An Exploration of Selected Factors Affecting the Labour Market in South Africa

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Abstract

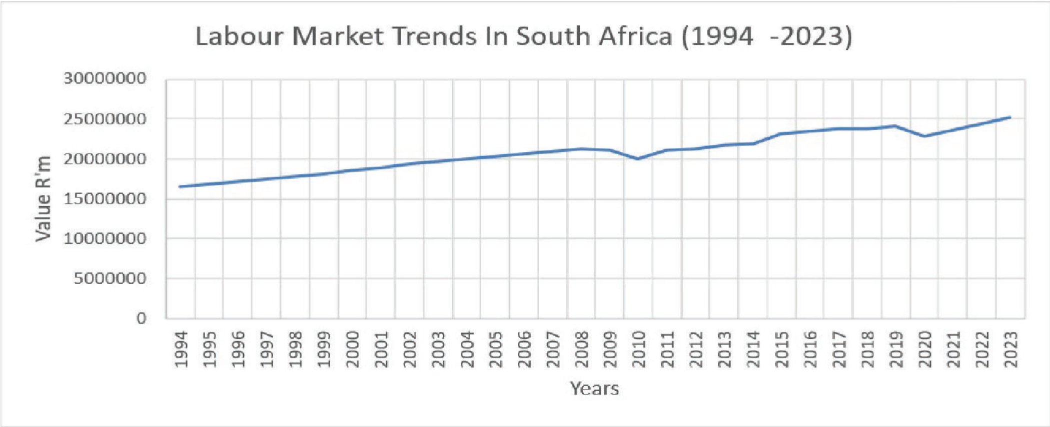
The purpose of this article is to explore selected factors affecting the labour market in South Africa. In the past two decades, South Africa has experienced a great improvement in its labour market, however, the labour market continues to encounter numerous challenges. The article adopted the Auto-regressive Distributive Lag (ARDL) to explore how population, remuneration, and gross fixed capital formation impact the labour market in South Africa for the period 1994 to 2023. A positive relationship between remuneration, population ageing, gross fixed capital formation and the labour market was discovered. To improve South Africa's labour market, this article proposes that the government invest in programs that enhance technical and vocational abilities. This will facilitate the connection between unemployed youth and sectors requiring skilled labour. This is crucial for mitigating poverty and fostering more inclusivity throughout society. Moreover, this article proposes the implementation of measures aimed at diminishing wealth disparity.

Keywords: Labour Market, Population, Remuneration, Gross Fixed Capital Formation, ARDL.

INTRODUCTION

The factors that affect the labour market have been widely investigated across the globe. According to Yeboah and Jayne (2020), South Africa has experienced a great improvement in its labour market in the past two decades. To combat unemployment and promote skill development, the South African government has launched several initiatives, including the Expanded Public Works Programme (EPWP) and the National Development Plan (NDP), which offer job opportunities and skills training (Habiyaremye, Habanabakize & Nwosu, 2022). However, the labour market continues to encounter numerous challenges. Mseleku (2022) argues that the South African labour market faces several challenges including high rates of unemployment. South Africa has one of the most elevated levels of unemployment on a worldwide scale, especially among the younger population and specific demographic segments, such as black South Africans (Meyer & Mncayi, 2021). To explore factors affecting the labour market in South Africa, the article adopted the labour market as a dependent variable and measured it against three selected factors namely population ageing, remuneration and gross fixed capital formation. The selection of factors was mainly determined by data availability; however, the chosen factors have shown to impact the labour market significantly.

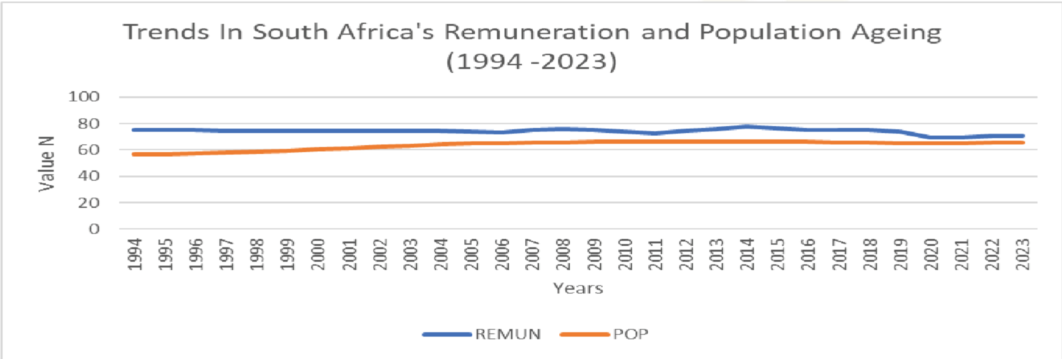
Figure 1: Labour market in South Africa (1994- 2023)



