



University of Fort Hare

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**DOES PUBLIC SECTOR EMPLOYMENT CROWD OUT PRIVATE SECTOREMPLOYMENT?
THE CASE OF SOUTH AFRICA**

MASTER OF COMMERCE

IN

ECONOMICS

NDUMISO GWEBU (200601240)

UNIVERSITY OF FORT HARE

**FACULTY OF MANAGEMENT AND COMMERCE DEPARTMENT OF ECONOMICS
SOUTH AFRICA**

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ABSTRACT

The main objective of the study is to establish whether public sector employment crowds out private sector employment in South Africa. Time series data for the period from 2000Q1 to 2022Q4 was utilised in the analysis. The Autoregressive Distributed Lag Model cointegration technique was employed to evaluate the long-term relationships and short run dynamic interactions among the variables. The data's time series properties were examined using the Phillips Perron and Augmented Dickey Fuller unit root tests. The results revealed that public sector employment has a positive effect on private sector employment in South Africa. The results imply that public sector employment complements private sector employment in South Africa. The results also revealed that trade openness, centralised collective bargaining, hiring and firing regulations, and unemployment have a negative effect on private sector employment. Conversely, GDP growth and labour market regulations have a positive effect on private sector employment in South Africa. The results imply that public sector employment does not crowd out private sector employment in South Africa. This result contributes to the ongoing discussion of whether changes in the public employment level is a practical tool for promoting private sector employment. Policies should be guided towards cautiously increasing government expenditure towards government programmes, which would contribute towards an increase in public sector employment leading to a multiplier effect on private sector employment.

Keywords: Private Sector, Public Sector, Crowd out, Crowd in, Employment, South Africa, Unemployment

JEL Classification: H0, J0

On originality of work

I, Ndumiso H Gwebu, hereby declare that this dissertation is of my own original work and each and every resource that was used was acknowledged through the use of complete referencing of sources in reference list. This dissertation has not been submitted before to any university or academic institution for an award or degree purposes.

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Acknowledgements

I am grateful to my supervisor, Prof. Forget Mingiri Kapingura for the supervision and assistance in preparing this dissertation. My appreciation also goes to my family, my wife and three children, for allowing me to undertake such a task. I indeed thank God for letting me be part of their lives. Lastly, I would like to thank the Mpumalanga Provincial Legislature for the financial support provided.

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CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1. Introduction and Background

The Nexus between public and private employment has long been debated over the years (Aldan 2021; Nalban and Smadu 2020; Auricchio, Ciani, Dalmazzo, & De Blasio 2017). On the available studies, Auricchio et al. (2017) state that policy responses to low private employment may include increasing public employment. Private employment may also respond to public employment at the same time. The public sector's output of goods and services could encourage improved facilities or an atmosphere that is more business-friendly, which would increase demand for privately made goods. Conversely, because governmental employment can increase production costs by raising the local cost of limited resources and/or reduce the labour supply available to the private sector, it may displace employment in the private sector (crowd out effect) (Auricchio et al 2017).

Algan, Cahuc & Zylberberg (2002) find that public employment may not only crowd out private employment, but also increase overall unemployment if, by offering attractive working conditions, it draws additional individuals into the labour force. They suggest that the crowding out effect of public jobs on private jobs is only significant in countries where public production is highly substitutable to private activities and the public sector offers more attractive wages and/or other benefits than the private labour market.

Nalban and Smadu (2020) also assert that work in the public and private sectors can complement each other. Consistent with the prior reasons, there will be a great deal of interest in public sector employment when the public sector offers higher pay potential. There will be a rise in disposable income as a result of the expansion in public sector employment, which will result in an increase in consumption of goods and services which are produced by the private sector. The increase in the consumption would also result in the public firms hiring more employees as they expand their capacity. However, Nalban and Smadu (2020) argue that the degree to which public and private goods are substitutes or compliments does play a role in terms of the employment levels between the two sectors. In the event that the publicly and privately produced goods are substitutes, private companies will hire fewer workers and the private sector employment will be reduced as individuals prefer the more secure public sector employment. In the event that they are complementary, consumers would mix sectoral goods in a way that balances them out, increasing the need for jobs in

the private sector. It is therefore argued that the relative strength of the channels discussed does determine the response of macroeconomic variables within the economy, suggesting that *a priori*, the relationship is ambiguous.

The private sector does play a very important role in the economy and has been regarded as one of the engines of growth. Several studies such as Nalban and Smadu (2020); Auricchio, Ciani, Dalmazzo, & De Blasio (2017) have indicated that countries which have become successful, much of their progress has emanated from the private sector. In essence, the private sector does contribute to the domestic economy through the production of goods and services, generate tax revenue for the state and do contribute greatly to research and development which is a very important factor in the development discourse.

This is important for a country such as South Africa given that the country has high levels of unemployment and as of December 2023 about 900 companies closed operations. The employment rate in South Africa is expressed as the proportion of the working age population that is employed. A Trade and Industrial Policy Strategies (TIPS) research in 2020 stated that about 25% of all formal jobs come from the public sector. In the second quarter of 2023, South Africa's employment rate rose to 40.12% from 39.88% in the first quarter. From 2000 to 2023, South Africa's employment rate averaged 42.28%. It peaked at 46.1% in the fourth quarter of 2008 and fell to a record low of 35.93% in the third quarter of 2021. (Statssa, 2023). This suggests that from 16.3 million in the second quarter of 2023 to 16.7 million in the third quarter of 2023, there were only 399 000 more employed people. In addition, the TIPS (2020) report shows that even though total employment dropped by 13.7% in the second quarter of 2020, private sector employment was significantly affected as compared to the public sector. In this regard, the drop from the private sector stood at 15.2% against a drop of 5.9% in the public sector.

South Africa's labour reforms differ dynamically from other countries. With the history of apartheid, post 1994 had been a transformational journey for the country. This saw wide range of labour reforms to address the political as well as the social dynamics. This saw the introduction of various programmes implemented by the government which included affirmative action, Black Economic Empowerment (BEE), Broad Based Black Economic Empowerment (BBBEE) and several many more. These programmes had a large impact in the country's labour market both public and Private. This is attested by the United Nations University's WIDER project which

observed that while the racial wage gap briefly widened post-apartheid, it began to narrow after the implementation of the Employment Equity Act (1998) and especially after the B BEE Act (2003). The study attributed this decline to affirmative action policies.

With the above background provided, the goal of the study is to determine if employment in the public sector in South Africa compliments or crowds out employment in the private sector. This study will further investigate the relationship between employment in South Africa's public and private sectors.

1.2. Problem Statement

South Africa has been experiencing a high level of unemployment in recent years. The latest figures as at the second quarter of 2024 reflected the unemployment rate at 32.9% (Statssa, 2024). This figure is exceptionally high for an emerging country such as South Africa. One of many reasons that could be contributing to this high unemployment is the role of the state with regards to its employment practices. Unemployment is a worldwide phenomenon that affects most countries around the world. More so to lesser developed nations. In general, it lowers output and income, promotes inequality, degrades human capital, and has incalculable psychological costs (Layard, Nickell & Jackman, 2005). This study proposes to examine the relationship between public and private sector employment to determine whether public sector employments reduces/crowds out private sector employment.

According to a study conducted in 2020 by TIPS, approximately 25% of all formal employment is in the public sector. Because a large portion of its workforce is considered important, it shrank significantly less than the private sector during the Covid-19 pandemic. Additionally, employees who were rendered incapable to work due to disaster restrictions were not fired by the public sector. According to the Quarterly Labour Force Statistics (QLFS), the public sector had a 7% loss in employment in the second quarter of 2020, or 168 000 positions, while the private sector saw a 15% decline in employment, or two million positions. In the second quarter of 2020, employment in the private sector fell to an all-time low as a result of numerous businesses closing in reaction to the lockdown.

Previous studies on this topic have been limited to multi-country analysis such as those in the OECD countries as well as advanced economies (see Chassamboulli, Fontaine and Gomes, 2020; Chassamboulli and Gomes, 2023; Jofrey-Monseny et al, 2020; Behar and Mok, 2019). Recent studies on emerging economies pertaining to the crowding out effect have also been conducted (see Aldan 2021; Nalban and Smadu 2020; Gescher, 2023; Bettoni and Santos, 2022). Furthermore, empirical studies have provided varied results regarding the relationship between public and private sector employment.

This study focuses on analysing the crowding out hypothesis of the private sector employment by public sector employment in the case of South Africa. The studies that have already been done focus on the finance and growth aspect (see Panda, 2023; Biza et al 2015) of crowding out. This study will look at the employment aspect and not necessarily finance and growth. It will explore whether employment growth in the public sector has a negative or positive impact on private sector employment, a view that has not yet been explored in South Africa.

1.3. Objectives of the study

The main objective of the study is to ascertain whether public sector employment crowds out private sector employment in South Africa. The specific objectives are:

- Provide a review of the public sector and private sector employment in South Africa;
- Ascertain whether public sector employment crowds out private sector employment in South Africa, using economic analysis; and
- Make policy recommendations related to the study.

1.4. Hypothesis

H₀: Public sector employment crowds out private sector employment in South Africa.

H₁: Public sector employment does not crowd out private sector employment in South Africa.

1.5. Significance of the study

There have been no studies conducted in South Africa that have narrowed their investigation into the connection between employment in the public and private sectors. More so, on how one variable may crowd out the other as well as the impact it could have on the overall unemployment rate of the

country. There have been several studies that have emphasised the crowding out aspect in South Africa but not focusing on the employment aspect.

Previous studies in South Africa have primarily focused on the nexus between foreign direct investment (FDIs) and domestic investment; share repurchases and internal investment; public investment and private investment; public transfers and private transfers; budget deficits and private investment as well as transfers and household expenditure patterns. (see Pamba, 2022; Steenkamp, Gretha, and Wesson, 2023; Maluleke, Odhiambo and Nyasha, 2023; Biza et al. 2015; Makuyana and Odhiambo, 2018 and Jensen, 2002). Additionally, many studies have focused more on clustered economies, such as emerging (such as those in the OECD countries) and advanced economies. These previous studies have explored the possibility of one variable crowding out/in the other. Most of the studies have concluded that the crowding out effect is plausible between the variables that had been chosen. This study focuses on the employment aspect.

The study will also provide policy recommendations that could be used as a basis for developing programmes to significantly encourage public and private employment levels in the country, seeing the recent high levels of unemployment. Lastly, the econometric analysis that will be conducted will highlight specific areas of improvement in terms of the employment sector in South Africa.

1.6. Chapter Outline

The structure of the dissertation is as follows: Chapter one provides the Introduction of the research work, focusing on the background to the study, the research problem, objectives and hypothesis. Chapter two provides an overview of trends of public sector and private sector employment in South Africa. Chapter three contains the Literature review, both theoretical and empirical. Chapter four will present the Methodology which was used to analyse the link between the variables of interest. Chapter five contains the findings and interpretation of the research work. The last chapter (Chapter six) presents a summary of the study, conclusion and policy recommendations.

2. CHAPTER 2

OVERVIEW AND TRENDS IN THE SOUTH AFRICAN EMPLOYMENT SECTOR

2.1. Introduction

The chapter provides an overview and trends of employment in the South African economy. This will be done by reviewing various data that will illustrate and paint a picture of South Africa's employment sector. This will provide the state of the variables which are the focus of the study. This should lay a foundation for the justification of the use of variables that have been identified in this study. The employment/unemployment rate trends as well as both private and public sector employment will be previewed along with various South African labour market regulations. This section will also elucidate on various policies that have been implemented over the years which have played a major role in influencing the South African labour market.

The chapter is composed of five sections. Following the introduction, section 2.1.1 provides trends of employment in the South African economy, section 2.1.2 provides an overview of unemployment trends in South Africa, section 2.1.3 highlights the private and public sector employment trends in detail, then section 2.1.4 provides an overview of labour market regulations in South Africa. The chapter then concludes in section 2.2.

2.1.1. Employment trends

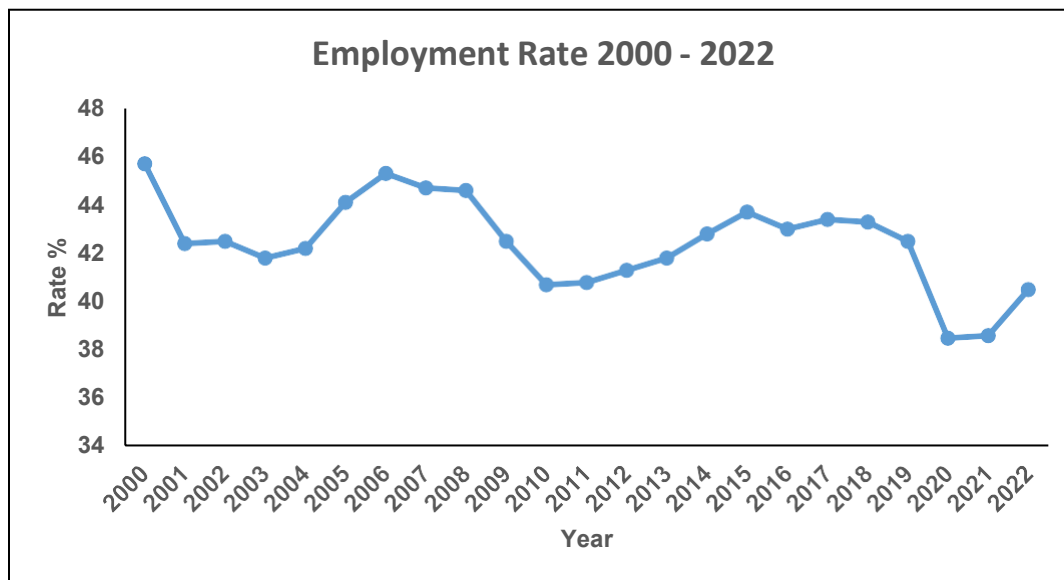
Employment, at this current juncture is at the core of all policy discussions taking place in South Africa. This is largely due to the high unemployment levels that have plagued the country in recent years. This is further exacerbated by the high levels of poverty and inequality in the country. Despite credible efforts, various policies put in place by the government in the past three decades have failed to drastically combat the high levels of unemployment in the country. The early post-apartheid era, post 1994, came with a strong surge in employment levels in the country, likely driven by the change of government and the introduction of new policies that favoured the employment of the previously disadvantaged communities which was the majority.

Statistics South Africa uses the term 'absorption rate' to describe the employment rate of the country. The 'absorption rate' is the percentage of South Africa's entire working-age population that is employed and is recognised by the International Labour Organisation (ILO) (Statssa, 2024).

The latest data from Statistics South Africa indicates that in the second quarter of 2023, South Africa's employment rate rose to 40.12% from 39.88% in the first quarter. This is at the back of the recovery from the Covid -19 Pandemic. The years 2020 and 2021, which were mostly riddled by the Pandemic saw an average employment rate of 38,5% and 37% respectively. The worst performance was experienced during the third quarter of 2021 with a low employment rate of 35,9%. The pre-Covid - 19 employment rate in 2019 was 42,5% (Statssa, 2024). This was before the shock effect of the Pandemic took effect. This illustrates the detrimental effect that the Pandemic had on the employment rate of the country during the two years to follow after the onset of the pandemic.

Figure 2.1 below depicts South Africa's employment rate from 2000 to 2022. This is a span of 23 years. Based on **Figure 2.1**, it can be seen that the country's employment rate has hovered around the 40 – 45% range.

Figure 2. 1: Employment rate in South Africa from 2000 - 2022



Source: Stats SA (2024) and SARB (2024)

From 2000 to 2022, South Africa's employment rate averaged 42,5% (Statssa, 2024). It peaked at 45,7% in 2000 and fell to a record low of 35,9% in the third quarter of 2021 (Statssa, 2024). This was in amidst the global Pandemic. During the years previewed in **Figure 2.1** above, it can be observed that the employment rate tended to be higher during the time when economic growth was

favourable. During the years 2000 to 2008, South Africa experienced a surge in economic growth that saw the country reaching a peak GDP growth rate of 5,6% in 2006 (SARB, 2024). During this time period, the employment rate averaged 43,7%. When the Global economic crisis occurred in 2008, this affected almost all countries globally. South Africa's employment rate began to decline and reached a low of 40,7% in 2010 before it began a slow and gradual recovery.

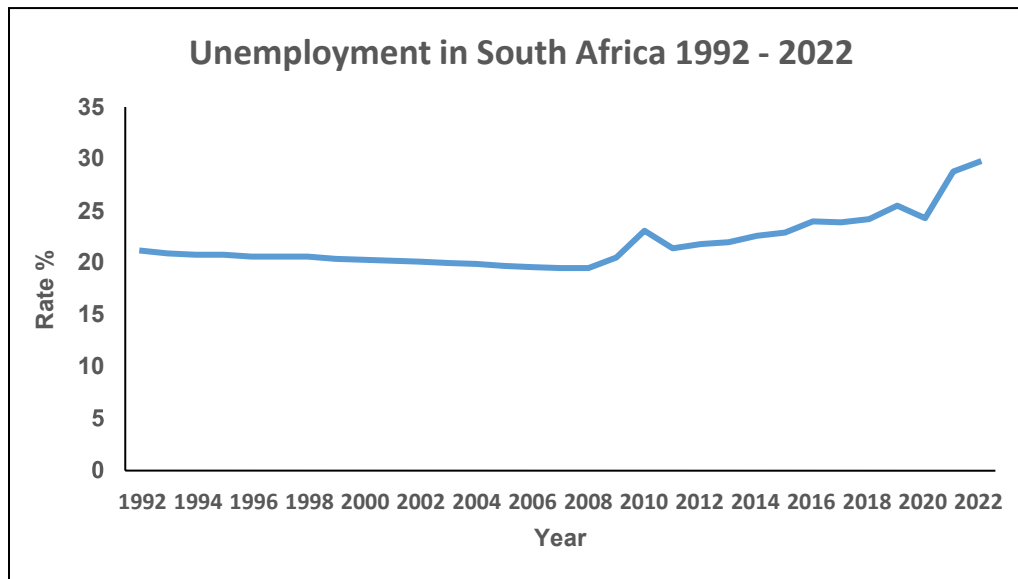
The employment rate continued to remain resilient and steady throughout the years 2013 to 2019, where it averaged 42,9%. There were positive signs that employment would once again be on the rise, however the Covid-19 Pandemic forced the global economy to once again practically shut down. During 2020, South Africa's economy shrunk by 6,3% (SARB, 2024), which resulted in several job losses, especially those in the private sector. According to the World Bank (2019), the global employment rate was 58% in 2019, down from 62% in the early 90s. Lower-middle-income countries reported a 54% employment rate, while upper-middle income countries (which include South Africa) reported an employment rate of 60%.

