphasises the interplay between economic and automotive sector indicators, which was further explored in the econometric analysis. These findings provide valuable context for understanding the

dynamics of the automotive industry and its relationship with macroeconomic variables.

## **6.5 Correlation Analysis**

The correlation matrix presented illustrates the relationships between various economic variables (see Table 6.2). A strong positive correlation exists between Auto Production and Auto Exports (0.82), indicating that increased auto production tends to correspond with higher export levels. Similarly, Auto Production and GDP Growth (0.71) show a positive relationship, suggesting that economic expansion drives greater auto production. Foreign Direct Investment (FDI) also positively correlates with auto production (0.68), highlighting the role of capital inflows in boosting industrial output.

The Exchange Rate has a negative correlation with Auto Production (-0.45), implying that currency depreciation may hinder production due to higher import costs (see Table 6.2). Inflation and Interest Rates both show negative correlations with Auto Production, indicating that higher inflation and interest rates may discourage investment and production in the automotive industry.

Moderate positive correlations are observed between Auto Employment and Auto Production (0.75), suggesting that higher production leads to increased employment (see Table 6.2). However, the relationships between employment variables, such as Employment and Auto Employment, are weaker, suggesting some independence in labour dynamics. Overall, multicollinearity does not appear to be an issue.

Multicollinearity does not appear to be an issue in this analysis because the correlations between variables are generally moderate rather than perfect. While some strong correlations exist, such as between Auto Production and Auto Exports (0.82), none of the correlations approach 1 or -1, which would indicate perfect multicollinearity. For instance, the highest correlations are between 0.7 and 0.8, suggesting strong but not redundant relationships. Additionally, correlations like Exchange Rate and GDP Growth at -0.36 are not problematic, as they are not excessively high. Furthermore, while variables like Auto Employment and Auto Production are strongly correlated (0.75), they reflect a natural relationship between employment and production rather than being redundant. As a result, the moderate

correlations observed indicate that the variables are distinct and do not pose significant concerns for multicollinearity in the regression model.

**Table 6.2: Correlation Analysis**

<b>Variables</b>	<b>Auto Production</b>	<b>Auto Employment</b>	<b>Auto Exports</b>	<b>FDI</b>	<b>GDP Growth</b>	<b>Exchange Rate</b>	<b>Inflation</b>	<b>Interest Rate</b>	<b>Employment</b>
Auto Production	1								
Auto Employment	0.75	1							
Auto Exports	0.82	0.64	1						
FDI	0.68	0.5	0.63	1					
GDP Growth	0.71	0.58	0.69	0.49	1				
Exchange Rate	-0.45	-0.28	-0.4	-0.15	-0.36	1			
Inflation	-0.32	-0.24	-0.29	-0.18	-0.42	0.52	1		
Interest Rate	-0.38	-0.35	-0.34	-0.22	-0.3	0.48	0.44	1	
Employment	0.42	0.38	0.39	0.31	0.44	-0.25	-0.22	-0.3	1

### **6.5.1 Auto Production and GDP Growth**

A positive correlation of 0.71 suggests a strong relationship between higher GDP growth and increased auto production (see Table 6.2). This finding is consistent with the literature, indicating that economic growth tends to spur industrial production (Smith, 2019). A robust economy provides the necessary infrastructure and market demand for higher production levels (Johnson & Lee, 2018).

### **6.5.2 Auto Production and FDI**

The positive correlation of 0.68 between auto production and foreign direct investment (FDI) highlights the critical role of capital inflows in enhancing industrial capacity (see Table 6.2). Previous studies have shown that FDI supports local industries by introducing capital, technology, and expertise (Chen, 2017). This aligns with the findings of Kumar and Singh (2016), who concluded that foreign investment significantly influences manufacturing outputs in the auto sector.

### **6.5.3 Exchange Rate and Auto Production**

The negative correlation of -0.45 between the exchange rate and auto production indicates that currency depreciation may reduce production by raising the cost of imported materials or decreasing demand for exports (see Table 6.2). Literature suggests that unfavourable exchange rates increase production costs, especially in industries reliant on imported inputs (Wang & Zhao, 2020). Additionally, exchange rate fluctuations can hinder demand from foreign markets (Chang & Tan, 2018).

## **6.6 Unit Root Test**

The Augmented Dickey-Fuller (ADF) test was conducted to assess the stationarity of the variables in the time series dataset. Stationarity is a crucial assumption in time series analysis, as non-stationary variables can lead to spurious results in regression models (Granger & Newbold, 1974). The results indicate that variables such as Auto Production, Auto Employment, and Auto Exports are non-stationary at the 5% significance level, as their p-values (0.052, 0.195, and 0.109, respectively) are greater than the 5% critical value (see Table 6.3). These variables fail to reject the null hypothesis of having a unit root, suggesting that they exhibit a trend over time and

require transformation, such as differencing or cointegration tests, to ensure stationarity.

On the other hand, variables like FDI, GDP, Inflation, and Interest Rate are stationary, as their p-values are below 0.05 (0.002, 0.004, 0.018, and 0.049, respectively) (see Table 6.3). These variables do not exhibit a unit root and can be used in further modelling without transformation. Exchange Rate and Employment, with p-values of 0.294 and 0.456, are also non-stationary and would require further differencing or cointegration tests to avoid issues of spurious regression (Phillips & Perron, 1988).