Source: Author compilation using data from World Bank (2024)

The labour market trends in South Africa are shown in Figure 1 for the years 1994–2023. Despite democratic reforms since 1994, unemployment rates have remained high, ranging from roughly 20% to more over 30% in recent years (Gumede, 2021). Many industries, particularly manufacturing and mining, saw job cuts, and the recovery in job creation has been gradual thereafter. Moyo and Gumbo (2021) noted that due to the economy's inability to accommodate the vast labour force, the informal sector is expanding. South Africa remains one of the world's most unequal societies, with significant salary gaps between high- and low-income earners. Source The Gini coefficient has remained high over the years, indicating an uneven distribution of wealth.

Figure 2: Trends in South Africa's remuneration and population ageing (1994- 2023)

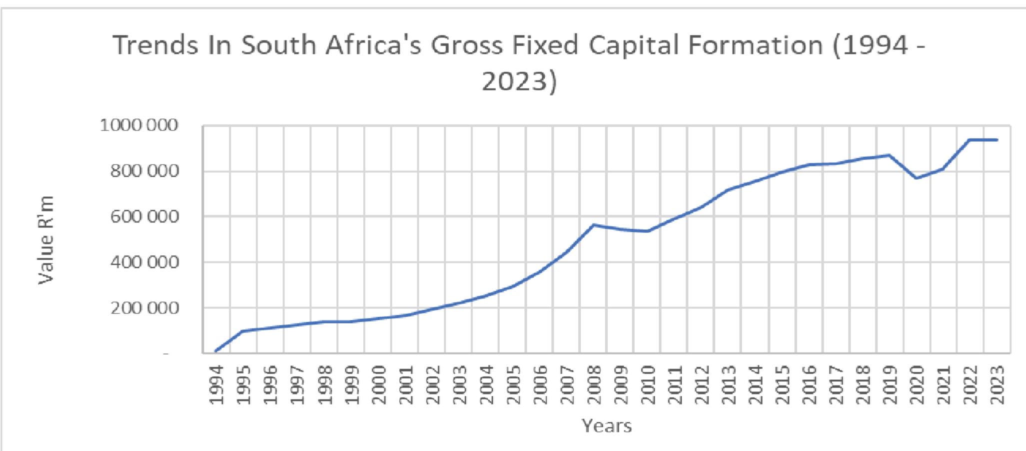


Source: Author compilation using data from World Bank (2024)

Figure 2 shows trends in remuneration and population ageing in South Africa from 1994 to 2023. Trends in employment, productivity, inequality, and labour mobility can all be explained with a better understanding of how remuneration affects the labour market. Significant salary gaps exist in South Africa's labour market, especially between highly and low-skilled workers (Mazorodze, 2021). In comparison to retail, lodging facilities, and agriculture, compensation rates in businesses such as banking, IT, and professional services are significantly higher (Khan et al, 2020). This is indicative of the dual economy of the nation, in which labour-intensive, low-wage sectors coexist with contemporary, high-income ones. There is a sizable informal economy in South Africa, where workers frequently make less than the minimum wage and are not eligible for official benefits like healthcare, pensions, or job security. Remuneration in this industry is generally low, and wage discussions are informal or non-existent.

Cristea, Stefea and Sala (2020) define population ageing as an increase in the proportion of elderly people in the population, is a phenomenon with ramifications for many sectors, including the labour market. Population ageing has begun to affect labour market dynamics in South Africa, even though the country remains relatively young in comparison to other countries such as Japan and Europe. South Africa's labour market is currently dominated by the issue of high youth unemployment, but as the population matures, labour market dynamics will evolve. Matschke (2020) argues that managing both youth unemployment and an ageing workforce need combining short-term and long-term policies, including generating jobs for young people while planning for future labour shortages.