It can be observed from the above analysis that South Africa's employment rate has been stubborn over the years. It has remained relatively fixed between the 40 – 45% range, which is below the global average. It has also been observed that as the economy performs better, there is likely to be a rise in the employment level. However, it is also observed that South Africa is vulnerable to external economic shocks such as the global crisis of 2008 and the Covid-19 Pandemic in 2020, which negatively affected the employment rate.

2.1.2. Unemployment trends

Unemployment remains one of South Africa's most hard pressing issues. It cuts the divide from economic to social aspects. In the past three decades, unemployment has largely presented an upward trend. According to the South African Reserve Bank, during the 90's and post-apartheid era, the unemployment rate remained resilient as it averaged 20,7% between 1992 to 2000, peaking in 1992 with a rate of 21,1%. During the same period, the unemployment rate was lowest in 2000 at 20,2%. The introduction of various post-apartheid labour market regulations did not seem to detour the unemployment rate as it remained constant right into the mid-2000s.

Figure 2. 2: Unemployment in South Africa 2000 - 2022



Source: Stats SA, QLFS data series (2024)

Figure 2.2 illustrates the unemployment rate in South Africa from 1992 to 2022. The global crisis in 2008 contributed to the beginning of the rise in the unemployment rate in the country. From 1992 to 2009, the unemployment rate averaged 20,3%. Following the years after 2008, the unemployment rate began to rise gradually as political and economic conditions continued to worsen in the country. Unemployment averaged 23,6% from 2013 to 2019 reaching a peak of 25,5% in 2019. From the Pandemic era (2020 to 2022), unemployment continued to be on the rise and averaged 27,6%, reaching a peak of 29,8% in 2022. From 1992 to 2022 unemployment averaged 22,7% largely exaggerated by the outlying years that saw the Pandemic devastate several global economies.

It can be observed from the above analysis that South Africa's unemployment rate has been sticky over the years, especially during the 90s to post 2010 falling way below the global rate of about 5% (ILO, 2024). It has remained relatively fixed between the 19 – 21% range until post 2010, where it began to rise quite sharply. It has also been observed that as the economy functions better, there is likely to be an improvement in the employment rate. However, it is also observed that South Africa is vulnerable to external economic shocks such as the global crisis in 2008 and the Pandemic in 2020, which negatively affected the unemployment rate just as it did with the employment rate.

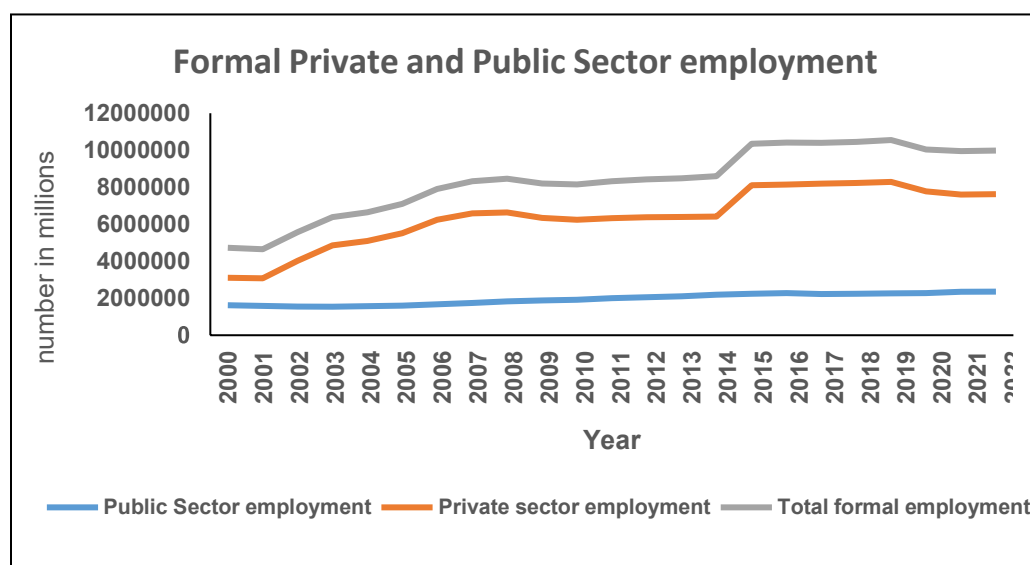
2.1.3. Overview of Private and Public Sector Employment Trends

The importance of the public and private sector working in collaboration with one another cannot be more vividly stressed. The private sector plays a pivotal role in the performance of the economy as a whole. They do this, among others by contributing to economic activities such as boosting productivity which allows them to contribute a lot more to the country's fiscus through the collection of taxes. This revenue allows the country to be able to carry out service delivery programmes that are aimed at uplifting the livelihoods of ordinary South Africans.

The public sector, therefore, also has an empirical role to play in ensuring that the underlying conditions and regulations required for the private sector to thrive are in place. Due to the profit seeking nature of the private sector, it then becomes quite susceptible to shocks in the economy. Shocks in the economy can lead to many jobs being lost in the private sector than in the public sector. This is because in an effort to keep companies viable, the private sector will shed some jobs in reaction to the shock, vice versa. The public sector, however, has various regulations in place that protect its workforce from the vulnerability of job losses.

According to TIPS research conducted in November 2020, about 25% of all formal jobs (excluding the agricultural sector) come from the public sector. This then leaves the remaining 75% of the formal workforce being employed by the private sector.

Figure 2. 3: Formal Private and Public Sector Employment



Source: SARB (2024)

Figure 2.3 above depicts formal private and public sector (excluding the agricultural sector) employment in South Africa from 2000 to 2022. It can be visibly seen that the private sector employs more people as compared to the public sector. Employment in both sectors peaked during 2019, where around 10,5 million people were employed in the formal sector. During the same year, the private sector achieved its highest number of people employed in that sector at 8,2 million. When one observes the sector employment contribution share, it can be seen that the share of the public sector has been on a decline. From 34% of the formal sector (excluding the agricultural sector) employment in 2000, to 24% of the share in 2022. The private sector has been resilient throughout the observed years, only being affected by major shocks in the economy such as the world economic meltdown in 2008 as well as the advent of the Covid – 19 Pandemic in 2020.

Employment in both sectors grew rapidly from between 2001 to 2008. This was at a time when the country had been experiencing an economic boom which culminated in an economic growth rate of 5,6% (SARB, 2024). Formal private and public sector (excluding the agricultural sector) employment in South Africa grew by 3,8 million from 4,6 million in 2001 to 8,4 million in 2008 largely due to the contribution of the private sector. Due to the economic meltdown, soon after, employment numbers dropped before picking up again during the recovery phase. There was prolonged steady growth in employment in the country until 2019.

Formal sector employment grew from 4,7 million in 2000 to 9,9 million in 2022. This was a growth of 5,2 million jobs (111%). This saw private sector employment in the formal sector growing from 3,1 million to 7,6 million by 4,5 million from 2000 to 2022 (145%). Conversely, public sector employment only grew from 1,6 million to 2,3 million by 741 000 from 2000 to 2022 (44%).

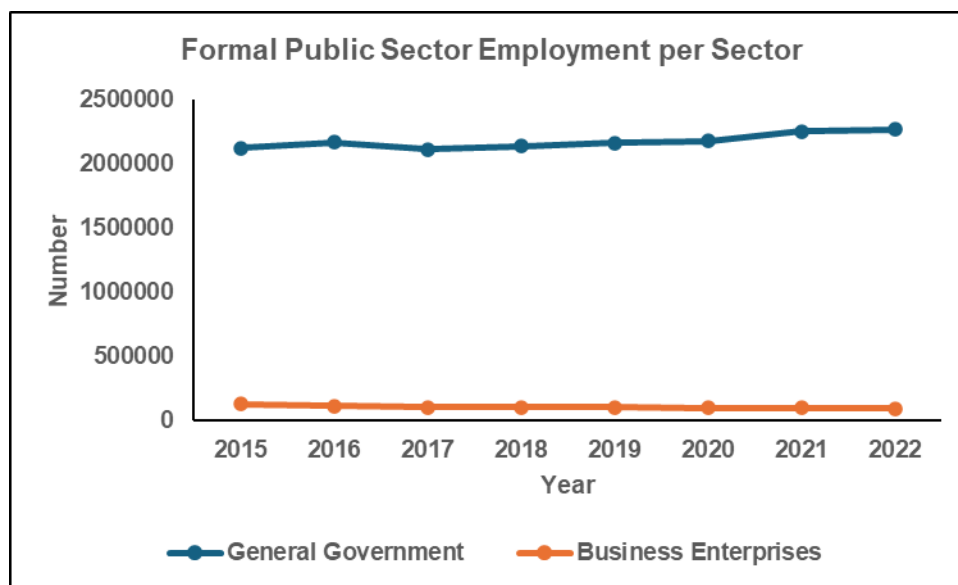
The economic shock brought about by the Covid – 19 Pandemic triggered a devastating impact on the formal employment sector of the country. While the public sector remained resilient from the result of protection of jobs through disaster related regulations, the private sector was forced to shed a number of jobs. From the beginning of 2019 to the end of 2021, approximately 595 000 jobs were lost in the formal sector. In contrast, formal public sector employment grew approximately by 85 000 during the same period. This was largely due to various health measures put in place by the state to combat the effects of the Pandemic. At the same breath, approximately

680 000 jobs were lost in the private sector. This left a devastating impact on the economy as some companies had to close down and jobs were lost (Statssa, 2024).

2.1.3.1. Public and Private Employment per Sector

According to the South African Reserve Bank (2024), public employment may be categorized into two sectors. These sectors include ‘General Government’ and Business Enterprises. In the same breath, private employment also contains several sectors which include Mining, Manufacturing, Construction, Trade and Finance. **Figure 2.4** below is an illustration of sectors within public employment. It reflects the number of people that were employed in the formal public sector between 2015 and 2022.

Figure 2. 4: Formal Public Sector Employment per Sector



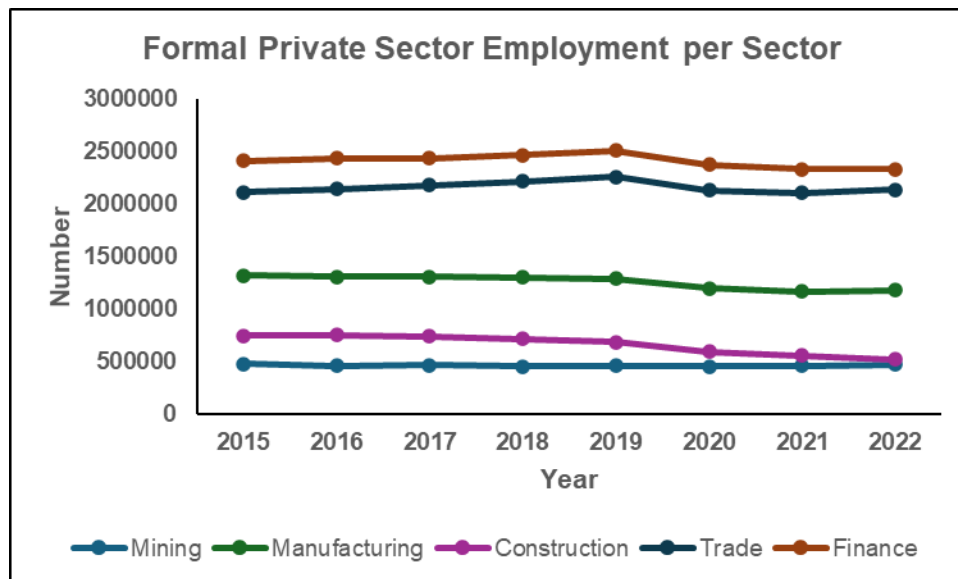
Source: SARB (2024)

The trend shows that the larger proportion of people in the public sector are employed in ‘General Government’. These are the people largely employed by the state to provide service delivery related services (SARB, 2024). The ‘Business Enterprise’ sector significantly employs a lower number of people. This has been the case in all the years observed in **Figure 2.4**. These are largely the state-owned enterprises who undertake duties in support of the state programmes. As reflected on **figure 3**, these numbers have been very steady due to a high density of regulations protecting

people from losing their jobs. ‘General Government’ employed 2,1 million people in 2015 compared to the almost 2,3 million that were employed in 2022. On the other hand, ‘Business Enterprises’ employed 128 000 people in 2015 compared to 94 000 that were employed in 2022.

Figure 2.5 below depicts formal private sector employment per sector from 2015 to 2022. It shows the number of people that were employed in each of the sectors within private employment between 2015 and 2022. It can be observed that the larger proportion of people are employed in the Finance sector. This sector employed a high of 2,5 million people in 2015 and has since dropped to 2,3 million in 2022, largely due to the Pandemic. The second largest employing sector in the formal private employment is Trade, which has demonstrated a more robust recovery from the Pandemic from employing 2,2 million people in 2019 to 2,1 million in 2022.

Figure 2. 5: Formal Private Sector Employment per Sector



Source: SARB (2024)

The Finance and Trade sector make up approximately 67% of formal private employment whilst Manufacturing, Construction and Mining take up 33%. The Mining sector has been quite resilient in the years observed in **Figure 2.5**, almost catching up with the number of people employed in the Construction sector in 2022. Most of the sectors have demonstrated a will to bounce back except for the Construction sector which has struggled to replace jobs lost during the Pandemic.

2.1.3.2. Trends from other Countries

When comparing South Africa with other nations, especially those in the BRICS countries, it can be observed that the country lags behind when it comes to the subject of employment. South Africa had about 75% of its formal labour workforce working in the private sector in 2022 (Statssa, 2024). Brazil has an active formal private sector which accounted for 73% of the people employed in formal employment in 2022 (Ceicdata, 2004). Similarly, in 2019, China's state accounted for 27% of formal employment in the country while 73% of people were employed in the private sector (Statista, 2024). This further solidifies the role of the private sector in the economy in providing a solid revenue base through the collection of taxes which further aid the economic growth of a country. This also highlights the importance of the private sector in providing jobs.

2.1.4. Labour market regulations in South Africa

Since the dawn of the new democracy, South Africa has implemented various programmes in the labour market to ensure that it is in line with worldly standards. These had been in an effort to augment employment through the creation of job opportunities, especially those individuals in the majority who had been previously disadvantaged. Not only would these laws bring about job opportunities, but they would also provide security of the jobs that people occupied, more especially in the public sector. This saw the strengthening of labour unions in the workplace, whose role was to primarily protect the workforce from any unfair practice from the employer.

One of the first policies put in place by the new government post 1994 was the 'Affirmative Action' programme. According to the 'White Paper on Affirmative Action in Public Service' published in 1998, the programme recognised that the new government inherited a public service which was strongly influenced by discriminatory employment policies and practices based on race, gender and disability. Hence these groups were poorly represented at decision making levels and in other technical occupational classes. The Constitution identified representativeness of the public service as one of the main foundations of a non-racist, non-sexist and democratic society that integrates people with disabilities. When the new government came into power in 1994, initiatives were put into place to remove discriminatory practices and policies in employment. Measures were also developed as an interim arrangement to facilitate and promote accessibility to the public service for all.

Another such policy in line with recognising the previously disadvantaged was introduced in South Africa in 2003. This was to be known as the Black Economic Empowerment (BEE) programme, which would be later amended in 2013 to reflect as the Broad-Based Black Economic Empowerment (B-BBEE). According to the South African government, (2024), the Broad-Based Black Economic Empowerment (B-BBEE) programme provides a legislative framework for the transformation of South Africa's economy. The Broad-Based Black Economic Empowerment Act, [No. 53 of 2003], as amended, aims to advance economic transformation and enhance the economic participation of black people in the South African economy. The introduction of such amove was anticipated to elevate or prioritise employment needs of the previously disadvantaged and marginalised groups in the country.

Over the years there has been other programmes introduced by the state in an attempt to create more jobs. One such programme is the Expanded Public Works Programme (EPWP), which sinceits inception in 2004 has created over 14 million unsustainable job opportunities. The programmewas set up to benefit the unskilled, unemployed, poor and vulnerable individuals.

Inasmuch as the majority of legislation mentioned above was from a state intervention point of view, there have been institutions put in place to protect employee rights. These include institutions such as the Commission for Conciliation, Mediation and Arbitration (CCMA) as well as labour unions. The South African employment sector is dominated mostly by labour unions whose role is to protect the rights of employees at the workplace. One of the largest unions in South Africa with over one million members is the Congress of South African Trade Unions (COSATU). The CCMA was established in November 1996 in terms of Section 112 of the Labour Relations Act, 1995, which in turn implements the labour rights provided for in section 23 of the Constitution ofSouth Africa.

South Africa has a dynamic labour market which has been influenced by many factors. From the repealing of old apartheid policies to the introduction of new legislation that would allow for the general population to benefit from the economic prosperity. All of these factors have played a role and continue to do so in shaping South Africa's employment sector. Hence, it is quite prudent that some of these variables are factored in this study.

2.2. Conclusion

This chapter has provided a review of the South African employment sector both in the private and public sector in South Africa. The employment trends were illustrated, and findings indicated that South Africa still falls short of the global average at 40.12% of people employed at the end of the second quarter of 2023. The unemployment trends were also reviewed and the analysis reflected that South Africa has one of the highest unemployment rates in the world at 32,9% at the end of the second quarter of 2024. The chapter delved deeper into profiling the private and public sector employment trends which revealed that private sector employment far exceeds the latter. Trends from other countries were considered and they depicted similar findings, which pointed towards the dominant role by the private sector to create a lot more jobs than the public sector.