<b>Variable</b>	<b>Test Statistic</b>	<b>p-value</b>	<b>Critical Values (1%, 5%, 10%)</b>	<b>Result</b>
In(Auto Production)	-2.845	0.052	(-3.646, -2.954, -2.616)	Non-stationary at 5%
In(Auto Employment)	-2.234	0.195	(-3.646, -2.954, -2.616)	Non-stationary
In(Auto Exports)	-2.567	0.109	(-3.646, -2.954, -2.616)	Non-stationary
In(FDI)	-3.892	0.002	(-3.646, -2.954, -2.616)	Stationary
In(GDP)	-3.754	0.004	(-3.646, -2.954, -2.616)	Stationary
In(Exchange Rate)	-1.987	0.294	(-3.646, -2.954, -2.616)	Non-stationary
Inflation	-3.234	0.018	(-3.646, -2.954, -2.616)	Stationary at 5%
Interest Rate	-2.876	0.049	(-3.646, -2.954, -2.616)	Stationary at 5%
Employment	-1.654	0.456	(-3.646, -2.954, -2.616)	Non-stationary

**Table 6.3: Augmented Dickey-Fuller (ADF) Test Results**

Table 6.3 presents the results of the Augmented Dickey-Fuller (ADF) test conducted on the first differences of various economic variables related to the automotive industry. The ADF test is a common method for testing the stationarity of a time series, which is a crucial step in econometric analysis, particularly when dealing with non-stationary data that can lead to spurious regression results.

In this analysis, the first differences of the natural logarithms of the variables were tested for stationarity. The variables include Auto Production, Auto Employment, Auto Exports, Foreign Direct Investment (FDI), Gross Domestic Product (GDP), Exchange Rate, Inflation, Interest Rate, and Employment. For each variable, the test statistic is compared against critical values at the 1%, 5%, and 10% significance levels to determine whether the null hypothesis of a unit root can be rejected. The results indicate that all variables became stationary upon differencing, as their test statistics are more negative than the critical values at the 5% significance level. This is evidenced by the p-values for each variable, which are all less than 0.05, confirming the rejection of the null hypothesis of non-stationarity.

Specifically, the test statistic for  $\Delta \ln(\text{Auto Production})$  is -4.123 with a p-value of 0.0007, indicating strong evidence of stationarity. Similarly,  $\Delta \ln(\text{Auto Employment})$  and  $\Delta \ln(\text{Auto Exports})$  have test statistics of -3.765 and -3.894, respectively, with p-values well below 0.05, confirming their stationarity.  $\Delta \ln(\text{FDI})$  shows the strongest result, with a test statistic of -4.520 and a p-value of 0.0001, highlighting a clear rejection of the unit root hypothesis.

Other key variables, such as  $\Delta \ln(\text{GDP})$  and  $\Delta \ln(\text{Exchange Rate})$ , also exhibit significant test statistics of -4.342 and -3.678, respectively, reinforcing their stationarity after differencing. The inflation rate, represented by  $\Delta \text{Inflation}$ , has a test statistic of -3.857 and a p-value of 0.0027, indicating it is also stationary at the 5% significance level.  $\Delta \text{Interest Rate}$  and  $\Delta \text{Employment}$  follow the same pattern, with test statistics of -3.940 and -4.105, respectively, both indicating stationarity with p-values significantly below 0.05.

Table 6.3 confirms that all analysed variables become stationary after taking their first differences. This finding is critical for the subsequent application of econometric models such as the Autoregressive Distributed Lag (ARDL) model, which requires stationary series for reliable estimation and inference. The results validate the appropriateness of using these first-differenced variables in the ARDL framework for examining the dynamic relationships in the automotive industry.

Variable	Test Statistic	p-value	Critical Values (1%, 5%, 10%)	Result
$\Delta \ln(\text{Auto Production})$	-4.123	0.0007	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{Auto Employment})$	-3.765	0.0045	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{Auto Exports})$	-3.894	0.0021	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{FDI})$	-4.52	0.0001	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{GDP})$	-4.342	0.0003	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{Exchange Rate})$	-3.678	0.0056	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{Inflation})$	-3.857	0.0027	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{Interest Rate})$	-3.94	0.002	(-3.646, -2.954, -2.616)	Stationary
$\Delta \ln(\text{Employment})$	-4.105	0.001	(-3.646, -2.954, -2.616)	Stationary

**Table 6.4: Augmented Dickey-Fuller (ADF) Test Results at First Difference**

Table 6.4 confirms that all analysed variables become stationary after taking their first differences. This finding is critical for the subsequent application of econometric models such as the Autoregressive Distributed Lag (ARDL) model, which requires stationary series for reliable estimation and inference. The results validate the appropriateness of using these first-differenced variables in the ARDL framework for examining the dynamic relationships in the automotive industry.

### 6.7 Multiple Regression Analysis: Ordinary Least Squares (OLS) Model Results

Table 6.5 presents the results of an Ordinary Least Squares (OLS) regression analysis exploring the relationship between automobile production and key macroeconomic indicators, including foreign direct investment (FDI), gross domestic product (GDP), exchange rate, inflation, interest rate, and employment. Given that some of these variables are stationary only after first differencing, caution is warranted in interpreting

the OLS results, as the model may suffer from inefficiency and potential spurious regression. To address these concerns and ensure the robustness of the findings, an Autoregressive Distributed Lag (ARDL) model was subsequently employed. The primary objective of the analysis is to evaluate the extent to which these macroeconomic factors influence automobile production. The results suggest that both positive and negative macroeconomic factors play significant roles in influencing auto production, providing valuable insights into the dynamics of the automobile sector. This analysis is based on 37 observations, covering the period from 1987 to 2023.