Figure 3: Trends in South Africa's GFCF (1994- 2023)



Source: Author compilation using data from World Bank (2024)

Figure 3 shows the GFCF trend in South Africa from 1994 to 2023. Nadabo (2023) noted that high levels of GFCF, notably in infrastructure development (roads, bridges, and power plants), result in direct employment creation in the construction, engineering, and allied industries. These capital-intensive projects demand significant labour inputs, particularly in the short term, offering job possibilities for both skilled and unskilled individuals. GFCF may highlight the need for increased investment in education and training to guarantee that the workforce is equipped to operate new machinery or manage modern infrastructure projects (Daniels, 2023). This requirement can drive government and business sector activities to promote skills development, boosting the workforce's employability. Because labour market dynamics affect economic development, income distribution, social welfare, and general societal well-being, it is important for businesses, employees, politicians, and economists to understand these aspects. Hence it is imperative for the study to explore factors affecting the labour market in South Africa.

LITERATURE REVIEW

As much as factors affecting the labour market have been discussed throughout the world, there is still limited literature concerning this topic in the case of South Africa. Ranchhod and Daniels (2021) analysed labour market dynamics in South Africa during the period from late March to late April 2020, using the first wave of the NIDS-CRAM (2020) survey. The study discovered that job losses were unevenly distributed across the various groups. Specifically, certain demographics that have historically faced higher levels of vulnerability, such as women, African/Blacks, youth, and less educated groups, have experienced a disproportionately unfavourable impact.

Mncayi and Shuping (2021) employed the Autoregressive Distributed Lag (ARDL) model to assess the long-term and short-term relationships. Gross fixed capital creation positively influences the rate of labour absorption; an increase of one unit in gross fixed capital formation results in a 0.000023% or 2.3% rise in the labour absorption rate. This suggests that investments in gross capital production are likely to facilitate the absorption of workers into the labour market, hence securing employment. Habanabakize and Dickason-Koekemoer (2022) utilised the autoregressive distributed lag (ARDL) model on data spanning from 1995 to 2019, research indicated that an augmentation in gross capital formation facilitates the generation of long-term employment in the construction and business enterprise sectors, while also inducing short-term employment fluctuations across various economic sectors.

Tsoki and Matarise (2014) utilised the Johansen Approach. This study identifies the long-term equilibrium link between remuneration and labour productivity in South Africa using annual time series data from 1970 to 2011. The Johansen cointegration technique reveals a cointegration between remuneration and labour productivity during the period from 1990 to 2011. The coefficient of the error correction term in labour productivity is substantial, signifying a swift adjustment of labour productivity to equilibrium; yet this labour productivity appears to exert no influence on remuneration in the short run.

Elsby, Smith, and Wadsworth (2021) contend that alterations in population result in variations in the relative significance of aggregate flows, contingent upon the specific segments of the age distribution experiencing change. The study presents annual gross population and labour market movements across all transitions, averaged over the sample period from 1975 to 2016. Consequently, the observation indicates that gross population inflows typically exceed gross population outflows during the study period. Consequently, population inflows significantly influence labour market dynamics. Consequently, population movements significantly influence the dynamics of labour markets.

METHODOLOGY

The study used a quantitative research design using time series data sourced from Statistics South Africa (Stats SA) and World Bank.

Model specification

In attempt to show the exploration of the selected factors on labour market, the following model was adopted:

$$LM_t = f(POP_t + REM_t + GFCF_t) \quad (1)$$

Equation (1) states the labour market is a function of population ageing, remuneration and gross fixed capital formation, holding other things constant. Making equation (1) linear, it will be transformed to equation (2) with L being the logarithm for respective logged variables:

$$LLM_t = \alpha + \beta_1 LPOP_t + \beta_2 REM_t + \beta_3 LGFCF_t + \varepsilon_t \quad (2)$$

where α is the constant; β measures the coefficient for each explanatory variable; LM is the labour market; POP is population ageing; REM, remuneration; GFCF, gross fixed capital formation; and ε is the error term to accommodate all other factors affecting the labour market and not accommodated by the study.