3. CHAPTER 3

LITERATURE REVIEW

3.1. Introduction

This section provides a review of theoretical and empirical literature relevant which analyses the link between public sector employment and private sector employment. There is a wide range of theoretical and empirical literature that documents the relationship between public sector employment and private sector employment. According to Craigwell & Jackman (2014), Adding more jobs in the public sector makes sense from an intuitive standpoint, as does lowering unemployment. First, there is the direct effect, where new positions in the public sector are presumed to be filled by unemployed people. Next is the Keynesian model impact, which is characterised by government involvement that increases aggregate demand and, as a result, generates employment possibilities in the private sector (also known as "crowding in hypothesis").

The chapter is composed of four sections. Following the introduction in 3.1, section 3.2 provides the theoretical literature of the study, section 3.3. provides the empirical literature of the study. Lastly, section 3.4 highlights the analysis of the literature that has been employed in the study.

3.2. Theoretical literature

The study is underpinned by two theories, the Neoclassical theory and the Crowding out hypothesis. These theories provide a foundation from which this study will be based upon. They are discussed in detail in this section.

3.2.1. Neoclassical theory

The Neoclassical theory on the link between public and private sector employment was developed by Alfred Marshall and Vilfredo Pareto. The theory's primary tenets are that value originates from perceived utility. In this regard, firms strive to maximise profits, consumers are rational, and market equilibrium is an economic priority. The theory tends to focus more on the problem of persistent unemployment, or unemployment caused by a recession, than it does on the problem of cyclical unemployment, or unemployment caused by economic growth that is at GDP potential.

Stated differently, the Neoclassical perspective on unemployment primarily focuses on the ways in which public policy can be modified by the government in order to lower the natural rate of unemployment. Redesigning unemployment and welfare policies to support the underprivileged while also providing more incentives for job searching could be one way to implement such policy changes (Gordon, 2023).

According to Vercherand (2014), the fundamental neoclassical model treats the determination of labour costs and employment levels as part of a perfectly competitive market, much like that of consumer goods. The agents' roles are inverted, which is the only distinction. Companies are both suppliers and demanders of labour on the market for commodities. However, households are both suppliers (of their productive services) and demanders of commodities on the labour market. The global supply and demand of labour are brought into free confrontation by the wage rate (or, alternatively, the unit wage; still more specifically, the hourly wage) and the volume of labour (the number of employees multiplied by the amount of time they work at a particular intensity, or work rates).

Despite its long history and influence, detractors believe this approach is too abstract and theoretical to describe economic realities. Other critics insist strict adherence to the precepts of Neoclassical economics has led to vast levels of income inequality.

According to Froyen (2009:83), the neo-classical system opposes budget deficits and maintains that the private sector should be the primary driver of economic activity in an economy free from government intervention. In other words, full employment would be reached, and the private sector would stabilise without government intervention through budget deficits.

According to Roubini and Backus (1998), an increase in the money supply would inevitably result in an increase in money balances, which will lower interest rates and boost both investment and consumption—two essential elements of aggregate demand. Moreover, the neoclassical approach promoted the idea that an increase in aggregate demand brought on by a rise in the money supply to cover budget deficits merely raises prices, not the level of output.

While reviewing the link between fiscal deficits and unemployment, Marire (2022) asserts that jobs in the private sector are eventually crowded out by government spending financed by deficits, thereby increasing unemployment, a similar observation made by De Leeuw & Holloway (1985); Mahadea & Simson (2010). He further supports Bernheim's (1989) view that budget deficits have

a beneficial impact on unemployment. Budget deficits increase future tax liabilities while increasing current consumption, assuming long-sighted people who use the Modigliani life cycle hypothesis to plan their lifetime consumption and savings.

3.2.2. The Crowding out hypothesis

The crowding out hypothesis was first proposed by Richard Titmus and later further developed by Bruno Frey in 1997. In its purest form, it is characterised by rising public sector spending which is assumed to drive down private sector spending. The theory suggests that when the government engages in revenue raising initiatives, it will negatively affect the private sector participants. The crowding out hypothesis takes on different forms. Firstly, it can manifest itself through the reduction in private sector investment spending due to increases in interest rates when the government borrows in the domestic economy. The reduction in capital expenditure by private firms will result in private sector employment dropping. According to Carlson and Spencer (1975), interpretations from various contexts can be used to explain the Crowding out Hypothesis. They characterise it as primarily an economic consequence of fiscal action, wherein an equivalent or almost equal quantity of private demand or spending for the same is displaced by a government demand that is paid by taxes or the issuing of debt.

In essence, the issue is how people's innate desire to contribute to the common good in a society is impacted by extrinsic motivation, such as taxes or laws and regulations (Boyer et al., 2014; Frey 1999). Deci and Ryan (1985) claim that an individual's internal motivation may be undermined by an external intervention if the individual believes that their behaviour is substandard and won't be acknowledged. The individual may therefore choose not to participate in the behaviour. A crowding out effect is considered to have occurred if such happens (Carlson and Spencer 1975).

The second aspect relates to social welfare activities. Under this theory, when the government increases taxes so as to engage in many social welfare activities, this would result in a reduction in funds available for expansion of the private company operations. The private companies may reduce their human resource component or maintain it at that level. In the same vein, it is also argued that where the government expands public health programmes like the case of the national health Insurance in the case of South Africa, that may result in people migrating from their private health insurance. The private insurance providers may end up without sufficient clients and be

forced to close operations. In this case, this will add to the number of the unemployed due to the government actions.

This is consistent with Schmelz (2021), who maintains that laws and government initiatives aimed at enhancing social welfare are crucial and cannot be disregarded. But Schmelz (2021) discovers that they have unexpected repercussions, or externalities, which make up the crowding-out effect. Government laws and policies are frequently formulated with the assumption that people are self-centred, although some behavioural theorists contend that this isn't always the case because people typically try to strike a balance between their own interests and those of their communities (Cardenas et al., 2000).

Research has demonstrated that moral or norm-based incentives for people to voluntarily contribute to social goods are suppressed by Government policy (Nyborg and Rege 2003). Boyer et al. (2014), for example, found that when taxes were imposed as external standards, respondents were less willing to make voluntary contributions. The Cardenas et al. (2000) experiment demonstrated how participants' innate motivation to help with an environmental problem was suppressed by environmental rules. Additionally, a recent German study demonstrates that people prefer to support anti-COVID-19 policies willingly over being coerced (Schmelz 2021).

3.3. Empirical literature

The section presents empirical studies on the subject. The review of literature will be based on the studies which have concluded on the crowding out and crowding in effect. Once the different perspectives have been reviewed, the analysis of the literature will be conducted.

The impact of public employment on the labour market, however, may be far more complex than previously thought. According to a recent body of literature. Public sector jobs have been accused of driving out private sector workers (see Malley and Moutos, 1996; Algan et al, 2002), so government job creation may actually have a negative overall effect on total employment. Boeri, Nicoletti, and Scarpetta (2000) used a sample of 19 industrialised OECD countries for the period of 1985-1992 to estimate that 10 more public jobs crowd out 3 private jobs. Finn (1998) supports this claim, finding that because public employment has a favourable impact on labour supply, it crowds out private employment, albeit less than one-to-one. He further finds that public employment has a positive general equilibrium effect on private sector wages because it lowers

private employment and increases its marginal productivity, which is how this positive effect is attained.

As an alternative, Linnemann (2009), Pappa (2005), and Cavallo (2005) all use various identification algorithms to estimate VAR using US aggregate time-series data. When it comes to the effects of output and budget deficits on fiscal shocks, Linnemann (2009) employs a typical Cholesky decomposition, Cavallo (2005) uses the Ramey-Shapiro military build-ups, and Pappa (2005) applies sign limitations to identify the VAR. According to Linnemann (2009), real output and private employment both respond favourably to shocks to public employment, pointing to a crowding-in effect. It is evident from the aforementioned studies that the research has been mixed. This is acknowledged by Pappa (2005) who presents results that reflect a more mixed response, with a statistically significant negative effect after the second period and a favourable contemporaneous effect. Below will be a discussion on theoretical as well as empirical literature to provide a base for the study.

3.3.1. Studies focusing on crowding out effect

The studies which have concluded that the crowding out holds include Bettoni and Santos (2022), who show that the government hiring policy reduces the hiring benefit for the company (private sector) and the matching surplus if the flow of human capital into the public sector increases (crowd out effect). Using a ‘two-sector search and matching model’, they discover that the association between private-to-public sector job transitions and an individual's experience is steeper for workers with high salaries and a college degree. Direct transfers from the public to the private sectors, however, are far less common. Indeed, the flow of college-educated civil servants into the private sector declines with age, with a decline of 0.88% at the ages of 31-35% to 0.69% between 46 and 50 years old.

Similarly, Nalban and Smadu (2020) argue that the creation of public jobs crowds out private sector employment and is contractionary, while increases in public wages have muted spillover effects. Conversely, public sector workers experience major crowding out effects from gains in private employment and earnings, which are significantly expansionary. They base their argument on the estimated DSGE model on Romania.

This is consistent with an earlier study by Craigwell & Jackman (2014), who assess the effect of government employment on the labour market in Barbados, a small island developing state in the Caribbean, using a two-step Markov-switching error correction model. The findings point to a partial crowding out scenario in which private employment is decreased by hiring in the public sector, but the overall effect of unemployment is negative. Furthermore, the findings imply that there are two possible avenues for crowding out to happen and that is through tax and debt expense.

According to Demekas and Kontolemis (2000), government decisions over wages, benefits, and employment are not made with the intention of maximising profits. Instead, they have a significant impact on the overall performance of the labour market and unemployment rate. They conclude that government employment is ineffective as a counter-cyclical tool and that increases in government pay or benefits lead to a decrease in private sector employment (crowding out) in a two-sector labour market model with free labour mobility. They offer empirical tests for Greece and verify that the decline in labour market performance was a result of the public sector's expansion in the 1980s.

Chassamboulli and Gomes (2023), using the search and matching model for US, UK, France and Spain conclude similarly. They state that if the two sectors are separated, a rise in skilled public sector wages has a greater negative effect on the employment of skilled workers in the private sector and a marginally favourable influence on the educational composition. This agrees with an earlier assertion by Adam (2020), who uses a panel VAR model for Greece and finds that private sector earnings are more impacted by shifts in public sector wages than they are by shifts in public sector employment.

Yassin and Langot (2018) established an equilibrium matching model that accounts for the interactions between the public, formal private, and informal private sectors in labour markets found in developing countries. According to their model, changes in public sector employment and wage policies have the potential to negate the benefits of reforms aimed at liberalising formal labour markets. The public sector functions as an additional tax on formal private enterprises since it impacts every worker's outside option. Utilising data on labour migration from Egypt, they demonstrate that the increases in employment following labour market liberalisation were countered by the concurrent rise in pay paid in the public sector.

Using census data from Ghana, Mali, and Mozambique, Ranzani and Tuccio (2016) examine the long-term effects of public sector employment on regional labour markets based on research done in other African countries. They discover that the public sector drives away private jobs and pushes qualified individuals to wait in queue for public positions, which raises the unemployment rate. This is in line with Ncube (2001), who investigated the prospect that employment in Zimbabwe's public sector could displace workers in the private sector. He uses a normal employment model that has been adjusted to include work in the public sector as an independent variable in order to accomplish this job. The findings offer compelling evidence in favour of the theory that excessive public sector job creation displaces private sector employment. He discovers that the presence of crowding out in the private sector results in a net reduction in employment creation compared to what could have been accomplished in the absence of excessive employment creation in the public sector. Ncube (2001) comes to the conclusion that the study's main policy implication is that, in the long run, the country may not benefit as much from the strategy of using the public sector to create jobs in order to reduce unemployment.

Chassamboulli, Fontaine and Gomes (2020), use a non-steady state decomposition of the US, UK, France and Spain to find that 10% to 35% of all public sector inflows and outflows come from and go to private employment. Only 7% to 25% of the variations in public employment may be attributed to these flows. One such flow is evident in a study by Behar & Mok, (2019), who's empirical results indicate that public sector employment crowds out private sector employment at aggregate level. Comparing the advanced and developing countries, the results show that the crowding out effect is more pronounced in advanced countries as compared to developing countries. The authors find that unnecessary public sector employment does not reduce the overall unemployment rate, secondly, it increases fiscal burden and lastly, inhibits growth through its reductions on private employment.

In an earlier study by Behar and Mok (2015), the authors quantify the degree to which employment in the public sector displaces employment in the private sector using specially assembled datasets for a wide range of developing and advanced countries. They also discuss the implications of their findings for countries in the Middle East, North Africa, Caucasus, and Central Asia. They find that these countries exhibit high percentages of employment in the public sector, low rates of employment in the private sector, and high rates of unemployment simultaneously. They discover

that full crowding out is indicated by regressions of unemployment rates on employment in the public sector. This implies that high public employment rates, which come with significant financial expenses, have little effect on the overall rate of unemployment.

In a slightly similar view, public employment's impact on local economies is examined by Auricchio, Ciani, Dalmazzo, and De Blasio (2017, 2019) in a series of papers that concentrate on Italian towns from 2017 to 2019. They begin by outlining a framework for spatial equilibrium in order to emphasise how the housing market is a significant conduit by which changes in public employment impact private employment. After that, they present actual data from Italian towns, concentrating on the sharp decline in the workforce in the public sector that took place between 2001 and 2011. They utilise an IV identification technique that makes minimal reference to the economic circumstances of the municipalities and takes advantage of the fact that fluctuations in local public employment were heavily impacted by decisions made by the central government.

According to their findings, exogenous reductions in public employment cause a rise in private employment, and the competitiveness in the housing market appears to be a pertinent factor in explaining this discovery. This outcome is slightly different from the ones previously observed since it emphasises the reduction rather than the increase in public employment which happens to provoke an increase in private employment. Effectively this indirectly implies that an increase in public employment may lead to a crowd out of private employment.

In a similar spirit, Auricchio, Ciani, Dalmazzo, and de Blasio (2020) conduct more research to confirm if public employment deters the growth of private economic activity in the South of Italy. According to their findings, which are consistent with study on the municipalities, a loss of one public employee will result in the addition of 1.06 private sector jobs. This also indirectly implies that an increase in public employment would discourage the private sector employment level, effectively rendering it a crowding out effect.

According to Michailat's (2014) utilising the New Keynesian model, when unemployment increases from 5% to 8 %, a certain kind of government multiplier doubles. When one worker is hired in the public sector, this multiplier shows how many more workers are added to the workforce. In terms of graphics, an equilibrium occurs when a downward-sloping labour demand and an upward-sloping quasi-labour supply intersect on a plane representing employment and labour market tightness. According to Michailat (2014) a rise in public employment boosts labour

demand, which in turn causes tightening and the crowding out of private employment. The quasi-labour supply is convex in a critical sense. Therefore, the rise in tightness and subsequent crowding-out are minimal when labour demand is low, and unemployment is high.

Consistent with this is the macroeconomic model with imperfect competition in the commodity market presented by Chang, Lai, Liao, and Chang (2001), who use it to examine the relationship between the structure of the commodity market and the effectiveness of government employment programmes. They discover that increasing employment in the public sector could result in lower output and higher costs. They further discover that these negative impacts will be mitigated, in particular, when there is less perfect competition in the products market. Additionally, they find that, while it might crowd out jobs in the private sector, the growth of jobs in the public sector positively impacts overall employment.

In order to determine if policies function differently during times of economic slack than during times of prosperity, Lamo, Benito, and Pérez (2016) conduct an empirical analysis of the effects of public employment and wage shocks on private labour market outcomes. They concentrate on the aggregate scenarios for Spain and the Euro Area and employ local projection techniques. They conclude that the main factor influencing whether state employment crowds out private employment is the level of economic slack. They find that during normal times, private employment is crowded out by public employment shocks, but during periods of high unemployment, at least temporarily, the opposite occurs.

Using a random search model calibrated to Italy, Caponi (2017) examines the consequences of the public sector's regional wage setting strategy. The author concludes that there are important factors influencing both private employment and unemployment. It is argued that public employment has a significant crowding out effect on private employment if the public sector sets geographically homogeneous pay across regions with varying productivity, which is in line with Alesina, Danninger, and Rostagno (2002). Qualitatively, up to 33% of the unemployment disparity between the North and South can be attributed to the central government's uniform pay setting policy, which was implemented in the face of regional productivity imbalance. However, this unfavourable result is not certain. The author demonstrates how, if wages are paid by the government based on regional output, both the crowding out effect and the majority of the unemployment differentials disappear.

The crowding out effect of China's Urban Residents Basic Medical Insurance (URBMI), a non-employment-based insurance programme, is empirically investigated by Li and Tian (2020). Using a unique administrative dataset on Chinese firms and taking advantage of variations in the programme's roll-out process from city to year, they find that the implementation of URBMI decreased a firm's ability to offer an employment-based health insurance programme by a statistically significant 0.94-1.29 percentage point. Individually held businesses, newly established businesses, and domestic private corporations were more affected by this crowding out impact.

The issue of whether a larger public sector stabilises or destabilises the economy of U.S. metro areas is revisited by Claire, Boeng-Reicher, and Caponi (2024). They demonstrate that a greater percentage of employment in the public sector stabilises, or lessens volatility in, the growth of private sector employment, with the possibility of a minor crowding out of private employment. These findings are based on data from two causal identification approaches. They also discover that while public wages raise private wages, they don't seem to be destabilising. Standard search and matching models with a public sector imply 1:1 crowding out and severe destabilisation, which contrasts with the stabilising effect of public employment with modest crowding out. In Gomes's (2015) footsteps, they incorporate a product market that can mimic the Business Cycle Wealth Effect, as defined by Gomes. They also mention that the government directly purchases goods from the private industry. They conclude that with less crowding out, the model can produce stabilising effects of public employment on private employment when it possesses these two characteristics.