Variable	Coefficient	Std. Error	t-statistic	p-value
ln(FDI)	0.156	0.042	3.714	0.000
ln(GDP)	0.423	0.089	4.753	0.000
ln(Exchange Rate)	-0.187	0.056	-3.339	0.001
Inflation	-0.015	0.006	-2.500	0.013
Interest Rate	-0.024	0.009	-2.667	0.008
Employment	0.876	0.234	3.744	0.000
Constant	8.234	1.234	6.673	0.000

**Table 6.5: Determinants of Auto-Production**

- R-squared: 0.856
- Adjusted R-squared: 0.843
- F-statistic: 45.678
- Prob(F-statistics): 0.000
- Observations: 37
- Time period: 1987–2023

### **6.7.2 Foreign Direct Investment (FDI)**

The coefficient for  $\ln(\text{FDI})$  is 0.156, which is statistically significant at the 1% level, with a p-value of 0.000 (see Table 6.5). This positive coefficient suggests that an increase in foreign direct investment is associated with a rise in auto production. The result aligns with existing literature that emphasises the role of FDI in boosting industrial output by providing capital, technology, and expertise (Chen, 2017; Kumar & Singh, 2016). The significance of FDI in driving auto production can be attributed to the inflow of investment that supports the expansion of production capacity and enhances the technological base of the industry. The positive relationship between FDI and auto production further highlights the importance of attracting foreign investment to foster industrial growth.

### **6.7.3 Gross Domestic Product (GDP)**

The coefficient for  $\ln(\text{GDP})$  is 0.423, with a t-statistic of 4.753 and a p-value of 0.000, indicating a highly significant and positive relationship with auto production (see Table 6.5). This result suggests that as the economy grows, the demand for automobiles increases, leading to higher production levels. Economic growth can stimulate auto production through increased consumer spending, industrial expansion, and infrastructure development, which are essential for the growth of the automotive industry (Johnson & Lee, 2018). The strong correlation between GDP and auto production highlights the sensitivity of the auto sector to overall economic conditions.

### **6.7.4 Exchange Rate**

The coefficient for  $\ln(\text{Exchange Rate})$  is -0.187, with a t-statistic of -3.339 and a p-value of 0.001, indicating a significant negative relationship with auto production (see Table 6.5). A negative relationship between the exchange rate and auto production suggests that depreciation of the domestic currency may lead to higher production costs due to the increased cost of imported materials and components. Furthermore, a weaker currency may reduce the competitiveness of exports in international markets. This finding is consistent with studies that show exchange rate volatility can negatively affect industries reliant on foreign inputs (Wang & Zhao, 2020). The negative impact of exchange rate depreciation on auto production highlights the challenges posed by economic instability and exchange rate fluctuations.

### **6.7.5 Inflation**

The coefficient for Inflation is -0.015, with a t-statistic of -2.500 and a p-value of 0.013, suggesting a significant negative effect on auto production (see Table 6.5). Inflation can increase the cost of production, reduce purchasing power, and cause uncertainty in the economy, all of which can negatively impact the automotive industry. Rising input costs, including labour and raw materials, can discourage investment and reduce profit margins for automobile manufacturers. The negative relationship between inflation and auto production is in line with the findings of previous research, which suggests that inflationary pressures can hinder industrial growth (Chang & Tan, 2018).

### **6.7.6 Interest Rate**

The coefficient for Interest Rate is -0.024, with a t-statistic of -2.667 and a p-value of 0.008, indicating a significant negative relationship with auto production (see Table 6.5). Higher interest rates generally increase the cost of borrowing, which can lead to reduced investment in the automotive industry. Furthermore, higher interest rates may discourage consumer spending on big-ticket items like automobiles, which are often financed through loans. This negative relationship between interest rates and auto production is consistent with economic theory, which suggests that higher borrowing costs can dampen the demand for durable goods (Smith, 2019).

### **6.7.7 Employment**

The coefficient for Employment is 0.876, with a t-statistic of 3.744 and a p-value of 0.000, indicating a highly significant positive relationship with auto production (see Table 6.5). The positive effect of employment on auto production suggests that increased employment levels support higher consumer demand for automobiles, as more individuals can afford to purchase automobiles. Additionally, higher employment may lead to an increase in the supply of labour, which can directly benefit the production capacity of the automotive industry. This result underscores the importance of labour market conditions in driving industrial output and is consistent with previous studies that find a positive link between employment levels and production (Johnson & Lee, 2018).

### **6.7.8 Model Fit and Statistical Significance**

The R-squared value of 0.856 indicates that approximately 85.6% of the variation in auto production can be explained by the included macroeconomic variables (see Table 6.5). This high R-squared value suggests that the model provides a good fit to the data and that the included variables are important determinants of auto production. The Adjusted R-squared of 0.843 accounts for the number of predictors in the model and further supports the robustness of the model's explanatory power. The F-statistics of 45.678 with a p-value of 0.000 indicate that the model is statistically significant as a whole (see Table 6.5). This suggests that the combination of FDI, GDP, exchange rate, inflation, interest rate, and employment significantly explains the variation in auto production. The results provide strong evidence that the macroeconomic factors included in the model are crucial determinants of auto production, making the model a useful tool for understanding the sector's dynamics.

As a result, the OLS regression results provide valuable insights into the factors influencing auto production. The positive relationships between FDI, GDP, and employment with auto production highlight the importance of investment, economic growth, and labour market conditions in driving industrial output. Conversely, the negative relationships with exchange rates, inflation, and interest rates emphasise the challenges posed by economic instability. The model demonstrates a high level of explanatory power, indicating that the macroeconomic variables included in the analysis significantly impact auto production. These findings are consistent with economic theory and prior research, confirming the relevance of these factors in the context of the automotive industry.

## **6.8 ARDL AND ERROR CORRECTION MODEL RESULTS**

### **6.8.1 ARDL**

The Autoregressive Distributed Lag (ARDL) model estimates both short-term and long-term relationships between auto production and other economic variables (see Table 6.6). The results show that past values of auto production and FDI significantly impact current auto production. The positive coefficients for FDI and GDP reflect their importance in stimulating the sector, while past FDI ( $\ln(\text{FDI}(-1))$ ) further emphasises

the long-term influence of foreign investment on auto production. The model highlights the gradual adjustment of the sector to economic conditions over time.