Stationarity/Unit root test

The formal unit root tests were presented using the Augmented Dickey-Fuller (ADF) test and the Dickey- Fuller Generalised Least Squares (DF- GLS) unit root test. ADF is an extension of the original Dickey-Fuller test that accounts for autocorrelation in the error terms by include lagged differences in the dependent variable. The ADF test is an enhanced version of the basic or original Dickey-Fuller (DF) test, also known as the autoregressive unit root test (Dickey and Fuller, 1981). The ADF was improved by Said and Dickey (1984), by developing the accommodation of autoregressive moving averages (ARMA) ordered at p or q in circumstances where orders are unknown. The ADF test directly tackles autocorrelation in residuals by incorporating lags of the differenced variable into the regression. The DF-GLS test improves on the ADF test by detrending the data with Generalised Least Squares (GLS) before performing the regression. This boosts the test's power, particularly in small samples or in the presence of predictable patterns (Wu, 2010).

ARDL bounds test for cointegration

Cointegration is modelling time series to keep their long-run information complete. When assessing the robustness of ARDL, an autoregressive distributive lag bounds test was conducted (Nkoro and Uko, 2016). Using this approach to test for the existence of cointegration has four advantages: (i) it is more robust and performs better with a small or infinite sample size (ii) it is applicable to variables of a different order of cointegration I(0) and I(1) , variables do not need to be integrated, (iii) it can cater for structural breaks in time-series data and finally (iv) the short-run and long-run parameters are estimated simultaneously, it obtains unbiased estimates of the long-run model. The ARDL technique consists of four steps: (a) assessing the presence of cointegration using bound testing procedures. It has two sets: I(0) and I(1). The first set assumes that all variables are I(0), while the second assumes that they are all I(1). If the F-statistic falls below the lower critical limit, there is no cointegration; if the estimated F-statistic exceeds the higher limit, there is cointegration and the null hypothesis is rejected. If the F-statistic falls within the boundaries, the test will be inconclusive. (b) Determine the long-run association coefficient identified in the first step. It is calculated using an appropriate delay selection criterion to determine the model's true dynamics, and it also calculates the short-term dynamic coefficients.

Auto Regressive Distributed Lag approach (ARDL)

The ARDL cointegration technique by Pesaran and Shin (1999) was selected as the best approach to determine the long run and short relationship of the concerned variables. This is because the variables of concern were found to be a mixture of I(0) and I(1) by the three unit root tests performed by the study. The unit root tests were performed to determine the number of unit roots in the series under consideration in order to avoid an ARDL model crash in the presence of an integrated stochastic trend of I(2) (Ghulam, Saud and Artiq Ur, 2018). According to Ghulam et al. (2018), the general ARDL cointegration model is presented as follows:

$$Y_t = \alpha + \beta_1 X_t + \beta_2 X_{t-1} + \beta_3 Y_{t-1} + \varepsilon_t \quad (3)$$

In equation 3, both dependent (Y) and independent (X) variables are lagged by one year (t-1), meaning that the values of the previous periods affect the values of the current period. The Error Correction Model (ECM) can be generated from the ARDL model using a simple linear transformation that combines short-run corrections with long-run equilibrium while preserving long-run information (Nkoro and Uko, 2016). The linked ECM model allows for a sufficient number of lags to capture the data generation process in general to specialised modelling frameworks. The ECM is used to explain the rate of adjustment to long-term equilibrium following any shocks (Wooldridge, 2013).

According to Nkoro and Uko (2016), the unrestricted ECM associated with the ARDL model can be calculated using the following general equation:

$$Y_t = Y_t - \sum_{j=1}^{s-1} \Delta Y_{i-j} \quad s = 1,2, \dots . p \tag{4}$$

The term error correction in this model is defined as the speed of adjustment parameter or feedback effect is derived as the error term from the cointegration models. It shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted in Y_t.