3.3.2. Studies focusing on the crowding in effect

On the other hand, the studies which concluded that government expenditure crowd in private sector employment, Jofrey-Monseny et al (2020), using a 2 stage least square technique on Spanish cities, find that public sector employment increases private sector employment in Spanish cities. The results further highlight that there are several multipliers through which an increase in public sector employment will influence private employment. The authors indicate that through reforms in the Spanish University system, the universities expanded their operations and that has contributed greatly to human capital development. The results also indicate that an increase in public sector employment result in additional jobs being created in the non-tradable sector.

Additionally, Becker, Heblich and Sturm (2021), using a simple economic geography model for Bonn (Germany), find that the number of public jobs in the city rises significantly. With each new public sector job eliminating about 0.2 industrial jobs and establishing slightly over one new private sector position elsewhere, this, however, only leads to slight increases in private sector employment.

This is regionally true according to a study by Faggio, Schlüter, and vom Berge (2023), which examines how employment in the public and private sectors interacts within a local labour market using the German government's 1999 relocation from Bonn to Berlin. According to their findings, services have a major positive impact on employment in the private sector (local multiplier 1.3–1.4). They discover that the policy's effects are very specific, peaking within 300 metres of a relocation site, and becoming noticeable a year following the occurrences. They describe the average government move beneficiary as a middle-aged or younger man with middle-skilled credentials who works full-time in an intermediate occupation.

This corresponds with Gescher (2023), who uses the OLS regression model for Germany and finds that public employment has a significant, positive multiplier effect on private employment. Based on his analysis, an additional 60 000 public sector jobs would generate 42 000 private sector jobs throughout the regions.

In a study reflecting similar outcomes, Aldan (2021) examines the causal relationship between the creation of public employment and formal employment in the private sector in Turkey's provinces using the local job multiplier paradigm. The findings imply that formal employment in the private sector benefits from work in the public sector (a crowd in effect). This outcome defies past research in wealthy countries that suggested private employment is being driven out by governmental employment. He contends that the direction and strength of the impact may be significantly influenced by labour market institutions and local labour supply elasticity. He finds that the provinces with greater unemployment rates or lower rates of labour force participation—which can be thought of as stand-ins for elastic local labour supply—are responsible for the beneficial effect.

Bermperoglou, Pappa and Vella (2017) use vector autoregressions (VAR) in a data-rich setting to find that while employment shocks at the federal level are only slightly expansionary, those at the state and local levels of the US workforce are heavily expanding and crowd in private sector

employment. Public wage shocks also give rise to differentiated effects: these are contractionary at the federal level (because of wage spillovers that create unfavourable labour demand effects), but expansionary at the state and local levels (because of strong income effects that raise aggregate consumption). The authors create a search and matching DSGE model with the elasticity of substitution between public and private goods as the primary parameter in order to match these heterogeneities.

Faggio and Overman (2014) take into account how employment in the public sector affects regional labour markets. Employing English data at the Local Authority level for the years 2003–2007, they discover that while public sector employment affects the sectoral makeup of the private sector, it has no discernible impact on the total amount of employment in the private sector. They discover that for every job created in the public sector, 0.5 jobs are created in the non-tradable sectors (construction and services), while 0.4 jobs are eliminated in the tradable sectors (manufacturing). They find no multiplier effect for non-tradables, higher crowding out for tradables, and crowding out for total private sector employment when they use data over a longer time period (1999–2007). This study is more on the fence than the ones that have been reviewed thus far.

In order to estimate the local employment multiplier, Lee, Ko, and Kim (2024) take use of a series of relocations of public-sector entities in South Korea as an exogenous source of variation in public sector employment. They discover that, mostly due to the service sector, the addition of one public sector job results in an increase in private sector employment of one unit. They provide evidence that there is a very localised impact of public employment on private employment. They find that the relocations resulted in a positive net influx of residents into the treated neighbourhoods in addition to changes in private employment.

Dale-Olsen & Schøne (2020) use administrative-register data from the population of Norway to examine the effect of creating jobs in the public sector on employment in the private sector. Differential treatment intensities lead to the identification of causal effects based on exact geographic information about the locations of occupations. The findings reveal that employment in the public sector has a favourable impact on employment in the private sector near the stimulus area. In effect, a crowd in effect. They also note favourable short-term effects on the firm's sales

and salary increases in the same area. Only employment effects become dominant over time. They support the causal interpretation of the primary results with two types of placebo tests.

Fallah's (2021) study, which examines the short-term impact of increasing governmental employment on private employment in the occupied West Bank of Palestine during the Second Intifada period, is likewise in line with the crowd effect theory. The study offers proof that increasing the number of public jobs boosts private employment overall. Additionally, the results demonstrate that private employment rises in both the tradable and non-tradable sectors, with a larger preference for the latter.

Afonso and Gomes (2014) investigate aggregate data in a panel of OECD nations for the period between 1973 and 2000 in a study that is concurring but focuses on wages. Using a system of linear equations on the growth in wages in the public and private sectors, they estimate the relationship. They discuss the difficulties in econometrics, especially the endogeneity issue. They discover that several factors, such as shifts in the urbanisation rate, growth in total factor productivity, and changes in the unemployment rate (which have a negative relationship), influence the development of wages in the private sector. Furthermore, salary growth in the private sector is influenced by both public sector wages and employment growth. They come to the conclusion that a 1% rise in public pay results in a 0.3% increase in private sector earnings. This might mean that if salaries in the public sector rise, more people will be drawn to work in the private sector because of the better pay there.

Using Census data from 1981 to 2011, Roupakias (2021) examines the effects of the notable rise in the proportion of public employment on the private sector in 156 Greek municipalities. He uses an instrumental variables method based on a shift-share design in order to capture causal effects. He discovers that while there are no appreciable consequences for the tradable sector (manufacturing), one extra job in the public sector generates roughly 0.7 jobs in the non-tradable sector (construction and services). The results seem resilient to varying estimating techniques, spillovers from adjacent regions, and the incorporation of confounding variables. He also provides evidence that the private sector was not greatly impacted by the reduction in the number of public employees.

In their study, Rougier, Combarrous, and Fauré (2021) evaluate how much the size of the municipal public sector influences local economic growth and how much it is influenced by

various types of political turnover. Through the use of a limited yet unique dataset covering municipalities in the Brazilian state of Ceará from 2000 to 2012, as well as addressing endogeneity and spatial correlation concerns, they discover evidence of a negative relationship between the amount of public employment and local economic growth. This relationship is mitigated when political stability takes the form of dynastic control. Also, they discover that public investment is correlated with the size of public employment, and that this positive correlation is stronger in towns run by political dynasties where policy consistency is greater. Their results, then, refute the notion that redistributive politics has a crowding-out effect on public investment for the Ceará towns. Increased numbers of private jobs could result from the expansion of private investment.

In slightly mirroring research that examines the impact of government spending on private economic activity, Park and Meng (2024) replicate the effects of a crowding out/in effect. Using a quarterly dataset from the Republic of Korea, they evaluate the effects of government spending on private economic activity across time and at different intervals. Their empirical findings show that, prior to 1970, fluctuations in government spending could largely account for changes in private consumption; however, between 1990 and 2010, these fluctuations could only occur at low frequency. Second, between 1970 and 1985, government spending crowds out private investment at the 8–16-year time scale while simultaneously crowding in private investment at the 2–8-year scale. Thirdly, between 1980 and 1990, a rise in government spending causes employment to decline on a 4–16-year scale. However, between 2000 and 2010, an expansion of public spending causes employment to increase on a 2–4-year scale.

3.3.3. Crowd out/in studies in South Africa

To the best of the authors' knowledge, no research has been done in South Africa on the topic of public sector employment driving out or influencing private sector employment. Prior research on the crowding out effect conducted in South Africa has mostly concentrated on the relationship between foreign direct investment (FDIs) and domestic investment, share repurchases and internal investment, public and private investment, public transfers and private transfers, budget deficits and private investment, and transfers and household expenditure patterns respectively.

Panda (2023) investigates the relationship between domestic investment (DI) and foreign direct investment (FDI) in South Africa over a 41-year span (1975-2016). He tries to ascertain if in South

Africa, FDI crowds out or crowds in DI. After determining that the variables were stationary (using the PP test), he applies the Autoregressive Distributed Lag-Error Correction Model (ARDL-ECM) technique to determine the long run and short run impacts simultaneously. The results showed that with time, variables cointegrate. FDI and domestic investment were found to be negatively correlated by the ARDL model. It is implied from the outcome that FDI displaces domestic investment. Furthermore, the long-term projection showed that government investment spending (GINV) crowds out domestic investment.

Steenkamp, Gretha, and Wesson's (2023) examine the connection between internal investment (which includes capital expenditure, employment expenditure, and research & development) and share repurchases in South Africa. Using data from South African listed firms between 2002 and 2017, they adopt a quantitative research methodology. For all organisations, there is a strong negative correlation between share repurchases and employment spending; but, for high-growth companies, there is a significant negative correlation between share repurchases and capital investment. The negative correlations can suggest that businesses are increasing share repurchases at the expense of internal investment, particularly employment.

The main elements of South Africa's debt sustainability and the efficacy of its short-term fiscal policy are identified and analysed in Schoeman's (2015) paper. He evaluates South Africa's countercyclical fiscal policy in light of the primary theoretical arguments and empirical data presented in literature in reaction to the global economic crisis of 2008. He then assesses the dangers of South Africa incurring significant fiscal deficits in light of the country's high level of public debt and the resulting burden of interest payments. According to him, there is reason for concern regarding South Africa's debt dynamics, as there could be a situation where debt does not reduce or even blows up if significant fiscal consolidation is not done. He also discovers that other government spending is being crowded out by South Africa's debt interest payments, despite the country's low post-crisis interest rates on public debt.

Maluleke, Odhiambo, and Nyasha (2023) use the autoregressive distributed-lag (ARDL) and nonlinear ARDL bounds testing approach to investigate the effect of public Investment on private investment in South Africa from 1980 to 2018. The ARDL findings demonstrate how, both immediately and over time, public investment crowds in private investment. According to the NARDL data, there is a short- and long-term decline in private investment as a result of the

negative shock to public investment. The findings demonstrate that, in South Africa, private investment is impacted asymmetrically by public investment.

The study conducted by Biza, Kapingura, and Tsegaye (2015) aims to determine if budget deficits in South Africa crowd out or crowd in private investment. They make use of quarterly data from 1994 to 2009. The quantitative impact of budget deficits on private investment are evaluated through the use of an empirical model that relates private investment to its theoretical variables. To provide strong long- and short-term dynamic effects on private investment, the study combines impulse response and variance decomposition analyses with cointegration and vector autoregression (VAR) analysis. The empirical findings demonstrate that private investment and the model's drivers have a long-term relationship. This suggests that over time, government deficits greatly crowd out private investment.

In order to further the discussion on the relative effects of public and private investment on economic growth, as well as the crowding effect between the two types of investment in South Africa, Makuyana and Odhiambo (2018) unearth fresh data. The study uses the Autoregressive Distributed Lag (ARDL)-bounds testing approach to cointegration using annual data from 1970 to 2017. They discover that although public investment has a long-term negative influence on economic growth, private investment has a favourable impact on growth both short- and long-term. Furthermore, over time, it is discovered that while its infrastructure component attracts private investment, gross public investment tends to crowd out private investment. The study's findings also demonstrate how, in the near term, gross public investment and non-infrastructure public spending crowd out private investment.

An Autoregressive Distributed Lag Model (ARDL) is used by Mbaleki (2024) to determine the magnitude of the fiscal spending multiplier in South Africa. He makes use of time series data with separated fiscal components covering the years 1982 through 2020. The long-term results indicate that all of the separated fiscal expenditure variables have positive but smaller (less than one) multipliers. The findings indicate that there may be a crowding out effect because the public sector wage bill, which accounts for the biggest portion of total government spending, has a smaller multiplier than the other expenditure components.

Zhou (2021) examines the link between South Africa's sovereign debt, corporate debt service costs, and private capital formation. He uses the Fully Modified Ordinary Least Squares technique

to capture the long-run characteristic of investment, and he uses Hansen's (1992) Parameter Instability test to test for cointegration. During the pre-crisis period, he finds that private capital formation increases in domestic debt and falls in external debt. But in the aftermath of the global financial crisis, he discovers evidence that private capital formation is being crowded out by domestic state debt while it is being crowded in by external debt. He also discovers that because of the debt overhang during the study period, debt servicing costs have been shown to lower investment.

In an earlier study, Jensen (2004) examines the potential displacement or crowding out of private support by government transfer programmes, with a particular focus on the significant rise in state old age pensions in South Africa. He discovers, using data covering the expansion era, that for every rand that goes towards public pension income for the elderly, private payments from children living away from home are reduced by 0.25 to 0.30. Nevertheless, there were no appreciable changes in migration, the labour supply, or the makeup of households despite the substantial increase in income. Additionally, he demonstrates that when crowding out is disregarded, assessments of the pension's distributional impacts are exaggerated.

3.3.4. Public and Private Investment crowding out/in

As much as the study is looking into the nexus between public and private employment, close to this argument is the relationship between public and private Investment. The key aspect to observe would be whether public investment crowds out or crowds in private investment. The answer to this question becomes extremely critical because it may have an influence on the number of people that can be employed in the private sector. It is assumed that if private sector investment is on the rise, then this would also promote economic activity which would in turn create more jobs in the economy, more to in the private sector, and thus creating a crowding in effect of private employment.

Consistent with this notion are Matvejevs and Tkacevs (2022), who use a sample of 33 OECD industrialised economies to investigate the link between public and private investment. Their approach is predicated on the idea that private investment can be influenced, at least temporarily, by the relationship between public and private capital stocks. In the medium to long term, additional public investment crowds in private investment as the latter adjusts to bring the stock

of private capital closer to its long-term cointegrating relationship with public capital. They show that the immediate effect of public investment on private investment is either small or statistically insignificant. Over a seven-year period, they discover that the anticipated median public investment multiplier is roughly 2, meaning that every dollar invested by public investment will draw in roughly two dollars from the private sector. They also investigate whether the crowding in effect is influenced by the type of public spending and the calibre of a country's institutions. They demonstrate how it becomes more robust when institutions pertaining to the rule of law, efficient government, and corruption control get better.

Jha (2022) examines the extent to which public-private investment compliments or substitutes each other. utilising a structural vector error correction model (SVECM). A stationary long-term relationship between output and public and private investment is embedded in the modelling framework by using the "great ratio" of output to investment. Decomposing structural innovations into those that have both temporary and permanent effects on the system allows for the identification of the SVECM. Using the empirical approach and World Bank data from 1964 to 2019, it was established that public investment has favourable benefits on output both in the short and long term, even if it may temporarily crowd out private investment. It appears that private investment does not significantly contribute to economic growth; nonetheless, it was found that economic growth drives private investment.

Similarly, Marcos and Vale (2022) examine, from 2000 to 2019, the link between public and private investment in a sample of 21 countries that are members of the Organisation for Economic Cooperation and Development (OECD). Their empirical findings, which employ panel data nonlinear threshold regression models, demonstrate the existence of threshold levels that influence the relationship between public and private investment. These threshold levels are related to the real GDP growth rate, the real interest rate, and the share of public investment in private investment. A crowding-in effect of public investment on private investment is supported by all estimations.

Using the autoregressive distributed lag bounds testing method, Maluleke, Odhiambo, and Nyasha (2023) investigate the crowding in or out effect of public investment on private investment in Botswana from 1980 to 2018. The study's conclusions show that while public investment in non-infrastructure has a short-term positive influence on private investment, public investment in

infrastructure has a negative impact on private investment. According to their research, public investments in infrastructure crowd out private investment, whereas public investments in non-infrastructure only temporarily crowd in private investment.

In an earlier related study, Nguyen and Trinh (2018) evaluate the effects of public investment, both immediate and long-term, on economic growth and investigate the premise that public expenditure in Vietnam encourages or discourages private investment. Utilising Vietnam's macro data from 1990 to 2016 and the autoregressive distributed lag model technique, they assess the immediate and long-term impacts of public investment on economic growth and private investment. Their approach uses neoclassical theories to assess how public and private investments affect economic growth. Their research's findings show that public investment in Vietnam during the previous period has an inverted-U-shaped pattern on economic growth, with positive benefits mostly starting in the second year and negative consequences that limit long-term growth. Additionally, they discover that state-owned capital stock has favourable long- and short-term effects on economic growth, as does investment from the private sector, foreign direct investment, and state-owned firms. A similar inverted-U shape is seen in the projected influence of public investment on private investment, as public investment initially crowds out private investment but eventually crowds it in.

3.4. Conclusion

The section on literature has reviewed both the theoretical literature and empirical evidence on studies that have carried out to examine the relationship that exists between employment in the public and private sectors at large. Variation in theoretical and empirical findings shows that different models could be used to analyse the employment sector with regards to a crowding out effect from one employment sector to the other. Different theories underpinning this discussion include the Neoclassical Theory and the Crowding out Hypothesis. Collectively, these theories contribute to understanding the dynamics driving the employment sector in general.

Various empirical studies were reviewed that examined the crowding out hypothesis pertaining to public sector employment and private sector employment. To do this, empirical literature was reviewed from studies looking at the crowding out as well as the crowding in aspect. Of the crowding out studies, the majority of them pointed towards a comprehensive crowd out effect of

private sector jobs. Implying that through every public sector job that is created, the result of this is a loss of a job in the private sector. The studies which looked at the crowding in hypothesis indicated that the expansion of the public sector employment actually had a positive impact on private sector employment. However, one of the many requirements needed for this to take place is a thriving economy.

For South Africa, to the best of the author's knowledge, there has not yet been a study that is looking at the nexus between public and private sector employment in South Africa, more especially the perspective of whether public sector employment crowds out employment in the private sector. Previous studies pertaining to South Africa regarding the crowding out hypothesis have primarily focused on the finance and growth aspect (Biza et al (2015)). The study differs from this study in that it examines the crowding out hypothesis from the point of view of employment and not necessarily finance and growth.