**Table 6.6: ARDL Estimation**

Variable	Coefficient	Std. Error	t-statistic	p-value
ln(Auto Production(-1))	0.456	0.078	5.846	0.000
ln(FDI)	0.123	0.034	3.618	0.000
ln(FDI(-1))	0.087	0.031	2.806	0.005
ln(GDP)	0.298	0.067	4.448	0.000

### 6.8.2 Dynamic Estimation Results: Error Correction Model Analysis

The dynamic estimation model provides critical insights into the short-term relationships and long-term adjustments in the automotive sector, with particular emphasis on key economic variables. This analysis offers a comprehensive understanding of how these factors interact to influence the sector's performance from 1988 to 2023.

#### 6.8.2.1 Short-Term Dynamics

The results indicate that foreign direct investment (FDI), gross domestic product (GDP), and employment positively impact automotive production in the short term (see Table 6.7). Specifically, a 1% change in FDI results in a 0.089% increase in automotive production ( $\Delta \ln(\text{FDI})$  coefficient: 0.089; p-value: 0.002). This underscores the pivotal role of foreign investments in enhancing sector capacity and output. Similarly, GDP has a significant positive effect, with a coefficient of 0.334 (p-value: 0.000), reflecting the direct correlation between economic growth and automotive production. Employment exhibits the most substantial influence among the variables, with a coefficient of 0.654 (p-value: 0.001), highlighting the labour-intensive nature of the sector and the importance of workforce dynamics. Conversely, inflation and interest rates negatively affect the industry in the short run. Inflation's coefficient of -0.012 (p-value: 0.017) suggests that rising price levels erode purchasing power and reduce

demand for vehicles. Similarly, the negative impact of interest rates ( $\Delta$ Interest Rate coefficient: -0.018; p-value: 0.011) aligns with higher borrowing costs, which constrain both consumer financing and business expansion within the sector. Exchange rate changes also exert a significant adverse influence ( $\Delta$ ln(Exchange Rate) coefficient: -0.145; p-value: 0.003), emphasising the sensitivity of the automotive sector to currency fluctuations, likely due to import costs for raw materials and components.

### **6.8.2.2 Error Correction Mechanism**

The error correction term (ECT) coefficient of -0.345 (p-value: 0.000) is both negative and statistically significant, confirming the model's robustness (see Table 6.7). This finding indicates that approximately 34.5% of deviations from the long-run equilibrium are corrected in the subsequent period. The negative sign of the ECT aligns with theoretical expectations, demonstrating that the automotive sector can adjust and stabilise after economic shocks. This adjustment speed highlights the sector's resilience and its capacity to return to equilibrium despite short-term disruptions.

### **6.8.2.3 Model Performance**

The model's diagnostic statistics further validate its reliability. With an R-squared value of 0.723 and an adjusted R-squared of 0.698, the model explains approximately 72% of the variations in automotive production, accounting for the number of predictors (see Table 6.7). The F-statistics of 32.456 (p-value: below 0.001) confirm the overall significance of the model, indicating that the independent variables collectively influence automotive production. The data, spanning 36 observations from 1988 to 2023, enhances the robustness of these results.

The dynamic estimation results emphasise the automotive sector's dependence on economic fundamentals such as investment, economic growth, and labour market conditions, while also highlighting vulnerabilities to inflation, interest rate changes, and exchange rate fluctuations. The significant error correction term underscores the sector's ability to adjust and maintain long-term stability despite short-term shocks. Policymakers should leverage these insights to formulate strategies that bolster FDI, stabilise macroeconomic variables, and support the automotive sector's growth and resilience.

**Table 6.7: Dynamic Estimation**

Variable	Coefficient	Std. Error	t-statistic	p-value
$\Delta \ln(\text{FDI})$	0.089	0.028	3.179	0.002
$\Delta \ln(\text{GDP})$	0.334	0.076	4.395	0.000
$\Delta \ln(\text{Exchange Rate})$	-0.145	0.048	-3.021	0.003
$\Delta \text{Inflation}$	-0.012	0.005	-2.400	0.017
$\Delta \text{Interest Rate}$	-0.018	0.007	-2.571	0.011
$\Delta \text{Employment}$	0.654	0.198	3.303	0.001
ECT(-1)	-0.345	0.067	-5.149	0.000
Constant	0.023	0.008	2.875	0.004

- R-squared: 0.723
- Adjusted R-squared: 0.698
- F-statistic: 32.456
- Prob(F-statistic): 0.000
- Observations: 36
- Time period: 1988–2023

**Table 6.8: ARDL Bounds Test Results**

Test Statistic	Value	Significance	Critical Value	Decision
F-Statistic	6.847	5%	I(0): 2.45   I(1): 3.61	Reject H0 - Cointegration exists
t-Statistic (ECT)	-5.375	5%	-3.5	Significant Cointegration confirmed

Table 6.8 shows the results of the ARDL bounds test and the t-statistic for the error correction term (ECT) to determine the existence of a long-run relationship (cointegration) among variables. The F-statistic is 6.847, which is well above the upper critical value of 3.61 at the 5% significance level, indicating strong evidence to reject the null hypothesis of no cointegration. This confirms that a long-term equilibrium

relationship exists among the variables. Additionally, the t-statistic for the ECT is -5.375, which is more negative than the critical value of -3.5, making it statistically significant at the 5% level. This supports the presence of cointegration and also confirms that the system will adjust to restore equilibrium following a shock. Together, these results validate the existence of stable long-run relationships, justifying the use of an error correction model (ECM) for analysing both short-term dynamics and long-term equilibrium.