Granger causality test

After performing the cointegration test, this study conducted causality test among the variables. Regression analysis such as ARDL deals with the dependence of one variable on other variables, it does not however prove a causal relationship or a direction of influence exists, the granger causality test helps determine the causal direction of variables (Gujarati and Porter, 2008).

Diagnostic testing

The study utilised diagnostic tests to verify that the model's outputs are reliable (Gujarati and Porter, 2019). The time series models must comply with the assumption of the classical linear regression model (CLRM). The tests for Normality, Heteroscedasticity, and Serial correlation were conducted. To test for normality, we used Jarque-Bera test. According to Gujarati and Porter (2019) residuals are distributed normally with a zero mean and variance. If residuals are not normally distributed, it means consistency of estimators is not guaranteed and estimators are BLUE, but not BUE. The non-normally distributed residuals can be caused by misspecification, multicollinearity, and non-stationarity of dependent and explanatory variables. it also measures the difference in skewness and kurtosis of a variable compared to those from the normal distribution.

Serial correlation, known as autocorrelation, occurs when there is nonstationary of dependent and explanatory variables. In time series data serial correlation occurs when error terms for one period are correlated with error term for a subsequent period. The violation of autocorrelation assumption may lead to inefficient coefficient estimates, which can result in wrong inference. It is measured by L. JUNG-BOX test and Breusch-Godfrey LM test, they test the assumption that the residuals do not have autocorrelation up to any order. The existence of heteroskedasticity in the study was detected using three tests, namely: Harvey, Breusch-Pagan, and ARCH tests. The CLRM assumes that the variance of residuals or error terms is constants and if the variance of the residuals is not constants, then they are said to be heteroskedasticity (Brooks, 2008). This is the assumption of homoskedasticity in terms of CLRM basic assumptions. If is violated any inference in the presence of heteroskedasticity usually drawn from Ordinary least Squares (OLS) analysis may be faulty.

Stability testing

To test if the model is stable, the cumulative sum of the squares of the recursive residual (CUSUMsq) and cumulative sum of the recursive residual (CUSUM) were used. According to Brooks (2008), the CusumSQ test is grounded on a normalized version of the cumulative sums of squared residuals. Under the null hypothesis of parameter stability, the CusumSQ statistic starts at zero and ends the sample at a value of 1. The Cusum statistic is created on a normalized version of the cumulative sums of residuals. The scaling is such that below the null hypothesis of perfect parameter stability, the CUSUM statistic is zero.

RESULTS AND DISCUSSIONS

This section delineates the estimating methodologies and empirical findings from tests performed to assess the labour market, gross fixed capital formation, population, and remuneration in South Africa.

Unit root/stationarity

An ADF value that is less than its critical values signifies that the underlying series is non-stationary and will form the basis for the decision rule. The Dickey-Fuller Generalized Least Squares (DFGLS) functioned as a confirmatory assessment. The ADF and DFGLS unit root tests were picked primarily for their simplicity and applicability to the study's methodology. The DFGLS test was initially introduced to evaluate the null hypothesis. This paper gives the results of the unit root test in Tables 1 and 2.

The ADF unit root tests were conducted with intercept, intercept with trend, and none. The findings are displayed in Table 1.

Table 1: ADF unit root test results

Variables	Model	Lag-length	t-statistic	p-value	Order of integration
LLAB_MARK	Constant, linear trend & none.	0	-2.971853	0.0001	I(1)
LGFCF		0	-2.967767	0.0001	I(0)
POP		1	-2.971853	0.0001	I(0)
REMUN		1	-2.976263	0.0008	I(1)

Source: Authors' Computation

The ADF results in Table 1 demonstrate that the labour market and wages achieve stationarity after the first difference. Conversely, gross fixed capital formation and population were determined to be stationary at the level.

Table 2: DFGLS unit root test results

Variables	Model	Lag-length	t-statistic	p-value	Order of integration
LLAB_MARK	Constant, linear trend & none.	0	-3.190000	0.0183	I(0)
LGFCF		0	-3.190000	0.0002	I(1)
POP		3	-1.955020	0.0103	I(1)
REMUN		1	-1.953381	0.0321	I(0)

**Source: Authors computation*

The DFGLS unit root test in Table 2 indicates that the labour market and remuneration achieve stationarity at level. Gross fixed capital and population were determined to be stationary at the first difference.