4. CHAPTER 4

DATA AND METHODOLOGY

4.1. Introduction

The review of literature in the previous chapter and the analysis of the South African employment sector in Chapter 2 have shed some light on the link between public sector employment and private sector employment over a long run period. This section of the study primarily discusses the empirical approach that the study has employed in analysing the effect of public sector employment on private sector employment in the case of South Africa. This section covers the research methodology, including the modelling techniques and all other econometric tools that were utilised to analyse the link between the variables.

This section is divided into several sub-sections, covering the introduction as 4.1. Subsequent to the introduction in section 4.1, sections 4.2 and 4.3 present the model specification and theoretical framework used in the study, respectively, and address research methodologies accessible for data collecting and analysis as well as the approach that was used in this study. The discussion on the definitions of variables and *a priori* expectations are provided in Section 4.4. Section 4.5 presents the sources of the data. A summary of the study's estimation methods is given in section 4.6, and the chapter is concluded in section 4.7.

4.2. Research Methods and Data Collection

The positivist approach has been opted as the philosophical stance for this research, and it emphasises the use of empirical evidence, observable phenomena, and objective measurements, often through quantitative methods. Positivism assumes that reality is objective and measurable, independent of human perception. Bryman (2016) states that Positivism is a research philosophy that asserts that the social environment may be examined using the same scientific methods as are employed in the natural sciences. Positivism places an emphasis on observation, reason, and empirical confirmation.

The method adopted for this research study as well as the analysis of data is documented in this section. A quantitative approach has been adopted for this study.

4.2.1. Research Design

The research design refers to the overall strategy and analytical approach that have been chosen in order to integrate, in a coherent and logical way, the different components of the study (De Vaus, 2001). It provides a rational foundation for the judgements that are made when anticipating and outlining the seemingly endless choices involved in carrying out data collection, processing, and analysis (Selltiz, 1962). It outlines the overall research strategy that creates a logical and explicit plan to gather, evaluate, analyse, and debate data in order to answer specific research questions (Wright et al., 2016).

This study employs a quantitative research technique approach since the samples of the variables are big and representative of a wider population, necessitating the quantification of the data collected. Data collection was done methodically and objectively using formal instruments and structured methods, and statistical procedures needed for the analysis. Xiong (2022) states that the quantitative research approach explains, analyses, and tests hypotheses using the numerical data collected for a certain period to generate statistical conclusions. The approach can be used to try and identify averages and trends, evaluate causality, forecast outcomes, and extrapolate findings to a larger population (Bhandari, 2020). Since the quantitative approach is based on numbers and techniques that other academics can objectively develop and generate, it is thought to be more trustworthy (Williams, 2007).

Conversely, in qualitative research, non-numerical data must be generated in order to gain a deeper understanding of people's concepts, behaviours, experiences and beliefs. The method is recognised for its capacity to provide “a new dimension to interventional studies” that are gained via the simple measurement of variables (Williams, 2007). It centres on interpreting a research issue as an idealistic and humanistic approach (Bhandari, 2020). Interview studies, observational studies, and documentary analysis of several written records are among the categories of the qualitative research approach (Williams, 2007).

4.2.2. Data Sources

This study uses the quantitative method and data was collected from sources such as Statistics South Africa (StatsSA), the South African Reserve Bank (SARB) statistical data base, the International Labour Organization (ILO), the Fraser Institute for Economic Freedom data base as well as the International Monetary Fund (IMF) World Economic Outlook (WEO) for statistical analysis on the

crowding out effect based on the chosen variables from 2000 to 2022. Quarterly time series data was collected for all the variables within the years that have been identified by the study. This period is significant because it provides a sufficient number of observations. It is also a critical phase in the country's history when it was a period just after the apartheid regime when government employment expanded massively, and the economy was open with more activities in

both the private and public sector. Furthermore, this period will assist in producing results that are frugal and unbiased. The main advantage of this method is that it produces outcome data that is accurate, trustworthy, and typically applicable to bigger populations. The Qualitative approach will not be utilised as this is a largely statistical and numerical study that is being pursued here.

4.3. Model Specification

To analyse the nexus between public employment and private employment in South Africa, the study is underpinned by the Neoclassical theory as well as the Crowding out Hypothesis discussed in the literature review section. this study adopted the model of. Based on the two theories, the study proposes that an increase in the public sector employment will result in a decline in the private sector (crowd out effect) through various aspects. Based on this as well as the work of Behar and Mok (2013) as well as Behar and Mok (2019), the following model is adopted:

$$Prvemp_t = \beta_0 + \beta_1 Pubemploy_t + \beta_2 X_t + \varepsilon_t \quad (4.1)$$

The subscripts t identifies the period; this also indicates that the variable is observed at time t . The term $Prvemp$ is the private employment rate. This is the dependent (response) variable at time t . The subscript t indicates that the variable is observed at time t . This variable represents the private sector labour market. $Pubemploy$ is the public employment rate. This is the key explanatory (independent) variable. The subscript t again indicates that this variable is observed at time t . This represents the public sector labour market. This will elucidate the interpretation of the effect of public employment on the dependent variable. β_0 is the coefficient on the period dummy. It is the intercept term. It represents the baseline level of $Prvemp_t$ when all other explanatory variables are equal to zero. It is a constant and does not change over time. β_1 is the coefficient for the variable $Pubemploy$, which is a public employment variable. The coefficient β_1 measures the effect that a one-unit change in $Pubemploy$ has on $Prvemp$, holding all other factors constant. In other words, it quantifies the relationship between public employment and private employment levels. β_2 is the coefficient for X_t ,

which represents a vector of other explanatory variables. These are a few factors that have been added to the model that may affect the dependent variable *Prvemp*, these are Unemployment rate, GDP, Labour market regulation and Openness, Hiring & Firing Regulations, Centralised Collective Bargaining. These additional variables were added to accommodate the South African context. ε is the error term or residual at time t . It accounts for the variation in *Prvemp* that cannot be explained by the model's predictors (i.e., *Pubemploy* and X_t). It captures all unobserved factors that affect *Prvemp*.

4.4. Definition of variables and *a priori* expectations

The following section discusses the study's relevant variables along with the a priori likelihood of the association between the independent and dependent variables.

4.4.1. Dependent variable

Private employment rate

The dependant variable in the above model is private employment rate (PRIVATEEMPLOYCHANGE). This relates to the jobs that are being created by the private sector. According to Birt (2023), “the portion of the economy owned, run, and governed by people and institutions looking to make money is known as the private sector”. Private sector businesses are often not subject to state ownership or control. These companies are the ones tasked to employ individuals who would be considered as being under the private sector employment. Algan et al (2002), provides clarity on how the government directly replaces private sector jobs through more alluring perks or wages. It is therefore expected that private sector jobs will be crowded out by additional public sector jobs.

4.4.2. Independent variables

Public employment rate

The public employment rate (PUBLICEMPLOYCHANGE) in the equation relates to the jobs that are being created by the public sector. This is the main variable being considered as the major factor in determining whether there is crowding out or not. According to Lazzari (2019), Teachers, police officers, firefighters, and many more vital positions necessary to preserve a secure and effective community are employed by the public sector. Jobs in the public sector are subsidised by taxpayers,

and the sector is not revenue driven. This is an important variable of the study as the coefficient of public sector employment can confirm crowding in or out. Either a positive or negative outcome is expected.

Unemployment rate

According to Layard, Nickell, and Jackman (2005), unemployment (UNEMPLOYMENT) entails incalculable psychological costs in addition to typically lowering output and income and increasing inequality and human capital erosion. Moreover, unemployment reduces a young democracy's prospects of surviving (Kapstein and Converse, 2008). According to the Keynesian theory, for instance, if government expenditure rises but all other spending factors stay the same, output will rise as well, which would lead to the creation of jobs. It is expected that as the government increases its resources through employing more people, the unemployment levels will decrease. However, it is expected that unemployment will have a negative impact on private sector employment.

Labour market regulations

This is a general term for a number of laws and policies whose main objective is to control the labour market. In their study, Behar and Mok (2019) include an index with a grading system from 0 to 10, where higher numbers correspond to more open employment markets. These include minimum wage and hiring policies, centralised collective bargaining, limits on hiring and firing, rules about working hours, mandatory costs associated with worker termination, and conscription. With the stringent labour practices in South Africa, it is expected that these will have a restrictive role on private employment. The study will utilise a measure drawn from the Education Finance Watch (EFW) database, specifically the labour market regulations (LMR), hiring and firing regulations (HFR) and centralised collective bargaining (CCB) to determine the stringency level.

Gross Domestic Product (GDP)

GDP (GDPGROWTH) in the equation represents the growth of the economy. Generally, growth prospects can promote private sector investment and employment. A positive effect of GDP on private sector employment will be expected. According to OECD Data (2024), GDP is a commonly used indicator of the value added generated by a nation's production of goods and services over a specific time period, thus, it also calculates the revenue from that output, or the total amount of money (less imports) spent on finished goods and services.

Trade Openness

Trade openness (LROPE) is the ratio of trade to GDP. It can also be referred to as the 'Trade Openness Index'. It is the total of goods and services imported and exported, divided by the GDP and given as a percentage. It shows how significant foreign trade is in relation to a nation's economy. The effect of trade openness on employment is mixed. According to Behar & Mok (2019), openness can also affect public employment. On the other hand, Asaleye (2017), shows trade has been harmful to employment generation. Conversely, trade openness has helped countries achieve more inclusive growth and reduce income inequality, according to Dollar & Kraay (2003), Anand et al. (2013), Barro (2000), and Raheem et al. (2016). Accelerated trade openness is anticipated to raise prices and demand for unskilled labour, which will lead to an increase in the unequal supply of wages in high-skilled labour abundant economies and a decrease in the equal supply of wages in low-skilled labour abundant economies, per the Heckscher-Ohlin and Stolper-Samuelson theoretical frameworks (Anyanwu, 2016). It is expected that 'openness' will have a negative relationship with private employment as South Africa is still considered a developing nation.

4.5. Estimation Techniques

Choga (2008) states that there are several approaches for estimating parameters, from cointegration-based strategies to traditional regression methods. The foundation of the classical regression approach is the presumption that the variables included in the regression model will remain stationary. Furthermore, estimates derived from this technique will be worthless because the majority of economic series exhibit non-stationarity in their values. Consequently, the methods used to check for stationarity and cointegration are reviewed in this section.

Examining the short- and long-term parameters among the variables of interest was one of the study's goals. To do this, the Autoregressive Distributed Lag (ARDL) methodology, which was presented by Pesaran & Sin (1998), and the error correction method (ECM) were used. Unit root tests were used to determine the time series qualities of the variables prior to using this method of cointegration.

Belloumi (2012) states that the ARDL I test is predicated on the assumption that the variables are $I(1)$ or $I(0)$. Therefore, before running the test, the order of integration of all variables is ascertained by the use of unit root tests. To prevent spurious results, the goal is to make sure that the variables

of interest are not $I(2)$. The F statistics results reported by Pesaran et al. (2001) cannot be interpreted in the case of variables that are integrated of order two (Belloumi, 2012).

One of the main advantages of ARDL is its ability to handle variables that are integrated of different orders (i.e., $I(0)$ and $I(1)$), unlike traditional cointegration techniques like the Johansen test, which require all variables to be $I(1)$. This flexibility allows ARDL to be applied to real-world data where variables may have different levels of integration Pesaran et al (2023). The ARDL model allows for the estimation of both short and long-run dynamics in a single framework. By incorporating lagged values of the dependent and independent variables, it provides a more nuanced understanding of how variables influence each other over different time horizons Pesaran et al (2023). ARDL is particularly useful for investigating cointegration relationships, especially when the variables do not have the same order of integration. If the model detects a stable long-run relationship between the variables, it can be used to test the cointegration without needing to transform the data Pesaran et al (2023).

4.5.1. Unit Root Test

Stationarity tests are performed on the model's variables. These tests are estimated to determine the order of integration of the variables which were employed in the study to avoid spurious regression which may result from non-stationary data, which could lead to conclusions which are wrong. The first action to take when a time series shows signs of non-stationarity is to vary the time series before it stabilises. As alluded to earlier, once this is done, the time series will be integrated to order d and expressed in the format $I(d)$. The time series is stationary, as indicated by the $I(0)$ series, and the variables include one unit root in the case of $I(1)$ and two-unit roots in the case of $I(2)$. Thus, in order to achieve stationarity status, $I(1)$ and $I(2)$ must diverge once and twice, respectively (Choga, 2008).

Variables of relevance should have their stationarity checked for this reason (Belloumi, 2012). In order to accomplish this goal, the present study will use the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests to determine the order of integration of the variables before utilising the cointegration strategy. This section goes into great detail on the two approaches.

4.5.1.1. The Augmented Dickey Fuller (ADF)

The Dickey-Fuller (DF) test and the Phillips Perron tests are the two most popular unit root tests. According to Xiao and Phillips (1998), the DF test is based on the regression of the observed variable on its one period lagged value, occasionally including an intercept and temporal trend. (Said & Dickey, 1984) state that the Dickey-Fuller i-test for a unit root, which was first created for AR representations of known order, remains asymptotically valid for a general ARMA process of unknown order. This is a crucial expansion of (Dickey & Fuller, 1979). The Augmented Dickey-Fuller (ADF) test is the common name for the r-test (Xiao & Phillips, 1998). The Dickey-Fuller test (DF), created by Dickey and Fuller (1979; 1981), was improved upon by the ADF test. The DF test yields lower findings than the enhanced ADF test because it lacks autocorrelation by incorporating more lagged terms of the dependent variable. The ADF is given by the following equation:

$$\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=1}^p \beta_i \Delta y_{t-i} + u_t \quad (4.2)$$

The equation shows that: $\Delta Y_t = Y_t - Y_{t-1}$; $\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$ etc., and the number of lags to be included is empirically determined using Schwarz information criteria.

The same critical values for the DF are calculated by Monte Carlo simulation in Mackinnon, Haug and Michelis (1999) as the distribution is not standard. The test proceeds by testing the significance of the coefficient of Y_{t-1} . The augmenting is done to remove possible autocorrelation among error terms. In the event that the calculated values are greater than the critical values, we reject the null and state that the variable is stationary.

4.5.1.2. Phillips Perron

Tripathy (2011) states that a number of unit root tests that were created by Phillips and Perron (1988) have gained popularity in the study of financial time series. The way that the ADF tests and the Phillips-Perron (PP) unit root tests handle serial correlation and heteroskedasticity in the errors is where they diverge. Specifically, the PP tests disregard any serial correlation in the test regression, whereas the ADF tests employ a parametric autoregression to simulate the ARMA structure of the errors in the test regression.

In order to determine if a unit root is present in a given time series, Phillips (1987a) suggests an alternate semiparametric method that is further developed in Phillips and Perron (1988) (Xiao & Phillips, 1998). The Augmented Dickey-Fuller test (ADF) and the Phillips-Perron (PP) test are

similar; however, the regression does not incorporate initial difference lag values. Additionally, the Phillips-Perron (PP) test corrects the test statistics and is more resilient to autocorrelation and undefined heteroscedasticity in the errors than the Augmented Dickey-Fuller (ADF) test (Xiao & Phillips, 1998).

The regression for the Phillips-Perron test is the AR(1) process given as:

$$\Delta y_{t-1} = \alpha_0 + \gamma y_{t-1} + e_{t-1} \quad (4.3)$$

One of the advantages of the PP test is that it corrects for higher order serial correlation by adding lagged differenced terms on the right-hand side. This test makes a correction to the *t statistic* of the coefficient γ from the AR(1) regression to account for the serial correlation in e_t .

Cointegration Tests

Cointegration tests are essential for figuring out the order of integration. According to Gujarati (2002: 830), the presence of cointegration between two or more time series indicates the existence of an equilibrium or long-term link between them. According to the economic interpretation of cointegration, if two or more series are connected to create an equilibrium connection over an extended period of time, their difference will be stationary, and they will move closely together over time even though the series themselves may not be stationary. Gujarati (2002) states that the equilibrium to which the system converges over time is the long-run relationship, and the disturbance term can be understood as the disequilibrium error or the system's distance from equilibrium at time t .

To find out if there is cointegration between variables, a number of tests can be used. These techniques include the Engle Granger method, the Auto-Regressive Distributed Lag approach (ARDL), and the Johansen cointegration tests. Due to its many benefits, the Auto-Regressive Distributed Lag (ARDL) technique was chosen for this study. The main benefit of using the approach is that, in comparison to other tests, it is a statistically suitable method for assessing the validity of the cointegration relationship in studies with small sample sizes (Khelifa, Guesmi, & Urom, 2021); it provides reliable results for cointegration analysis with small sample sizes (Majid, 2008); and it is helpful when the variables of interest have different integration orders (Oluseye & Gabriel, 2017).

Qamruzzaman, Karim, and Jahan (2021) state that the ARDL model, which consists of 30 observations, is better than either restricted or finite, regardless of sample size (Ghatak & Siddiki, 2001). Since the sample size in this study is 92, the approach is applicable to smaller sample sizes ranging from 30 to 80 observations (Narayan, 2004 & 2005). For this reason, the model is being used in this study. In situations when some of the variables are endogenous and independent of the characteristics of the unit root dataset, the method also yields unbiased estimates of the long-run model (Khobai, 2017). In addition to avoiding issues such false relationships resulting from non-stationary time series data, the ECM integrates long-run equilibrium with the short-run dynamics without omitting long-run information (Shrestha & Batta, 2017).

Preliminary testing of variables of interest for unit root problems is not required when ARDL models are used because the estimation can variables which are integrated of different orders, that is $I(0)$ and $I(1)$ variables; though it cannot be estimated with $I(2)$ series (Oluseye & Gabriel, 2017). For this reason, unit root tests were carried out in the study, as was previously mentioned. According to Libanio (2005), the presence of a unit root indicates that the time series under examination is non-stationary, whereas its absence suggests that the stochastic process is stationary.