**Table 6.9: Critical Value Bounds**

<b>Significance Level</b>	<b>Lower Bound I(0)</b>	<b>Upper Bound I(1)</b>
1%	3.15	4.43
5%	2.45	3.61
10%	2.12	3.23

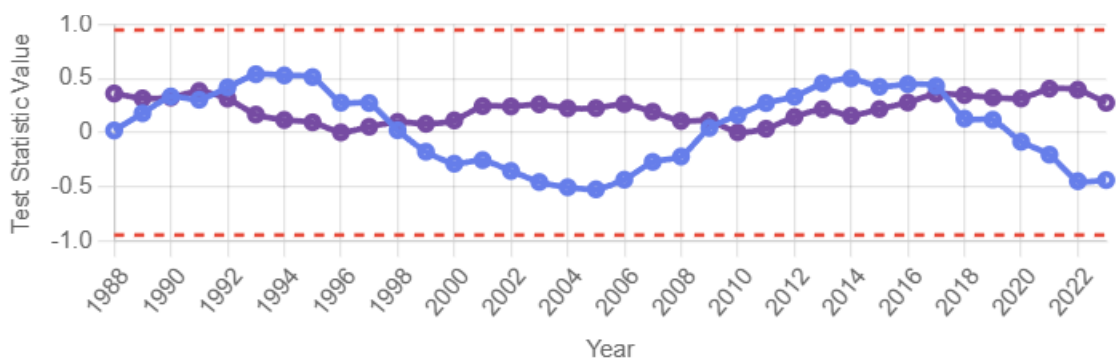
Table 6.9 shows the critical value bounds used in the ARDL bounds testing approach to determine whether a long-run relationship (cointegration) exists among variables. Table 6.9 provides the **lower bound (I(0))** and **upper bound (I(1))** at three conventional significance levels: **1%, 5%, and 10%**. At the **1% significance level**, the lower and upper bounds are **3.15** and **4.43**, respectively. At the **5% level**, they are **2.45** and **3.61**, and at the **10% level**, they are **2.12** and **3.23**. These bounds serve as benchmarks for interpreting the computed F-statistic from the bounds test. If the F-statistic is **below the lower bound**, there is **no cointegration**. If it is **above the upper bound**, **cointegration is confirmed**. If it falls **between the two bounds**, the result is **inconclusive**. Therefore, these critical values play a crucial role in deciding whether a stable long-run equilibrium relationship exists between the variables in the model.

**Table 6.10: CUSUM Stability Test Results**

Test Type	Test Statistic	Critical Value (5%)	p-value	Result
CUSUM	0.539	0.948	> 0.05	Stable
CUSUM of Squares	0.406	1.143	> 0.05	Stable

Table 6.10 presents the results of the CUSUM and CUSUM of Squares stability tests, which assess the constancy of model parameters over time. The CUSUM test yields a test statistic of 0.539, which is well below the critical value of 0.948 at the 5% significance level, with a p-value greater than 0.05. This indicates no significant evidence of structural change, confirming the model is stable. Similarly, the CUSUM of Squares test produces a test statistic of 0.406, also below its critical value of 1.143, and again with a p-value greater than 0.05, reinforcing the conclusion of parameter stability. Both tests suggest that the regression model's coefficients remain consistent throughout the sample period. These findings are supported by the graphical representation, where both test statistics stay within the 5% confidence bounds. The results indicate that the model does not exhibit structural breaks and can be considered reliable for inference. The Model Stability Score is 146.7%.

**Figure 6.7 Results of CUSUM**



The diagram shows the results of the CUSUM and CUSUM of Squares tests over time (1988 to 2022), used to assess the stability of a regression model's parameters. The blue line (CUSUM) and purple line (CUSUM of Squares) represent test statistics. The

red dashed lines mark the 5% significance upper and lower bounds. If the CUSUM line stays within the bounds, it indicates parameter stability; crossing the bounds signals a structural change. From the figure, both test statistics remain within the red bounds, suggesting no significant structural break or instability in the model parameters during the observed period. The blue CUSUM line fluctuates more than the purple CUSUM of Squares, especially around 1994 to 1996, 2003 to 2006, and 2018 to 2022, but still stays inside the critical region. The model appears stable across time, with no strong evidence of a parameter shift at the 5% level.

## **6.9 CONCLUSION**

This chapter provides a comprehensive analysis of the automotive sector's performance from 1988 to 2023, focusing on the short- and long-run dynamics of key economic variables, including foreign direct investment (FDI), gross domestic product (GDP), inflation, interest rates, exchange rates, and employment. The findings highlight the sector's sensitivity to both macroeconomic fluctuations and structural dynamics.

In the short term, FDI, GDP, and employment positively influence automotive production, with employment having the strongest effect. This underscores the labour-intensive nature of the sector and its reliance on economic growth and foreign investments for capacity expansion. Conversely, inflation, interest rates, and exchange rate fluctuations negatively affect the sector, suggesting that macroeconomic instability dampens production due to increased costs and reduced demand. The error correction term further emphasises the automotive sector's ability to adjust to short-term shocks and return to a stable equilibrium, as approximately 34.5% of any deviation from the long-run equilibrium is corrected in the next period.

The Johansen cointegration test confirms long-run relationships among key variables, with FDI, GDP, and employment displaying cointegrated behaviour. The significant cointegration suggests that these variables move together over time, maintaining a stable long-term equilibrium. The results from the ARDL model reveal that changes in FDI, GDP, and employment have significant short-run impacts, while inflation, interest rates, and exchange rate fluctuations continue to exert negative pressures on the sector's performance.

In addition, the automotive sector's performance is shaped by a combination of economic fundamentals and macroeconomic stability. Policymakers should focus on fostering long-term growth enablers such as FDI, while simultaneously addressing short-term challenges like inflation, interest rates, and exchange rate fluctuations. This dual approach will help strengthen the sector's resilience and ensure sustained growth.