Cointegration Analysis Results

The ARDL limits tests include treating each variable as the dependent variable, which is methodically analysed by regression on the other variables. This contravened the weak exogeneity criterion of the limits testing paradigm by implicitly allowing each variable to be endogenous. The findings are displayed in Tables 3 and 4.

Table 3: ARDL Bounds Test Results

Test Statistic	Value	
F-Statistic	4.280241	
Bounds Critical Values Sample size 30		
Significance	I(0) Bounds	I(1) Bounds
10%	2.676	3.586
5%	3.272	4.106
Asymptotic		
10%	2.370	3.200
5%	2.790	3.670

Source: Authors' Computation

Table 3 indicates that the calculated F-statistic of 4.280241 surpasses both the upper and lower thresholds at all significance levels. The empirical evidence confirms the long run cointegration equation among the labour market, gross fixed capital formation, population, and remuneration.

Table 4 presents an overview of the long-term link among the labour market, gross fixed capital formation, population, and remuneration.

Table 4: Estimated Long Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.

LLAB_MARK (-1) *	-0.218772	0.274738	-0.796293	0.4413
LGFCF (-1)	0.131713	0.056858	2.316521	0.0390
POP (-1)	-0.625887	0.270437	-2.314352	0.0392
REMUN (-1)	0.940254	0.443661	2.119309	0.0556
C	0.222329	2.347852	0.094694	0.9261

Source: Authors' Computation

The data collected demonstrated the lasting impact of each independent variable on the labour market process. The data reveal that the labour market exerts a negative and insignificant influence in the long run, but the population exerts a negative but significant influence. Nonetheless, gross fixed capital formation and remuneration have a favourable and significant impact in the long term. this aligns with the findings of Mncayi and Shuping (2021), who identified a positive long-term correlation between gross fixed capital formation and labor absorption. Tsoki and Matarise (2014) assert that a long-term equilibrium relationship exists between compensation and labour productivity. Elsby, Smith, and Wadsworth (2021) discovered that population fluctuations substantially affect the dynamics of labor markets. Conversely, Ranchhod and Daniels (2021) found that job losses were disproportionately allocated among different demographic groups, resulting in adverse effects.

Table 5: Estimated Short Run Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Cointeq (-1)	-0.218772	0.040955	-5.341810	0.0001
D (LLAB_MARK (-3))	-0.306874	0.135729	-2.260937	0.0381
D(LGFCF)	0.218031	0.043207	5.046141	0.0001
D(POP)	6.891246	1.286711	5.355706	0.0001
D(REMUN)	0.580486	0.204528	2.838180	0.0119

Source: Authors' Computation

The results shown in Table 5 indicate that the error correction coefficient possesses a negative and statistically significant value. This indicates that subsequent to any economic shock, there is an annual adjustment of 21% towards the long-term equilibrium. The estimated lagged error term, referred to as CointEq, exhibits a negative sign and is experimentally significant. Consequently, the established long-term relationship between the variables was validated. Moreover, it exhibited a consistent methodology towards achieving equilibrium.

Table 6: Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Prob.
LGFCF does not Granger Cause LLAB_MARK	28	0.11167	0.8948
LLAB_MARK does not Granger Cause LGFCF		0.00478	0.9952

POP does not Granger Cause LLAB_MARK	28	0.05565	0.9460
LLAB_MARK does not Granger Cause POP		3.80181	0.0375
REMUN does not Granger Cause LLAB_MARK	28	1.26539	0.3010
LLAB_MARK does not Granger Cause REMUN		1.37604	0.2726
POP does not Granger Cause LGFCF	28	5.17448	0.0139
LGFCF does not Granger Cause LPOP		3.55004	0.0453
REMUN does not Granger Cause LGFCF	28	1.34139	0.2812
LGFCF does not Granger Cause REMUN		0.47919	0.6253
REMUN does not Granger Cause POP	28	3.25688	0.0568
POP does not Granger Cause REMUN		0.20328	0.8175