4.5.1.3. Autoregressive Distributed Lag (ARDL) Bound Test Approach for Cointegration

The ARDL cointegration technique is used to empirically assess the long-run relationships among the variables as well as the short-run dynamic interactions. When assessing the long-term relationship, Oluseye & Gabriel (2017) state that a two-step process is employed. Since the first step predicts the occurrence of a long-term relationship between the variables, the ARDL framework error correction process (Pesaran & Shin, 1998) pertaining to the variables shown in equation (4.1) in section 4.3 above is presented as follows:

$$Prvemp_t = \beta_0 + \sum_{i=1}^p \alpha_i Prvemp_{t-i} + \sum_{j=0}^{q1} \beta_j Pubemploy_{t-j} + \sum_{k=0}^{q2} \gamma_k X_{t-k} + \varepsilon_t \quad (4.4)$$

Where:

$Prvemp_t$: Private employment at time t

$Pubemploy_t$: Public employment at time t

X_t : Control variables (*Unemployment rate, GDP, Labour market regulation and Openness, Hiring & Firing Regulations, Centralised Collective Bargaining*)

$p, q1, q2$: optimal lag lengths for respective variables

The bound tests approach is used to examine whether there is a long-run link between the variables. The F-statistic with a non-standard distribution forms the basis of the test. The null hypothesis is accepted, suggesting that there is no cointegration, in the case when the F-statistics are determined to be below the lower bound critical value, ($\phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = \phi_6 = \phi_7 = \phi_8 = 0$). Moreover, the null hypothesis is rejected, suggesting cointegration in the event that the computed F-statistic is found to be bigger than the upper bound critical value. There is an inconclusive outcome when the F-statistic falls between the upper and lower bound critical values

Long run model

The long-run model below can be estimated after establishing the presence of cointegration among the variables.

$$Prvemp_t = \alpha_0 + \sum_{i=1}^p \alpha_1^i Prvemp_{t-i} + \sum_{j=0}^q \alpha_2^j Pubemploy_{t-j} + \sum_{k=0}^r \alpha_3^k X_{t-k} + \varepsilon_t \quad (4.5)$$

Where:

α : Short-run coefficients

p, q, r : Lag lengths, selected

The following is the ECM Model:

The lag orders are selected by employing the Akaike Information Criteria to establish the ARDL specification optimal structure. After estimating the ARDL specification as well as calculating the associated long-run multipliers, below is the error correction model that is formulated to estimate the short-run dynamics.

$$\Delta Prvemp_t = \lambda (Prvemp_{t-1} - \beta_0 - \beta_1 Pubemploy_{t-1} - \beta_2 X_{t-1}) + \sum \delta_i \Delta Z_{t-i} + \varepsilon_t \quad (4.6)$$

Where:

λ is the speed of adjustment

In establishing stability of the short-run and long-run coefficients, the CUSUM and CUSUMSQ tests are applied to the residuals of the equation to assess whether the two statistics remain within 5% significant level.

4.6. Diagnostic tests

“Diagnostic checks test the stochastic properties of the model, such as residual autocorrelation, heteroskedasticity and normality, among others” (Tiwati, 2012). This section is vital for the analysis of the nexus between public sector employment and private sector employment as it confirms parameter estimation outcomes achieved by the estimated model. The purpose of the ARDL result diagnostic tests was to evaluate the validity of the fitted model. A test was conducted to determine whether serial correlation is present in the residuals. To determine whether the residuals are regularly distributed, normality tests were run.

To determine if the residuals are homoscedastic, the heteroscedasticity test was utilised. According to Brooks (2008), "there are several formal statistical tests for heteroscedasticity. One well-liked test is the universal heteroscedasticity test developed by White in 1980. The test is helpful since it makes several assumptions, one of which is that the calculated regression model follows a typical linear form. Following the regression, the residuals are calculated, and the joint significance of the regression is assessed by regressing each residual product on the cross products of the regressors. For the White test, homoskedasticity is the null hypothesis. If the null hypothesis is not rejected, homoskedasticity is the result. Then there is heteroscedasticity if the null hypothesis is rejected. Cumulative sum of squares and cumulative sum (CUSUMSQ and CUSUM) were used to test the stability of the long-run coefficients with the short-run dynamics.

4.7. Conclusion

This chapter presented the strategy that was employed during the data collection process and determined the study's methodology. There was discussion of the different data sources and how information will be gathered from them. It also covered the estimation of the model that was used to conduct the empirical analysis on the relationship between employment in the public and private

sectors in South Africa. The model contains a number of variables that, according to theory, are significant factors influencing the country's employment sector. The approach that was selected and investigated to be used to experimentally evaluate the long- term relationships and short-run dynamic interactions among the variables of interest was the ARDL cointegration technique. A log-level ARDL error correction representation strategy is used if a cointegrating relationship between the variables is found and the null hypothesis of no cointegration is rejected. The suitability of the ARDL error correcting models were also evaluated using a battery of stability and diagnostic tests.

5. CHAPTER 5

EMPIRICAL ANALYSIS AND DISCUSSION

5.1. Introduction

The analysis of the data is presented in this chapter in order to address the question as set out in chapter 1, which was the study's overall objective. Finding out whether employment in the public sector in South Africa crowds out employment in the private sector is the main goal. The outcomes of the model estimated in Chapter 4 are further presented in this chapter. According to theory, several of the independent factors of interest selected for this study have a significant impact on how jobs in the private sector are affected. Therefore, the purpose of this chapter is to present the results based on the models presented in the previous chapter. The analysis seeks to evaluate the estimated effects on Private Sector Employment (PRIVATEEMPLOYCHANGE) by Public Sector Employment (PUBLICEMPLOYCHANGE), Gross Domestic Product (GDPGROWTH), Trade Openness (LROPE), Centralised Collective Bargaining (CCB), Hiring and Firing Regulations (HFR), Labour Market Regulations (LMR), and Unemployment (UNEMPLOYMENT).

There are six subsections in this chapter. Descriptive statistics are presented in section 5.2 after the introduction. Stationarity, Lag Length, and Bound Test are given in Section 5.3. The ARDL estimation is shown in Section 5.4. Stability test results are presented in section 5.5. The conclusion to the chapter is presented in section 5.6. The aforementioned subsections serve as a roadmap for precisely analysing the data in order to get the empirical findings. Descriptive statistics show what kind of information is contained in the data, such as whether or not there are any outliers. In order to prevent the problems of spurious regression biased results, stationarity and proper lag duration selection is essential. The Bound Test is a crucial step in determining whether the long-term relationship between the variables of interest is cointegrated, and stability tests verify that the model is appropriately described.

5.2. Descriptive Statistics

The term ‘descriptive statistics’ describes a set of measurements that have two characteristics: variability and location. According to Cooksey (2020), location indicates the central value of the

variable, with mean values being the most widely used metric. Variability, on the other hand, describes the data spreading from the centre value (variance, standard deviation, etc.). It is crucial that this stage be completed in order to ascertain the message that the sample delivers before moving forward with any regression analysis.

Since this study uses time series data (Asteriou D & Hall, 2007), logs of several variables were obtained in order to simplify the modelling and, in the unlikely event that an exponential trend exists, to effectively linearise it (Oluseye & Gabriel, 2017). The summary statistics for the variables considered in this study are provided in Table 5.2.1. The Private Sector Employment (PRIVATEEMPLOYCHANGE) and Public Sector Employment (PUBLICEMPLOYCHANGE) are 0.53 and 1.53, respectively, according to the descriptive statistics in the table. In contrast, the average values for Centralised Collective Bargaining (CCB), Trade Openness (LROPE), Gross Domestic Product (GDPGROWTH), and Hiring and Firing Regulations (HFR) are, respectively, 0.44, 12.92, 3.91, and 6.19. The average values for unemployment (UNEMPLOYMENT) and Labour Market Regulations (LMR) are 26.21 and 6.45, respectively.

For variables like PUBLICEMPLOYCHANGE and UNEMPLOYMENT, the statistics of skewness, which gauge the degree of asymmetry of the series around its mean, showed positive skewness, suggesting that the distribution had a lengthy right tail with higher values than the sample mean. Negative skewness is shown for the remaining variables, suggesting that the distribution has a long-left tail with more values below the sample mean.

Additionally, the kurtosis value of LROPE, CCB, HFR, and LMR is platykurtic, indicating that the distribution has a flat surface in relation to the normal, while the kurtosis value of the remaining variables is leptokurtic, indicating a peaked distribution. Kurtosis measures the flatness or peakness of the series' distribution. Since kurtosis = 3 and mesokurtic = 3, none of the variables have a fully normal distribution.

The null hypothesis of a normal distribution is rejected for PRIVATEEMPLOYCHANGE, PUBLICEMPLOYCHANGE, and GDPGROWTH because the probability values for these variables are highly statistically significant, in contrast to LROPE, CCB, HFR, LMR, and UNEMPLOYMENT, which are more normally distributed, according to the Jarque-Bera statistic, which measures the difference between the kurtosis and the skewness of each of the variables from those that are normally distributed.

Table 5.2. 1: Descriptive Statistics

	PRIVATEEMP LOYCHANGE	PUBLICEMPL OYCHANGE	GDPGROWTH	LROPE	CCB	HFR	LMR	UNEMPLOYMENT
Mean	0.528	1.525	0.436	12.916	3.906	6.185	6.449	26.207
Median	0.700	1.050	0.600	13.047	4.060	6.640	6.510	25.400
Maximum	9.60	31.800	16.800	13.448	4.670	6.640	7.000	35.300
Minimum	-27.800	-22.700	-20.300	12.142	2.790	5.230	5.970	21.000
Std. Dev.	4.056	6.843	2.937	0.327	0.536	0.591	0.294	3.235
Skewness	-3.824	0.344	-1.865	-0.723	-0.687	-0.873	-0.104	1.079
Kurtosis	27.861	7.878	38.626	2.324	2.633	1.993	1.728	3.811
Jarque-Bera	2593.654	93.056	4918.873	9.767	7.753	15.583	6.365	20.388
Probability	0.000	0.000	0.000	0.007	0.020	0.000	0.041	0.000
Sum	48.600	140.300	40.200	1188.301	359.400	569.040	593.320	2411.100
Sum Sq. Dev.	1497.527	4261.672	785.454	9.784	26.171	31.886	7.916	952.364
Observations	92	92	92	92	92	92	92	92

Table 5.2. 2: Correlation Matrix

Covariance Analysis: Ordinary								
Date: 07/18/24 Time: 18:13								
Sample: 1 92								
Included observations: 92								
Correlation								
Probability	PRIVATEEMP LOYCHANGE	PUBLICEMPL OYCHANGE	GDPGROWTH	LROPE	CCB	HFR	LMR	UNEMPLOYMENT
PRIVATEEMPLOYCHANGE	1.000							
PUBLICEMPLOYCHANGE	0.079	1.000						
	0.449	-----						
GDPGROWTH	0.586***	0.037	1.000					
	0.000	0.725	-----					
LROPE	-0.043	0.061	0.031	1.000				
	0.683	0.562	0.762	-----				
CCB	-0.051	-0.107	0.027	-0.394**	1.000			
	0.628	0.306	0.794	0.000	-----			
HFR	-0.173*	0.074	-0.0306	0.923**	-0.462***	1.000		
	0.097	0.478	0.771	0.000	0.000	-----		
LMR	0.0007	0.0005	0.030	0.533**	0.138	0.399***	1.000	
	0.994	0.995	0.775	0.000	0.189	0.0001	-----	
UNEMPLOYMENT	-0.036	-0.082	0.249	0.287**	0.306***	0.212**	0.336***	1.000
	0.734	0.435	0.017	0.006	0.003	0.042	0.001	-----

Note:

*** Correlation is significant at the 0.01 level of significance

** Correlation is significant at the 0.05 level of significance

* Correlation is significant at the 0.1 level of significance

The statistical correlation coefficients between the variables are presented in detail in the correlation matrix shown in Table 5.2.2. The link between the variable and other variables is shown by the off-diagonal values in the plot, while the diagonal represents the behaviour of the variable with itself. The table's findings indicate that while LROPE, CCB, HFR, and UNEMPLOYMENT point to a considerably negative relationship, GDPGROWTH, LMR, and PUBLICEMPLOYCHANGE show a significantly positive link with the dependent variable (PRIVATEEMPLOYCHANGE). The main primary dependant variable in the study is private sector employment. The correlation of between private sector employment and public sector employment which are the main variable of interest is 0.08 which shows a weakly correlation between the two variables. It is also interesting to note that the correlation is positive which suggest that the two variables move together.

It is also noteworthy that GDPGROWTH has the strongest association, at nearly 60%. This suggests that a significant contributing factor to the fluctuation in PRIVATEEMPLOYCHANGE for the data under examination is the growth in the gross domestic product. This implies that a thriving economy would lead to a surge in private sector jobs. Conversely, there is a noteworthy negative association between HFR and PRIVATEEMPLOYCHANGE, and the similar result is observed for CCB. This indicates that the stricter the labour market regulations in the country the less jobs there will be in the private sector.

5.3. Unit Root Tests

The results of the unit root tests are presented in this part to demonstrate the time series properties of the data. The study utilised two tests: 1) graphical analysis-based informal testing for stationarity. Before performing any formal tests, the first stage in the analysis of any time series is to perform a visual depiction of the data, which is known as a graphical analysis. 2) Formal tests to be used are the Augmented Dickey Fuller (ADF) and Phillip Peron tests to identify the order of integration, that is, the number of times the variables need to be differenced to arrive at stationary level. Graphical analysis is important because it allows for the detection of any data capturing errors and checks for structural breaks and drifts that may bias the unit root tests and gives an idea of the trends and stationarity of the data set. One test may not be completely reliable, hence ADF and PP are utilised jointly.