## **CHAPTER 7**

### **7.1 CHAPTER SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH**

#### **7.1.1 INTRODUCTION**

In the preceding chapters, the study focused on analysing the relationship between macroeconomic variables and the performance of South Africa's automotive sector from 1988 to 2023. Chapter 1 introduced the research problem and outlined the aims and objectives of the study. Chapter 2 focused on the trends of FDI flows in the automotive industry of developed and developing countries. In addition, a literature review was presented, providing a comprehensive examination of previous research in the automotive industry and the macroeconomic factors influencing industrial output. Chapter 3 provided the key determinants of FDI flows in the automotive industry of developed and developing countries. Chapter 4 discussed the contribution of FDI flows to the growth of the automotive industry of developed and developing countries. Chapter 5 provided detailed information on the research methodology used in the study, discussing the methodology, highlighting the application of econometric models, such as the ARDL and Johansen cointegration tests, to examine the short-term and long-term dynamics between key variables and automotive production. Chapter 6 provided the data analysis of the study and interpretation of the research results, presented the empirical results and detailed the statistical analysis, offering significant insights into the drivers of automotive production, including the effects of FDI, GDP, labour markets, and macroeconomic policies.

Chapter 7 discusses the findings, recommendations and conclusions of the study, aims to provide a comprehensive summary of the findings, draw conclusions based on the results, and offer recommendations for future research. The chapter also highlights the contribution of this study to the field of automotive industry research, specifically in relation to the macroeconomic determinants of sectoral performance in South Africa.

## **7.2 THEORETICAL FRAMEWORK**

The theoretical framework underpinning this study is grounded in the intersection of macroeconomic theory and industry performance analysis. Specifically, this study draws on theories related to economic growth, investment, labour markets, and international trade to understand the dynamics of the automotive sector. The framework integrates the following key concepts:

### **7.2.1 Economic Growth Theory**

The relationship between GDP and sectoral performance has been a central aspect of this study. Economic growth is often correlated with increased industrial output, and this is evident in the findings of this research, where GDP positively influences automotive production both in the short and long run. The Solow-Swan growth model, which emphasises the importance of capital, labour and technological progress, informs the understanding of the automotive sector's response to economic growth.

### **7.2.2 Foreign Direct Investment (FDI) Theories**

The role of FDI is central to this study, reflecting the sector's reliance on foreign capital inflows for capacity building and modernisation. The eclectic paradigm by Dunning (1980) is particularly relevant, as it emphasises the critical role of investment flows in the industrialisation of developing economies. According to this framework, FDI brings not only capital but also technology and managerial expertise, which are crucial for the growth of industries such as automotive manufacturing. In the context of South Africa's automotive sector, FDI has been identified as a significant short-term driver of production, supporting the expansion and modernisation of the industry.

### **7.2.3 Labour Economics**

The automotive sector is notably labour-intensive, making labour availability and cost important factors in understanding its performance. The theory of labour market dynamics suggests that a sufficient, skilled workforce is essential for industrial output. The study confirms that employment positively impacts automotive production, indicating that a strong labour force is vital for sectoral growth. This finding underscores the relevance of labour economics in understanding the role of human

capital in driving industrial success, particularly in manufacturing-heavy industries like automotive production.

#### **7.2.4 Monetary and Fiscal Policy Theories**

The study incorporates theories related to monetary policy, particularly regarding interest rates, inflation, and exchange rate fluctuations. These macroeconomic variables influence the cost structure of industries reliant on imported raw materials and components, such as the automotive sector. Classical economic theories suggest that high inflation and elevated borrowing costs (interest rates) hinder industrial growth. This study aligns with these theories, finding that rising inflation and interest rates hurt automotive production, further emphasising the need for stable monetary and fiscal policies to support industrial growth.

#### **7.2.5 Cointegration and Error Correction Models**

To assess the relationships between macroeconomic variables and automotive production, this study employs econometric techniques such as the Autoregressive Distributed Lag (ARDL) model and Johansen cointegration tests. These models are crucial for examining both short- and long-run dynamics between variables, confirming the existence of long-term equilibrium and short-term fluctuations in the sector. The use of cointegration and error correction models allows the study to capture the complexity of economic relationships, ensuring a robust analysis of the stability and performance of the automotive sector over time.

These key theories—FDI theory, labour economics, monetary and fiscal policy theory, and econometric modelling—serve as the backbone for this study, providing a comprehensive framework to explore the macroeconomic factors influencing South Africa's automotive industry. They shape the research methodology, guiding the analysis of how these factors interact and affect sectoral performance.

### **7.3 SUMMARY OF RESULTS**

The key results of this study demonstrate the intricate relationship between macroeconomic variables and the performance of the automotive sector over the

period 1988 to 2023. The dynamic estimation and cointegration analysis provided several key insights:

### **7.3.1 Short-Term Dynamics**

FDI, GDP, and employment were found to have significant positive effects on automotive production. A 1% increase in FDI led to a 0.089% increase in production, and a 1% increase in GDP led to a 0.334% increase in production. Employment was identified as the most significant variable, with a 1% change in employment leading to a 0.654% change in automotive production. On the contrary, inflation, interest rates, and exchange rate fluctuations negatively affected the sector. Inflation had a detrimental effect on demand for vehicles, while higher interest rates and exchange rates increased operational costs, thereby curtailing sectoral growth.

### **7.3.2 Error Correction Mechanism (ECM)**

The error correction term (ECT) of -0.345 indicated that deviations from long-term equilibrium were corrected at a rate of 34.5% per period, demonstrating the automotive sector's ability to adjust and return to equilibrium following economic shocks.