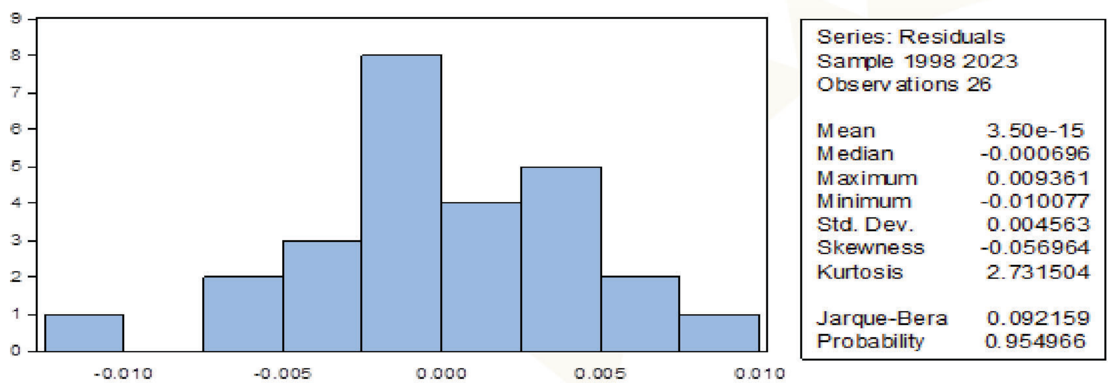
Source: Authors' Computation

Table 6 demonstrates a bi-directional causality between gross fixed capital formation and population ageing, as indicated by the probability values. Nonetheless, there exists a unidirectional flow of the labour market and population ageing. Likewise, remuneration had a unidirectional relationship with population ageing.

Diagnostic test results

A method to detect misspecification problems is by examining the regression of residuals. The violation of residuals renders the inferential statistics of a regression model invalid. The findings of residual normality are depicted in Figure 4.

Figure 4: Normality Test Results



Source: Authors' Computation

A kurtosis of 2.731504 indicates a deviation from normal distribution of residuals. According to (Brooks, 2008), kurtosis must be equal to or exceed 3 for a normal distribution, and with a Jarque-Bera statistic greater than 0.05, we fail to reject the null hypothesis of normality at the 5% significance level.

To assess the adequacy of the estimated model and to verify the correct specification of the VAR. The findings in Table 7 are summarised.

Table 7: Summary of Diagnostic Tests

Diagnostic analysis	Test	p-value	Conclusion
Serial correlation	Breusch-Godfrey Serial Correlation LM	0.2476	Do not reject null
Heteroskedasticity	ARCH	0.3511	Do not reject null
Heteroskedasticity	Breusch-Pagan-Godfrey	0.8914	Do not reject null
Heteroskedasticity	Harvey	0.1964	Do not reject null

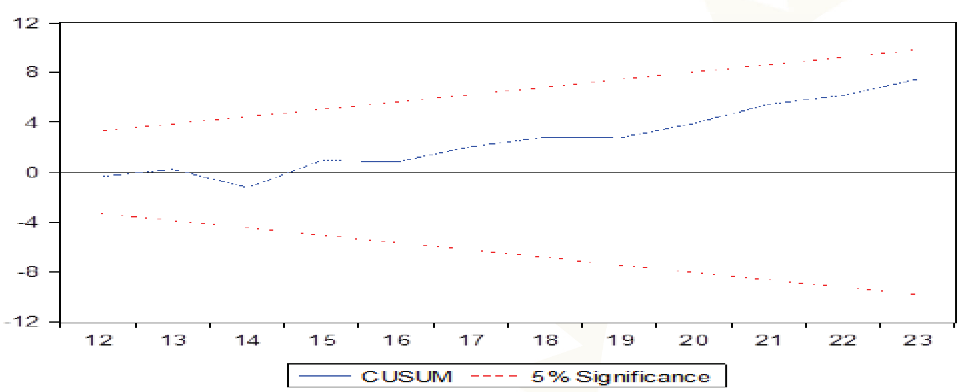
Source: Authors' Computation

The serial correlation analysis yields a p-value of 0.2474. As it exceeds 0.05, this indicates the absence of serial correlation. The ARCH test yields a p-value of 0.3511, indicating that we fail to reject the null hypothesis, implying the absence of heteroskedasticity. The Breusch-Pagan-Godfrey test yields a p-value of 0.8914, suggesting that the null hypothesis remains unrefuted. It also indicates the absence of heteroskedasticity issues. Additionally, the Harvey test yields a p-value of 0.1964, indicating the absence of heteroskedasticity and supporting the acceptance of the null hypothesis. The normality test yielded a p-value of 0.9549, indicating that the study accepted the null hypothesis of normality at a 5% significance level.