Figure 5.3. 1: Graphical Plots of Key Variables at Level Series

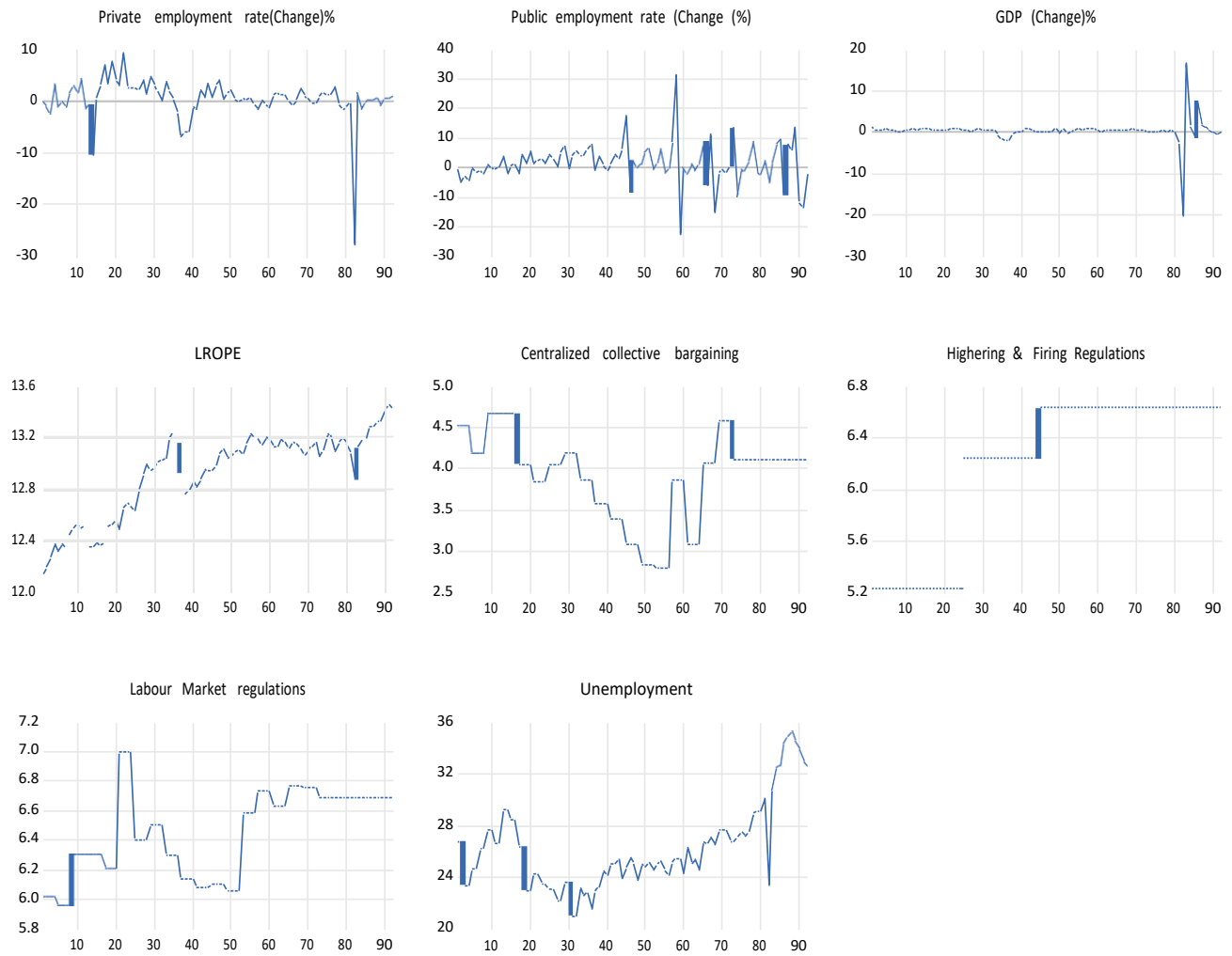


Figure 5.3. 2: Graphical Plots of Key Variables at First Difference Series

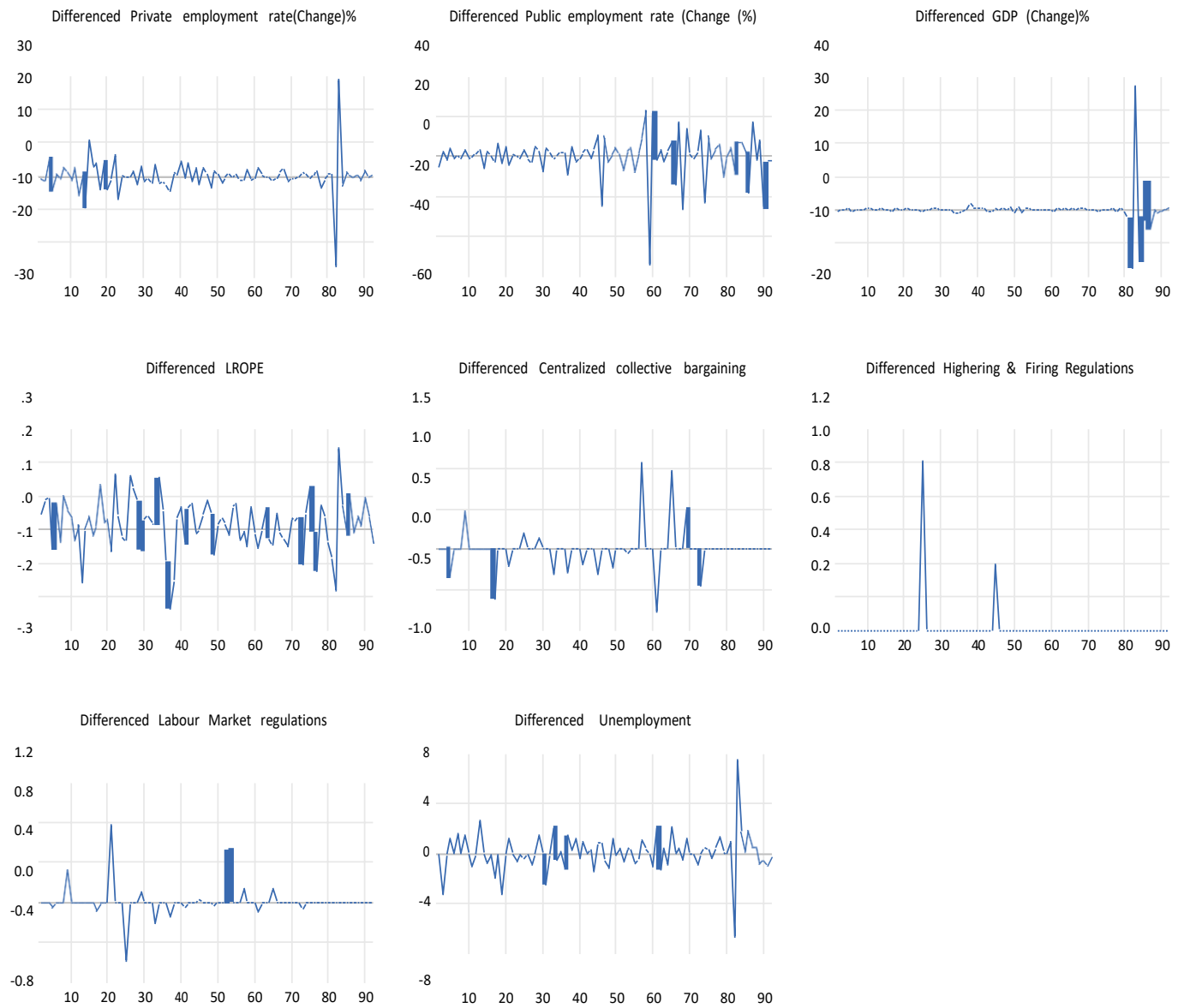


Table 5.3. 1: Unit root tests: Level Series

Variables	Augmented Dickey Fuller (ADF)			Phillips Perron (PP)		
	C (Trend and Intercept)	C & T (Intercept)	N (None)	C (Trend and Intercept)	C & T (Intercept)	N (None)
PRIVATEEMPLOYCHANGE	-7.822380***	-7.595239***	-7.529067***	-7.930635***	-7.803199***	-7.751686***
PUBLICEMPLOYCHANGE	-11.115812***	-11.178476***	-10.608144***	-11.299995***	-11.368287***	-10.60758***
GDPGROWTH	-12.888755***	-12.96175***	-12.646935***	-12.888755***	-12.961751***	-12.80601***
LROPE	-2.795620	-1.920218	1.656783	-2.821202	-1.897758	2.024312
CCB	-2.033061	-2.143964	-0.478300	-2.097384	-2.206195	-0.478300
HFR	-1.549121	-1.475208	1.155445	-1.549121	-1.472902	1.167044
LMR	-2.745126	-2.319557	0.435405	-2.889341	-2.387053	0.435405
UNEMPLOYMENT	-2.158521	-1.100244	0.423049	-2.581451	-1.522473	0.546997

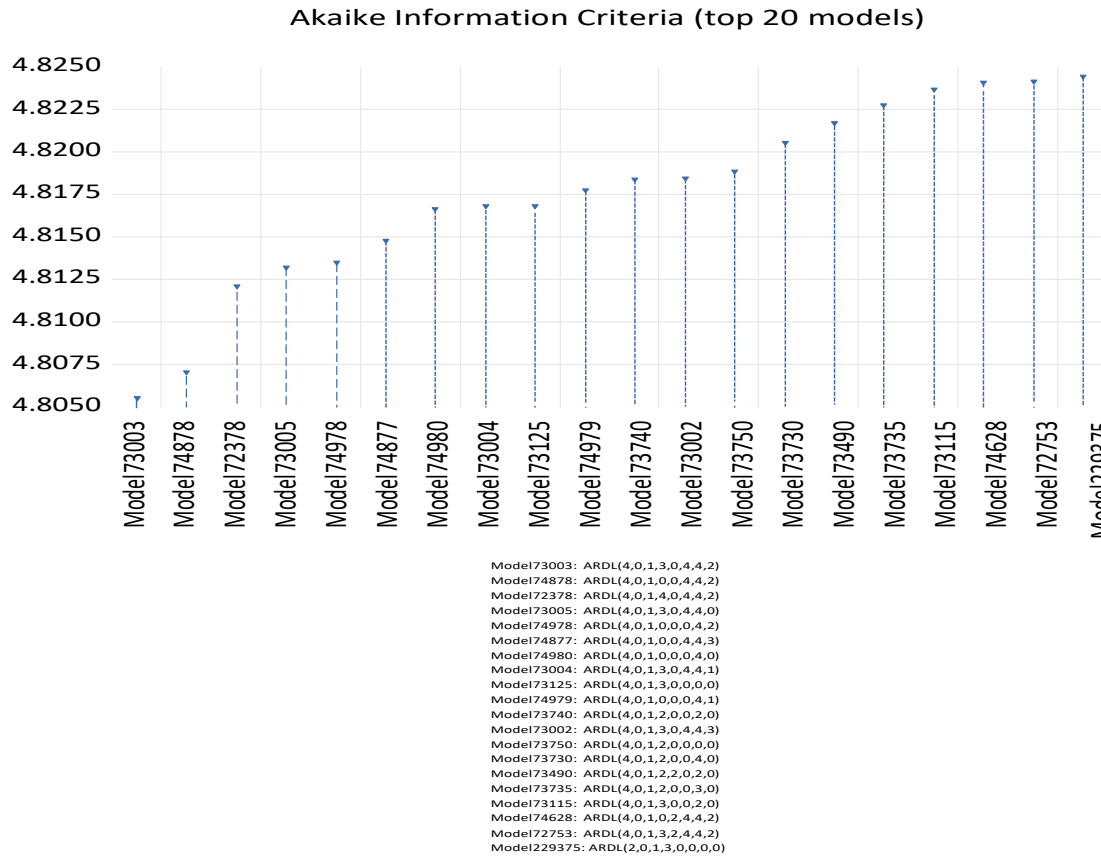
Note: ***represents significance at 1%; ** significance at 5% and * significance at 10%

The Augmented Dickey Fuller and Phillips Perron tests were performed to check for the presence of unit roots in the study's variables. These assessments were carried out at the level, and figures 5.3.1 and 5.3.3 present the findings (both official and informal, respectively). It is effective to utilise the Autoregressive Distributed Lag (ARDL) approach for this study since the results show that while the other variables are non-stationary at level, PRIVATEEMPLOYCHANGE, PUBLICEMPLOYCHANGE, and GDPGROWTH are stationary at level according to the PP and ADF unit root tests.

5.4. Lag length criteria and Bounds Test

Based on the findings of the Akaike Information Criterion, a maximum lag order of 1 is selected since the cointegration F-statistic computation is quite sensitive to the lag length selection (see Figure 5.4.1). With p being the maximum number of lags and k being the number of variables in the equation, the first stage of the ARDL estimation produces a $(p+1) \times k$ number of regressions so that the optimal lag length for each variable is obtained (Menegaki, 2019). One of the most important aspects of using ARDL is selecting the distributed lag function's order (Dizaji, 2012). Pesaran & Smith (1998) state that because the Akaike information criterion typically has more parsimonious specifications, it should be utilised as a preference to alternative model specification criteria. This idea is further supported by the study's small data sample. the number of variables in the equation ($k=8$) and the maximum number of delays ($p=1$). Since there is a long-term correlation between the variables, ARDL co-integration is used to estimate the parameters, and a maximum order of 1 is chosen to help minimise the loss of degrees of freedom.

Figure 5.4. 1: Lag Length Selection



ARDL Bounds Test results Model

Table 5.4.1 presents the results of the ARDL Bounds Test model.

Table 5.4. 1: Cointegration Test

F-Statistic			5.88*			
Level of Significance						
	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
80	2.02	3.05	2.34	3.46	3.02	4.35
Asymptotic	1.92	2.89	2.17	3.21	2.73	3.90
* I(0) and I(1) are respectively the stationary and non-stationary bounds.						

Note: ***represents significance at 1%; ** significance at 5% and * significance at 10%

Table 5.4.1 shows that the calculated F statistic for the bounds test of 5.88 (refer to Table 5.4.1) is greater than both the critical values of the upper bound value, I(1), which is 3.46, and the lower

bound value, $I(0)$, which is 2.34. These results imply that cointegration exist, and the null hypothesis of no cointegration should be rejected. This implies that, at the 1%, 5% and 10% significance level, there is a long-term link between the variables.

5.5. ARDL Long run Model

When a series exhibits cointegration or a long-term relationship, it means that even while short-term shocks could affect the movement of individual series, eventually those series will converge (Nkoro & Uko, 2016). As a result, estimations for the long- and short-term models should be made. The Akaike information criterion is used to assess the optimality of the model. The ideal number of lags for the variables is represented as Model 73003. The outcomes of the long run ARDL Approach are shown in Table 5.5.1.

Table 5.5. 1: ARDL Long-run Estimation

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
PUBLICEMPLOYCHANGE	0.149534	0.328237	0.455566	0.6500
GDPGROWTH	4.247651**	1.622944	2.617250	0.0107
LROPE	-26.99240*	14.61041	-1.847477	0.0686
LMR	4.439351	3.333235	1.331845	0.1869
UNEMPLOYMENT	-0.570967***	0.164157	-3.478167	0.0008
CCB	0.436520	1.972461	0.221308	0.8254
HFR	11.91657*	6.062003	1.965780	0.0530
C	258.7999	139.6337	1.853420	0.0677
Note: * Coefficients derived from the CEC regression				

Note: ***represents significance at 1%; ** significance at 5% and * significance at 10%

The dependent variable is private sector employment (PRIVATEEMPLOYCHANGE). The following variables are utilised as independents: centralised collective bargaining (CCB), hiring and firing regulations (HFR), labour market regulations (LMR), unemployment (UNEMPLOYMENT), trade openness (LROPE), employment in the public sector (PUBLICEMPLOYCHANGE), and the gross domestic product (GDPGROWTH). The dependent variable's change as a result of the effect of the independent variables is shown by the coefficient estimates of the independent variables and the sign.

The result shows that employment in the public sector (PUBLICEMPLOYCHANGE) may not necessarily be the primary independent variable. This study's main objective is to determine

whether employment in the public sector crowds out employment in the private sector (PRIVATEEMPLOYCHANGE). Table 5.5.1 shows that for every increase in public employment (PUBLICEMPLOYCHANGE), there is a long-term positive impact on private sector employment (PRIVATEEMPLOYCHANGE). It is insignificant even though positively related to the dependent variable. This suggests that public sector employment does not have a significant effect on private sector employment in South Africa. The results align with those of Faggio and Overman (2014), who investigate the impact of public sector employment on local labour markets. They find that while employment in the public sector influences the sectoral composition of the private sector, it has no appreciable effect on the overall amount of employment in the private sector, using English data collected at the Local Authority level for the years 2003–2007. They find that for every job created in the public sector, 0.4 jobs are removed in the tradable sectors of manufacturing and 0.5 jobs are created in the non-tradable sectors of construction and services. When they examine data over a longer time span (1999–2007), they find no multiplier impact for non-tradables, increased crowding out for tradables, and crowding out for total private sector jobs. The result is also supported by Roupakias (2021) who provides more support for this in 156 Greek towns using census data from 1981 to 2011. The author found that one more job in the public sector creates about 0.7 jobs in the non-tradable sector (construction and services), but there are no discernible effects on the tradable sector (manufacturing). The findings appear to be unaffected by different estimation methods, spillovers from nearby locations, and the addition of confounding variables. He also offers proof that the reduction in the number of governmental employees had little effect on the private sector.

However, the results contradict the findings of Behar & Mok, (2019), who's empirical results indicate that public sector employment crowds out private sector employment at aggregate level. Comparing the advanced and developing countries, the results show that the crowding out effect is more pronounced in advanced countries as compared to developing countries. The authors find that unnecessary public sector employment does not reduce the overall unemployment rate, secondly, it increases fiscal burden and lastly, inhibits growth through its reductions on private employment.

Labour market regulations (LMR) and centralised collective bargaining (CCB) are the two other variables that do not have a noticeable influence on private sector employment in the long run.

Albeit a positive impact by both variables on private sector employment but however, insignificant.

Results of the ARDL model further show that unemployment (UNEMPLOYMENT) has a significant and negative effect on private sector employment (PRIVATEEMPLOYCHANGE) in the long run. The coefficient of UNEMPLOYMENT is 0.57, indicating that an increase in initial unemployment will lead to the reduction private sector employment by 0.57 units in the long run. This implying that the private sector would be losing jobs at a faster rate. This is consistent with Layard, Nickell, and Jackman (2005), who state that unemployment entails incalculable psychological costs in addition to typically lowering output and income and increasing inequality and human capital erosion. Moreover, unemployment reduces a young democracy's prospects of surviving (Kapstein and Converse, 2008). This is also in line with the *apriori* expectation which state that unemployment tends to have a negative impact on private sector employment. This is further asserted by Marire (2022), who asserts that jobs in the private sector are eventually crowded out by government spending financed by deficits, thereby increasing unemployment, a similar observation made by De Leeuw & Holloway (1985); Mahadea & Simson (2010).

The results also shows that trade openness (LROPE) has a negative coefficient result that indicate an increase in trade openness will result in a long-term reduction in private sector employment. The result is in line with Asaleye's (2017) claim that trade has hampered the creation of jobs. Given that South Africa is still regarded as a developing country, this is also consistent with earlier projections that trade openness will have a negative association with employment in the private sector.

The results of the ARDL model show that GDP growth has a positive and significant relationship with private sector employment in the long run. This implies that the more growth there is, the more private sector employment occurs. In this case, an increase in GDP growth would lead to an increase in private sector employment in the long run. This notion is in line with the *apriori* expectations that state that a positive effect of GDP on private sector employment will be expected. This is based on evidence according to Khan's 2007 research, which states that the employment elasticity of GDP growth in emerging nations is 0.7. Globally, over the three years between 1991 and 2003, total employment increased by 0.3% to 0.38% points for every percentage point of additional GDP growth, according to Kapsos (2005).

The last variable to be considered is hiring and firing regulations (HFR). This variable has a positive significant relationship with private sector employment (PRIVATEEMPLOYCHANGE) in the long run. With a coefficient of 11,92, this implies that a 1% increase in HFR would translate to an increase of private sector employment in the long run. These are assumed to be regulations imposed by the government to protect employees from being dismissed easily. These results are in contradiction to the *apriori* expectations which assumed that these regulations would restrict private sector employment. According to the results, HFR enable the growth of private sector jobs in the long run. The existence of Unions in South Africa plays a major role in people being protected against being fired easily. There are processes that include the Commission for Conciliation, Mediation and Arbitration (CCMA) which is a process designed to scrutinise scenarios before a decision to fire an employee is taken. There are also a number of recruitment agencies in South Africa that make it seamless for the private sector to recruit the required skills.

5.6. Short run Model

Table 5.6.1 presents the short run coefficients as well as the ECM model (long run representation) constructed from the residuals of the long-term model.

Table 5.6. 1: Autoregressive Distributed Lag Model Short run results

Dependent Variable: D(PRIVATEEMPLOYCHANGE)				
Method: ARDL				
Selected model: ARDL(1,0,2,2,0,3,0,0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-0.833	0.094	-8.802	0.000
D(GDPGROWTH)	1.080	0.113	9.550	0.000
D(GDPGROWTH(-1))	-0.480	0.131	-3.665	0.0004
D(LROPE)	7.738	3.873	1.997	0.049
D(LROPE(-1))	6.776	3.683	1.839	0.069
D(UNEMPLOYMENT)	-0.466	0.258	-1.801	0.075
D(UNEMPLOYMENT(-1))	-0.378	0.251	-1.505	0.136
D(UNEMPLOYMENT(-2))	-0.584	0.244	-2.395	0.018
R-squared	0.804	Mean dependent var		0.037
Adjusted R-squared	0.787	S.D. dependent var		5.170
S.E. of regression	2.384	Akaike info criterion		4.661
Sum squared resid	460.363	Schwarz criterion		4.884
Log likelihood	-199.416	Hannan-Quinn criter.		4.751
F-statistic	47.564	Durbin-Watson stat		2.097
Prob(F-statistic)	0.000000			
* p-values are incompatible with t-Bounds distribution.				

Note: ***represents significance at 1%; ** significance at 5% and * significance at 10%

The short run coefficients and the ECM model, or long run representation, which is built from the long-term model's residuals, are shown in Table 5.6.1. Regarding Table 5.6.1, GDPGROWTH, LROPE, UNEMPLOYMENT shows a discernible short-term impact on employment in the private sector. On the other hand, the remaining variables point to a negligibly mixed positive and negative contribution.