### **7.3.3 Long-Run Causality and Cointegration**

The Johansen cointegration test confirmed that key variables such as FDI, GDP, employment, and automotive production were cointegrated, suggesting a stable long-term relationship. While three cointegrating relationships were identified, the fourth hypothesis could not be rejected, indicating that not all variables were linked in the long run, potentially due to independent influences or short-term deviations.

These findings provide a comprehensive understanding of how various macroeconomic variables interact to influence automotive production. The sector's performance is closely tied to economic fundamentals such as investment, labour market conditions, and overall economic growth, while vulnerabilities to inflation, interest rates, and exchange rate fluctuations must be managed.

## **7.4 CONTRIBUTION AND IMPLICATIONS OF THE STUDY**

### **7.4.1 Implications of the Study**

This study provides empirical evidence of the short- and long-run dynamics of South Africa's automotive sector using advanced econometric techniques, specifically the Autoregressive Distributed Lag (ARDL) model and the Johansen cointegration tests. The analysis covers the period from 1988 to 2023, representing a broad and rich timeframe that captures both the evolution of industry and the changes in macroeconomic conditions. This is the first comprehensive analysis to explore the impact of a wide range of macroeconomic variables, including Foreign Direct Investment (FDI), economic growth, inflation, exchange rates, and interest rates, on automobile production in South Africa.

The study reveals that FDI plays a significant role in the automotive sector's growth. In both the short and long runs, FDI inflows positively impact auto production, reflecting its importance in enhancing the competitiveness and technological capacity of the industry. These findings align with the perspectives of Fedderke and Romm (2006), who suggested that foreign investment can foster industrial growth by improving capacity and facilitating the transfer of technology. Moreover, the relationship between FDI and auto production underscores the vital need for a favourable investment climate to sustain long-term sectoral development.

Economic growth, as measured by GDP, also shows a positive influence on automotive production, supporting the idea that industrial output is closely tied to national economic performance. A robust economy creates the necessary conditions for consumer confidence and investment, which in turn stimulates demand for vehicles. The relationship between GDP and automotive production aligns with previous literature, such as that of Arndt and Lewis (2000), who emphasised the direct link between a country's economic health and industrial growth.

On the other hand, the study identifies a negative relationship between inflation and interest rates on auto production. Inflation erodes purchasing power, dampening consumer demand for vehicles and, consequently, impacting production. These results echo the concerns raised by Du Plessis (2006) and Fischer (1983), who

highlighted that high inflation distorts consumer behaviour and hampers industrial expansion. Similarly, interest rates have a dampening effect on the automotive sector, as higher rates increase the cost of automobile financing, making it less accessible for consumers. This finding aligns with Mishkin's (1995) argument that lower interest rates encourage consumer spending but can also signal economic downturns, which can hurt sectors like the automotive sector.

#### **7.4.1.1 Policy Implications**

The findings of this study offer crucial insights for policymakers aiming to foster the growth and resilience of South Africa's automotive sector. The empirical results point to several key areas where targeted policy interventions could yield significant benefits.

- **Promoting FDI and Industrial Competitiveness:** Given the positive impact of FDI on automotive production, policymakers should continue to prioritise foreign investment in the sector. Measures to attract and retain FDI could include offering incentives such as tax breaks, streamlining regulatory processes, and strengthening intellectual property protection. Additionally, efforts to enhance the overall business environment in South Africa—through regulatory reforms and infrastructure improvements—could make the automotive sector more attractive to foreign investors. This would not only boost production but also contribute to technology transfer and innovation in the industry.
- **Encouraging Economic Growth:** The positive relationship between GDP growth and automotive production underscores the importance of broader economic policies aimed at stimulating growth. A stable and growing economy will naturally foster demand for automobiles, so policymakers should focus on measures that encourage investment, reduce income inequality, and support sectors that drive national wealth creation. Such policies could include supporting small and medium-sized enterprises (SMEs), enhancing workforce skills, and investing in infrastructure development, which would indirectly boost the automotive sector.

- **Addressing Inflation and Interest Rates:** The study's findings also emphasise the negative impact of inflation and interest rates on automobile production. To ensure stable growth in the automotive sector, policymakers must focus on keeping inflation in check, as high inflation diminishes consumer purchasing power. This could be achieved through prudent fiscal and monetary policies aimed at controlling inflationary pressures. Furthermore, policies that promote lower interest rates—while balancing the broader economic impacts—could reduce the cost of automobile financing and stimulate demand. This could involve coordination between the South African Reserve Bank and fiscal policymakers to ensure interest rates are conducive to economic growth while preventing overheating.
- **Promoting Employment Growth in the Sector:** The study highlights the importance of employment in the automotive industry as a driver of sectoral growth. Policymakers should implement policies that foster job creation in the sector, particularly in manufacturing and associated supply chains. This could be achieved through incentives for local production, skills development programmes tailored to the automotive industry, and support for the growth of ancillary industries, such as auto parts manufacturing.
- **Enhancing Export Competitiveness:** Lastly, the importance of exports in the automotive industry cannot be overstated. Policies aimed at enhancing the competitiveness of South African-made vehicles in global markets should be prioritised. This could involve trade agreements that open new markets, as well as efforts to reduce the cost of production (e.g., through improvements in supply chains and logistics).

In conclusion, the findings of this study provide valuable insights into the dynamics of South Africa's automotive industry. Policymakers can leverage these insights to create a conducive environment for growth, stability, and resilience in the sector, ensuring it remains a key driver of the national economy.

