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Importance of AGOA on Exports and Employment in the Western Cape

18 August 2023

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Contents

1. Introduction 3
2. Objective of the Study 3
3. About the African Growth Opportunities Act (AGOA) 3
4. Importance of AGOA to Western Cape Exports 4
5. The Importance of AGOA to the Labour Market in the Western Cape 7
6. Theoretical and Empirical Literature Review 10
7. Data Types and Sources 11
8. Empirical Model 11
   - 8.1 Model Specification 11
   - 8.2 Definition of Variables and Expectations 12
9. Data Analysis and Tests: Stationarity, Cointegration and Diagnostic Tests 13
   - 9.1 Descriptive Statistics 13
   - 9.2 Correlation of Variables 14
   - 9.3 Stationarity Analysis 14
     - 9.3.1 Unit Root Tests 14
     - 9.3.2 Correlation after Differencing 15
   - 9.4 Autocorrelation 15
   - 9.5 Heteroskedasticity 16
   - 9.6 Test for Cointegration 16
10. Model Estimation and Results Discussion 17
11. Conclusion 18
12. Addenda 19
13. References 26

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1. Introduction

The African Growth and Opportunities Act (AGOA), which was signed into law in 2000 as part of the United States' trade legislation, has the objective of increasing trade and investment between the United States and qualifying countries in sub-Saharan Africa (SSA) by reducing trade tariffs applied to African exports of different products. This Act was designed to stimulate economic growth and development in SSA through trade.

In providing preferential and duty-free access to the United States, AGOA has been instrumental in the development of many Western Cape exporters over the last two decades. Through the programme, exporters are able to gain access to the vast and lucrative United States market and are able to sell their products at competitive prices. As expected, demand from the United States for the relatively cheaper Western Cape products has surged as a result, and in 2021, the United States became the leading global market for Western Cape exports.

Economic theory would suggest that an increase in exports is synonymous with an increase in output. As output increases, the factors of production would similarly need to increase to support the higher level of output. It therefore stands to reason that an increase in exports, *ceteris paribus* (meaning all other factors being constant), would lead to an increase in employment and that export-enabling policies, such as AGOA, would stimulate job creation. However, there are many confounding factors which could influence the effects of AGOA on the labour market and in some instances, as the literature review shows, the impact of AGOA could be insignificant in creating employment.

This paper provides a statistical analysis of the impact of AGOA on employment levels in the Western Cape. The aim of the analysis is to examine whether AGOA has had any effect on employment levels in the Western Cape, and if so, whether this was statistically significant. In doing so, the paper will provide a compelling argument about the importance of AGOA, not only in regard to its effect on the labour market in the Western Cape, but also with reference to its ability to reduce poverty, inequality and to stimulate economic growth.

In short, the paper examines the importance of AGOA to the export and labour market in the context of the 11 AGOA-related exporting sectors outlined in Section 3. Thereafter, there is a brief literature and empirical review to assess prior research that may have been conducted on the effects of AGOA on the Western Cape's labour market. A statistical analysis follows, which uses a linear regression model to examine the determinants of the employment levels in the province, thereby isolating the impact of AGOA on employment levels in the Western Cape.

2. Objective of the Study

The general objective of the study is to conduct a statistical analysis of the determinants of the Western Cape's employment levels. A specific objective is to examine whether AGOA has played a significant role in employment creation through providing duty-free exports to the United States. Based on the outcome of this analysis, relevant policy recommendations will be made to lobby for the continuation and extension of the AGOA programme to South Africa, and therefore to the Western Cape.

3. About the African Growth Opportunities Act (AGOA)

AGOA is a unilateral preference programme established by United States law. Through AGOA, the United States unilaterally offers duty-free access to qualifying sub-Saharan African countries for certain products. AGOA builds on the United States' Generalised System of Preferences (GSP), and together these two agreements provide duty-free access to 6,500 product tariff lines. The main AGOA-

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related sectors analysed in this report are those that have been identified to be the most significant by Tralac (The Trade Law Centre) and include:

- Primary agriculture
- Wood products
- Mining and quarrying: primary metals
- Food processing: Food, beverages, and tobacco
- Textiles, Clothing and Leather Goods
- Basic chemicals
- Metals, metal products, machinery, and equipment
- Non-metallic mineral products
- Petroleum products, chemicals, rubber, and plastic
- Transport equipment
- Other manufacturing groups

An examination of these sectors provides a relatively complete picture of the importance of AGOA to the exporting capacity of the Western Cape, and more importantly, an insight into AGOA's effect on employment levels in the Western Cape.

4. Importance of AGOA to Western Cape Exports

Trade and market openness is an essential part of economic development for both developed and developing countries. Scholars have noted that open economies grow faster than their relatively closed counterparts; salaries and working conditions are generally better in companies that trade; and greater global opportunities lead to increased stability and security. Trade also helps to lower prices and thereby alleviate poverty. Further, the act of importing products from countries with a competitive advantage means that the price of goods from the importing market is relatively cheaper than the price of locally produced goods. Poorer households can benefit from this.

Trade is also a key factor in job creation, particularly as it relates to exports. The Organisation for Economic Cooperation and Development (OECD) reported that at least 10% of the workforce in the United States relied on the production of goods and services for exports, and this share rose exponentially for countries like France (20%), Germany (30%) and as much as 47% for smaller open economies like Ireland[1] (OECD, 2021). Moreover, the World Bank, in conjunction with the International Labour Organisation, published a paper which established that boosting exports had positive implications for the South Asian labour market, such as higher wages, the raising of skill levels among workers, and even explained a high conversion of informal jobs to formal jobs[2].