Stability test results

The stability tests were performed to assess the stability of the model throughout the study. The results are presented in Figures 5 and 6 respectively.

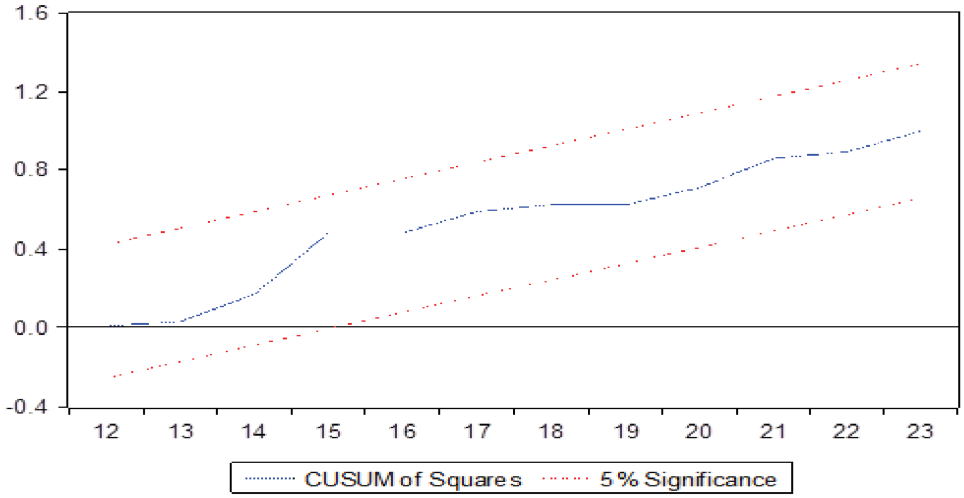
Figure 5: CUSUM test results



Source: Authors' Computation

A 5% significance threshold was used to analyse the findings of the CUSUM stability test, which are presented in Figure 5. Throughout the course of the inquiry, the stability of the computed model coefficients is validated by the test statistic that is contained within the essential bounds.

Figure 6: CUSUM of Squares test results



Source: Authors' Computation

The findings of the CUSUMSQ stability test are presented at a 5% significance level. The test statistic remains within the critical bounds, confirming the stability of the derived model coefficients.

CONCLUSIONS AND RECOMMENDATIONS

An investigation of the relationship between the labour market, gross fixed capital formation, population ageing, and remuneration was carried out with the help of the ARDL bounds testing approach. This investigation was carried out by analysing annual data spanning the years 1994 to 2023. The article discovered a positive correlation between remuneration, the labour market, gross fixed capital formation, and population ageing in South Africa. It has been demonstrated by empirical evidence that there is a cointegration between the variables, which verifies the presence of a long-term correlation between the variables. The predicted model coefficients, on the other hand, remain consistent throughout time. It is thus recommended that the government must invest more in modern machinery and technology to boost South Africa's industries' competitiveness abroad and increase the country's economic complexity index. Through capital formation, sectors modernise and create new job possibilities in high-tech businesses that demand a more trained labour force. Promoting youth employment requires an integrated approach that considers both labour supply and demand. To address the labour demand-supply gap, the article recommends that the government must increase investment in programs that promote technical and vocational skills. This will help to bridge the gap between unemployed youth and sectors with a skilled labour need.

To encourage the hiring of marginalised groups, like as youth, women, and elderly workers, the study recommends that the government should establish targeted pay subsidies that lower firms' labour costs. This can encourage businesses to hire workers they might otherwise overlook. When conducting research, authors frequently encounter data limitations; the authors did as well when carrying out this study. Nonetheless, the writers were able to collect, collate, and analyse data, yielding concrete results. For future studies, a more thorough data set will be used to produce better findings.

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