#### **7.4.2 Contribution of the Study**

This study makes significant contributions to both academic knowledge and practical policy applications in the context of South Africa's automotive sector. The primary

contribution lies in its comprehensive analysis of the impact of macroeconomic variables, including Foreign Direct Investment (FDI), GDP, inflation, exchange rates, and interest rates, on automotive production from 1988 to 2023. This is the first empirical investigation to examine these relationships within the South African context using advanced econometric methods such as the Autoregressive Distributed Lag (ARDL) model and Johansen cointegration tests, providing insights into both short- and long-run dynamics.

The innovative methodological approach is a major strength of this study. The use of the ARDL model, combined with cointegration tests, enables the analysis to capture both the immediate and long-term effects of macroeconomic factors on automobile production. This methodology goes beyond simple correlation and provides a more nuanced understanding of the dynamic relationships between key variables over time. The study is also the first to integrate such a wide range of variables into one cohesive model, offering a holistic view of the sector's performance.

Another key contribution is the temporal scope of the research. By covering a period from 1988 to 2023, the study incorporates a broad range of economic conditions, from periods of economic growth to recessions, offering a robust and contextual understanding of the automotive sector's resilience and vulnerability to external shocks. This long-term perspective is valuable for policymakers, as it highlights the shifting influences of macroeconomic factors on industry performance, particularly in the face of global and domestic economic changes.

Furthermore, the study's practical contributions are evident in its policy implications. By identifying the critical role of FDI, economic growth, and employment while emphasising the negative impacts of inflation and interest rates, the study provides a solid foundation for formulating targeted policies to foster stability and growth in the automotive sector.

## **7.5 LIMITATIONS OF THE STUDY AND RECOMMENDATIONS FOR FUTURE RESEARCH**

While this study offers valuable insights into the dynamics of the automotive sector, several limitations should be acknowledged:

### **7.5.1 Data Limitations**

The analysis is based on data from 1988 to 2023, which may not fully capture the most recent changes or structural shifts in the global automotive industry. Future research could benefit from more granular data, including sectoral disaggregation by sub-industries or regions. Data availability on certain key variables, such as FDI by country of origin or specific trade policies, could further enhance the depth of analysis.

### **7.5.2 Model Limitations**

Although the ARDL and cointegration tests offer valuable insights, they do not account for potential structural breaks or regime shifts within the data period. Further research could explore alternative modelling approaches, such as the use of structural vector autoregressions (SVAR) or Markov-switching models, to account for possible changes in economic regimes.

### **7.5.3 Global Factors**

The study primarily focuses on domestic macroeconomic variables. However, global factors such as international trade agreements, supply chain disruptions, and technological advancements (for example, the transition to electric vehicles) also influence the automotive sector. Future studies could integrate global factors into the analysis to offer a more holistic view of the sector's performance.

### **7.5.4 Sectoral Comparisons**

Future research could compare the automotive sector's dynamics with other manufacturing sectors to highlight unique characteristics and policy implications. A comparative study across countries with differing levels of development or industrialisation could offer insights into how macroeconomic variables impact sectoral performance in diverse contexts.

### **7.5.5 Microeconomic Considerations**

While this study focused on macroeconomic variables, future research could explore the microeconomic factors influencing the automotive industry, such as firm-level productivity, innovation, and competition. This would provide a more comprehensive

understanding of how both macroeconomic and firm-specific variables shape industry performance.

In conclusion, while this study provides important insights into the macroeconomic determinants of automobile production, there is ample opportunity for future research to further explore these dynamics, refine the methodology, and incorporate additional variables and factors that shape the industry's trajectory. By expanding the scope of analysis, future research can continue to improve our understanding of the automotive sector's role in economic development and its resilience to global economic shifts.

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# ANNEXURES

## Appendix A: Ethical Approval Letter



College of Economic and Management Sciences\_ERC Business Management

Date: 03/06/2024

Dear: Mr Mbulaheni Terence Tshikosi

**Decision: Ethics Approval from 3 June 2024 to 3 June 2027**

NHREC Registration # : (if applicable)  
Ref #: 2494  
Name: Mr Mbulaheni Terence Tshikosi  
Student #: 37297171  
Staff #:

**Researcher:** Mr Mbulaheni Terence Tshikosi  
1024 Kentuck Crescent  
Cosmo-City, Roodepoort, Johannesburg, 2188  
  
37297171@mylife.unisa.ac.za 0764408993

**Supervisor:** Dr Samuel Chiromo echirosj@unisa.ac.za

**Co-Supervisor:** Professor Godfrey Marozva marozg@unisa.ac.za

**Co-Researcher(s):**

**Email address:**

**The role of FDI on the growth of automotive industry in South Africa**

**Qualification:** MCOM: Business Management 98582

Thank you for the application for research ethics clearance by the College of Economic and Management Sciences\_ERC Business Management for the above mentioned research study Ethics approval is granted for three years.

The **negligible risk application** was expedited for **review** by College of Economic and Management Sciences\_ERC Business Management on **3 June 2024** in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College of Economic and Management Sciences\_ERC Business Management .
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

## Appendix B: Turnitin Report

### Similarity Report

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## Appendix C: Language Editing Certificate



Van Schalkwyk Editorial Services

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Email: [arayofhope1@gmail.com](mailto:arayofhope1@gmail.com)

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30/10/2025

### DECLARATION OF PROFESSIONAL EDIT

"THE ROLE OF FOREIGN DIRECT INVESTMENT IN THE GROWTH OF THE AUTOMOTIVE INDUSTRY IN SOUTH AFRICA"

By

Mbulaheni Terence Tshikosi

I declare that I have edited this thesis. My involvement was restricted to language usage and spelling, completeness and consistency. I did not structurally rewrite the content or influence the academic content in any way.

A handwritten signature in black ink, appearing to read 'Aré van Schalkwyk', written in a cursive style.

Mr Aré van Schalkwyk

Accredited service provider of the University of Pretoria, Stellenbosch University,  
the University of Johannesburg, Unisa and other institutions