Table 5.6.1 shows that trade openness has a short-term beneficial impact on employment in the private sector, as opposed to a long-term one. This outcome is in line with Behar & Mok's (2019) assertion that trade openness has an impact on public employment. Reducing income inequality and achieving more equitable growth have been made possible by trade openness, as stated by Dollar & Kraay (2003), Anand et al. (2013), Barro (2000), and Raheem et al. (2016). According to the Heckscher-Ohlin and Stolper-Samuelson theoretical frameworks, increased trade openness is expected to drive up prices and demand for unskilled labour, which will increase the unequal supply of wages in high-skilled labour abundant economies and decrease the equal supply of wages in low-skilled labour abundant economies (Anyanwu, 2016).

The coefficient of error correction, which stands at -0.83, suggests that errors from the previous period will be corrected in the upcoming period, implying a faster rate of equilibrium adjustment. At the 1% level, it is also statistically significant.

Table 5.6. 2: Diagnostics tests

<u>Test</u>	<u>F-statistic</u>	<u>P-value</u>	<u>H0</u>	<u>Conclusion</u>
Normality	23.08	0.8752	Residuals are normally distributed	Errors are normally distributed
Heteroskedasticity	0.453833	0.5024	The residuals are homoscedastic	No Heteroscedasticity
Serial correlation	0.114624	0.8919	There is no serial correlation in the residuals.	No 2nd-order Autocorrelation

Table 5.6.2 displays the results of the diagnostic tests. The findings verify that there is no violation of the assumptions underlying the classical linear regression model. In other words, the residuals are normally distributed, homoscedasticity and not serial correlation.

5.7. Stability Tests

To assess the stability of the models, the cumulative sum of squares of the recursive residuals (CUSUMQ) and cumulative sum of recursive residuals (CUSUM) tests were performed. The CUSUM and CUSUMSQ plots (Figures 5.7.1 and 5.7.2, respectively) both show that the long-run coefficients of the repressors that affect private sector employment in South Africa are stable, as indicated by the blue lines falling within the range of critical bounds. Given that the results of the two tests fall within the range of the five percent significance threshold, it is clear from the model's appearance that it is stable and appropriately stated.

Figure 5.7. 1: Illustration of Cumulative Sum of Recursive Residual (CUSUM) at 5% level of significance

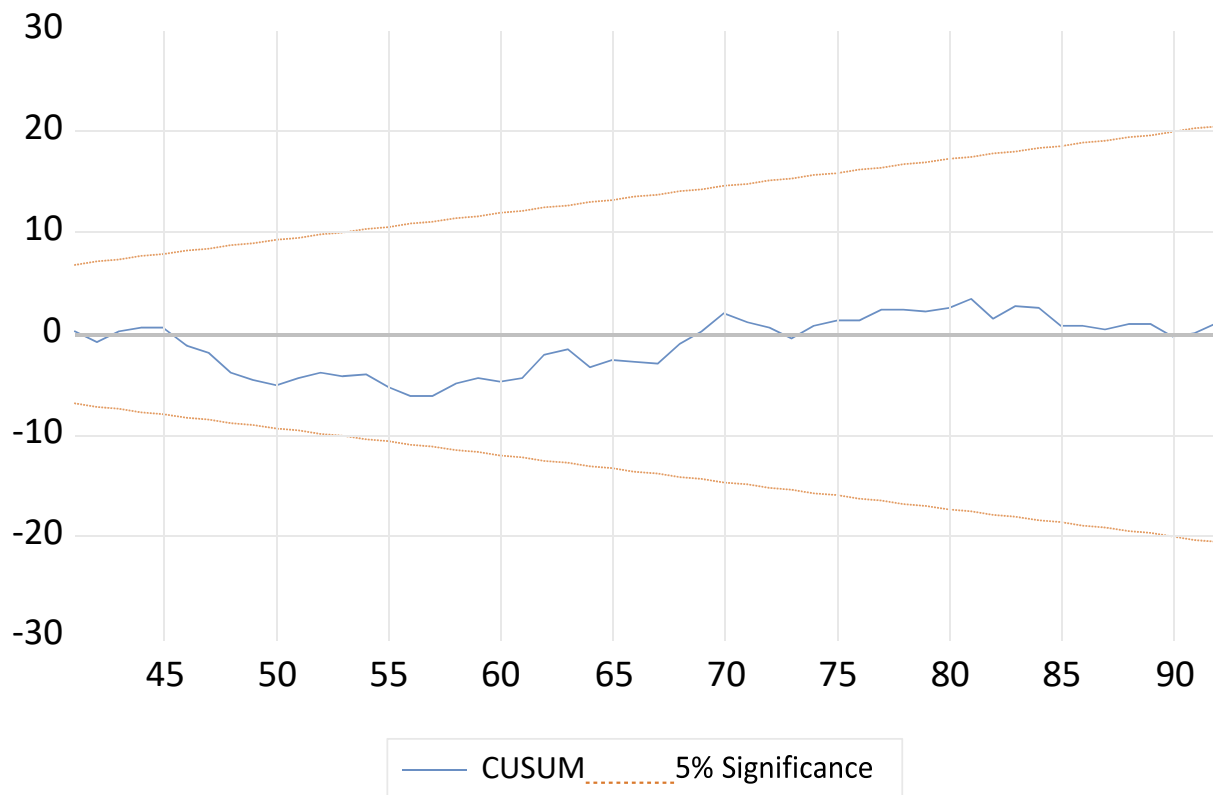
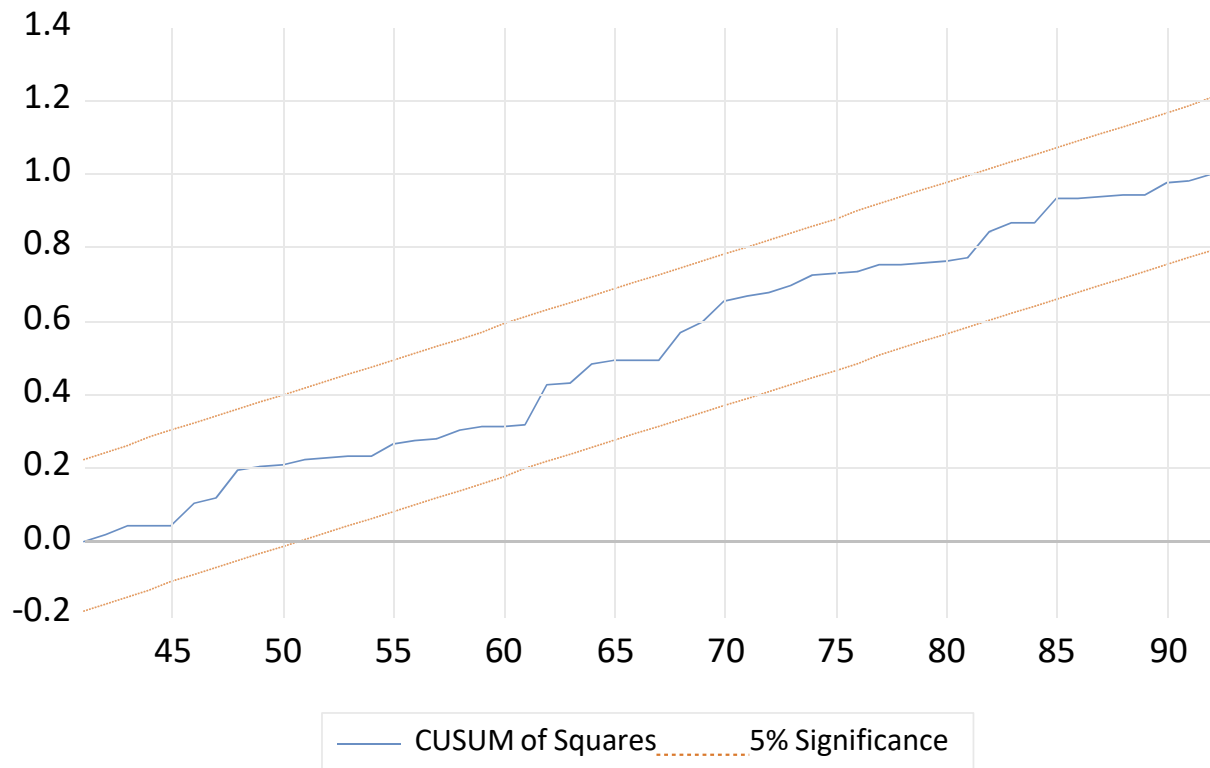


Figure 5.7. 2: Illustration of Cumulative Sum of Recursive Residual (CUSUM) at 5% level of significance



5.8. Discussion

In this phase of the study, logs of some variables were selected since, in time series analysis, employing some variables in logarithms is commonly believed to alleviate the series' variance and enhance efficiency in modelling (Lütkepohl & Xu, 2010). The private sector employment rate, the skewness statistic, the Kurtosis, and the Jarque-Bera test statistic for the variables under examination were all displayed in Table 5.2.1, which also included summary statistics for all the variables of interest that were used in the current analysis.

Following that, the data's time series properties were examined using the Phillips Perron and Augmented Dickey Fuller unit root tests. The integration of the variables of both order I (0) and order one I (1) was verified by both approaches. Theory suggests that the ARDL model is the best

method for handling variables integrated of mixed orders once it has been shown that the variables are integrated of different orders. After then, this was used.

The findings show that while LROPE, CCB, HFR, and UNEMPLOYMENT point to a considerably negative relationship, GDPGROWTH, LMR, and PUBLICEMPLOYCHANGE show a significantly positive link with the dependent variable (PRIVATEEMPLOYCHANGE). GDPGROWTH has the greatest correlation (>60%), suggesting that the variance in PRIVATEEMPLOYCHANGE for the data under examination maybe largely explained by the increase in the gross domestic product.

The bulk of the information requirements recommended a lag of 1, and this was the lag length that was used in the ARDL calculation, which was established empirically. For the estimation, a maximum lag order of 1 was thus selected. it was concluded that the null hypothesis of no cointegration should be rejected and that there may be cointegration because the estimated F statistic in the limits test was found to be bigger than the critical value of both upper and lower bound values. Thus, it was implied that employment in the private sector and its determinants have a long-term link.

The results of the ARDL model showed that most of the factors listed in the study have a strong impact on employment in the private sector. The model also showed that they had the right indicators and agreed with the conclusions of a large body of research.

Finally, the results of the diagnostic tests verified that the error terms in the short run model are not normally distributed. They also verified that there is no serial correlation and that they are not heteroscedastic. Given that the Durbin Watson statistic is higher than the R-squared, the models are most likely legitimate.

5.9. Conclusion

The interpretation of the models' estimates from Chapter 4 was the main focus of this chapter. The ARDL model was then identified as the best fit method to be used for handling variables integrated of mixed orders. The findings show that while LROPE, CCB, HFR, and UNEMPLOYMENT point to a considerably negative relationship, GDPGROWTH, LMR, and PUBLICEMPLOYCHANGE show a significantly positive link with the dependent variable (PRIVATEEMPLOYCHANGE).

6. CHAPTER 6

CONCLUSION, POLICY RECOMMENDATIONS AND LIMITATIONS

6.1. Summary of the Study and Conclusion

This chapter presents conclusions and gives policy implications and recommendations based on the results obtained in chapter 5. The study at hand investigated whether public sector employment crowds out private sector employment in South Africa for the period 2000Q1-2022Q4. This is also in view to ascertain what impact this has on the unemployment rate of the country. The study assesses whether the identified explanatory variables contribute to the changes in private sector employment.

The first chapter presented the aim of this study which was to establish the nexus between private and public sector employment. Chapter two of this study gave an overview of the South African employment sector in relation to short and long run trends. This was necessary to outline the problem at hand, which is the high unemployment rate, which reached a level of 32.9% at the end of the second quarter of 2024. Chapter 3 outlined the analysis of theoretical and empirical literature, where the underpinning theories were identified as the Neoclassical theory and the Crowding out hypothesis. In chapter 4, methodology to this study was discussed and the explanation of variables employed in the model was conducted. Chapter 5 presented the analysis and interpretation of results.

The variables that were used in the study as potential determinants of private sector employment were public sector employment (PUBLICEMPLOYCHANGE), change in gross domestic product (GDPGROWTH), trade openness (LROPE), centralised collective bargaining (CCB), hiring and firing regulations (HFR), labour market regulations (LMR), and unemployment (UNEMPLOYMENT). This data was extracted and presented on a quarterly interval session.

The Autoregressive Distributed Lag (ARDL) test approach for cointegration was used to investigate whether there was a long-term relationship between private sector employment and its determinants. Because it outperformed other cointegration models and produced consistent results even with small sample sizes, the ARDL cointegration model and Error Correction Model (ECM)

were chosen over alternative methods. For statistical study, time series data from 2000Q1 to 2022Q4 was utilised.

Prior to estimating the cointegration tests, the time series properties of the data were examined for stationarity. The results indicated that the variables were integrated of both order zero $I(0)$ and order one $I(1)$. In determining the optimal lag length to be used in the study, the lag length selection approach was employed in the study. On the basis of the results from Schwartz-Bayesian Criterion (SBC), a maximum lag order of 1 was chosen. The Schwarz–Bayesian Criterion was used as a preference to alternative model specification criteria as it frequently has more parsimonious specifications and the small data sample in this study further supports this notion.

The null hypothesis of no cointegration was rejected at the 10% level of significance. As a result, this suggested that there is a long-term relationship that exists between private sector employment and its determinants as specified in the model. The long-run model, error correction model was thus estimated.

The long run cointegrating equation indicated that not all the variables employed in the model were significant. Employment in the public sector (PUBLICEMPLOYCHANGE) is the primary independent variable in the model that is notably relevant to the topic of this study. The results showed that for every 1% increase in public employment (PUBLICEMPLOYCHANGE), there was a 14.9% long-term positive impact on private sector employment (crowding in) (PRIVATEEMPLOYCHANGE).

Labour market regulations (LMR) and centralised collective bargaining (CCB) are the two other variables that did not have a noticeable influence on private sector employment in the long run. Albeit a positive impact by both variables on private sector employment but however, insignificant.

The results of the ARDL model further showed that unemployment (UNEMPLOYMENT) has a significant and negative effect on private sector employment (PRIVATEEMPLOYCHANGE) in the long run. This implying that the private sector would be losing jobs at a faster rate. This is also in line with the *a priori* expectation which state that unemployment tends to have a negative impact on private sector employment.

The results further reveal that an increase in trade openness (LROPE) will result in a long-term reduction in private sector employment. The result is in line with available literature that claims that trade has hampered the creation of jobs. That is, however, found to be the opposite in the short run,

whereby, an increase in trade openness brings about positive outcomes in private sector employment.

The results of the ARDL model further show that GDP growth has a positive and significant relationship with private sector employment in the long run as well as the short run. Lastly, hiring and firing regulations (HFR) have a positive significant relationship with private sector employment (PRIVATEEMPLOYCHANGE) in the long run. These results are in contradiction to the *apriori* expectations which assumed that these regulations would restrict private sector employment.

6.2. Policy Implications of the Study and Recommendations

The results from the study have several policy implications. Firstly, public sector employment compliments private sector employment in South Africa. This implies that implemented policy should not be geared towards altering the level of employment in the public sector in an effort to influence private sector employment. This study rather recommends that the government intensifies its efforts to create an environment that is tolerant for the private sector to create jobs.

In the same vein, efforts to increase job creation in the public sector is still very much encouraged. This study has revealed that, the government can continue to employ people in the public sector, and this will not have a significant negative impact on private sector employment, both in the short and the long run. Policies should be guided towards cautiously increasing government expenditure towards government programmes, which would contribute towards an increase in public sector employment leading to a multiplier effect on private sector employment. This further advocates for already in existence programmes such as the Expanded Public works Programme (EPWP) and various initiatives designed to create employment within the public sector in South Africa.

The results shows that GDP has a positive impact on private sector employment. This suggests that the more the economy expands implies the more jobs that are created within the private sector. This study recommends that policies should be guided towards trying to grow the economy in order to create an environment that will allow for the private sector to thrive and be able to create more jobs.

The empirical results further indicate that trade openness has a positive impact on private sector employment in the short run in South Africa but negative in the long run. This implies that trade will tend to promote private sector employment in the short run. This calls for authorities to pursue

policies that are aimed at making trade across borders more accessible and dependable, thereby trying to maximise mass creation of jobs in the short run.

Moreover, with reference to hiring and firing regulations, an interesting observation from the empirical results suggest that hiring and firing regulations in South Africa are not detrimental to private sector employment. Instead, the findings support that more regulations tend to promote private sector employment. Therefore, policy measures that enhance the promotion of regulations within the employment sector should be encouraged. This study recommends that there should be a constant review of the employment equity act of the country to ensure that regulations in place create an environment that will promote easy access to job opportunities for people.

South Africa is largely dominated by trade unions who represent the rights of the employees at their workplaces. Empirical results have indicated, however, that centralised collective bargaining (CCB) has an insignificant yet positive impact on private sector employment. This implies that regardless of changes that are implemented within the centralised collective bargaining, this will not significantly alter the trajectory of private sector employment.

6.3. Limitations of the Study and Areas of Further Research

The study focused on examining the variables that affect private sector employment in South Africa. There are several other factors that influence private sector employment; however, the study focused on the certain few as literature reviewed deem these as the key variables. An important feature which has confronted previous researchers is the availability of data. In this case, it means that some variables could have been omitted from the estimation because of lack of data. However, these problems seem not to affect the results of the study in any meaningful way given that they corroborate both theory and empirical findings on the relationship between private sector employment and the aforementioned variables.

The areas of further research that emerge from this study include looking at how technology and the introduction of Artificial Intelligence (AI) would impact private sector employment. There is a school of thought that suggests that technology is taking away people's jobs. That would need to be tested whether it holds or not. This would prove to be interesting seeing that South Africa is headed towards implementing the fourth industrial revolution. Lastly, the study has not looked at how population growth has affected the employment sector at large. This will need to be observed further for relevant policy measures to be put in place.

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