Many countries around the world have reaped the benefits of open economies. This applies generally to those with relatively higher production costs, as has been the case with the Western Cape. Historically, the Western Cape has adopted an export-oriented approach to growth, which is clearly reflected in the Provincial Strategic Plan for the period 2019 to 2024. In short, the Western Cape is not a low-cost manufacturing destination, but many of the products are produced for the export market. This can be seen in Figure 1, which shows that the Western Cape's export-to-GDP ratio increased steadily from 16.24% in 2013 to nearly 30% in 2022, indicating the export sector's rapidly growing importance to economic growth in the province.

[1] Source: https://www.oecd.org/trade/understanding-the-global-trading-system/why-open-markets-matter/#:~:text=Relatively%20open%20economies%20grow%20faster,stability%20and%20security%20for%20everyone.
[2] Economic research has traditionally focused on aspects such as imports and tariffs when considering relationships between globalization and labour markets. The report titled, Exports to Jobs: Bosting the gains from trade in South Asia, adds to a growing body of literature on the effects of exports and job creation.

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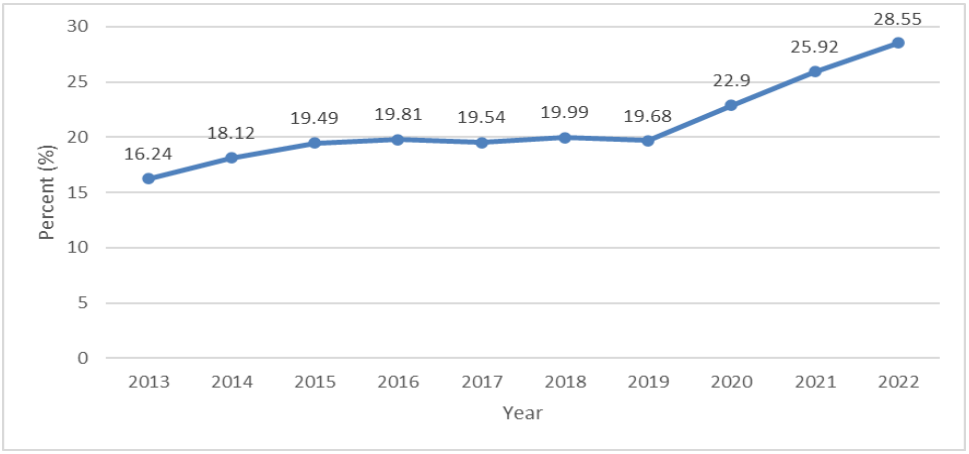
Figure 1: Export-to-GDP Ratio in the Western Cape, 2013–2022



Source: Quantec and own calculations, 2023

The value of the Western Cape's total global exports has grown exponentially over the past 10 years, from a value of ZAR97.91bn in export receipts in 2013 to ZAR186.23bn in 2022, equating to a 10-year average annual growth rate of 8.83% from 2013 to 2022. The United States has consistently been a key export destination for Western Cape goods, consistently ranking as one of the top five export markets over the past 20 years and the second largest in the last five years. In 2013, exports to the United States reached a value of ZAR3.59bn. Since then, exports to the North American country have more than quadrupled, growing at an average annual rate of 15.73% to reach ZAR15.26bn worth of exports in value terms in 2022. This amount represented an 8.20% share of the Western Cape's total exports in 2022. These figures can be observed in Table 1.

Table 1: Western Cape's Top 10 Export Markets, 2022

Rank (2022)	Market	Value (ZARbn), 2013	Value (ZARbn), 2022	Share (%), 2022	Ave Annual Growth (%), 2013-2022
1	Netherlands	6.80	16.88	9.06	12.58
2	United States	3.59	15.26	8.20	15.73
3	United Kingdom	6.73	12.69	6.82	9.86
4	Botswana	7.22	12.28	6.59	7.50
5	Namibia	9.92	12.04	6.47	6.90
6	China	1.98	10.33	5.55	22.81
7	Germany	3.86	5.48	2.94	6.34
8	United Arab Emirates	2.22	5.27	2.83	15.48
9	Mozambique	3.84	4.36	2.34	26.13
10	Lesotho	1.92	4.26	2.29	9.38

Source: Quantec and own calculations, 2023

As discussed in Section 3, data limitations exist in the study, including the challenge of isolating products which are AGOA-eligible from their relevant sectors. This is beyond the scope of the study. Therefore, the "AGOA-eligible sectors" are defined as those sectors whose products are eligible for AGOA, even if all the products within that sector are not. This still provides an opportunity to meaningfully assess the importance of AGOA-related exports from a sector perspective.

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Table 2 shows that the total value of AGOA-related exports[3] originating from the Western Cape to the rest of the world reached ZAR165.11bn in 2022, equivalent to 88.66% of the Western Cape's total exports. Agriculture (31.13%), food (11.70%), and oil (7.66%) were the top three AGOA-related export sectors to the world, collectively accounting for close-on 50% of total Western Cape exports in 2022[4].

Although the United States accounted for only 8.06% of total AGOA-related exports originating from the Western Cape in 2022, the country's importance varies widely when considering individual sectors. For example, basic iron and steel exports to the United States amounted to 41.70% of the Western Cape's iron and steel exports to the world. And exports to the United States of motor vehicles, other manufacturing groups, and rubber products each represented more than 20% of the Western Cape's exports to the world[5].

Table 2: Western Cape's Top 10 AGOA-related Exporting Sectors to the World, 2022

Rank (2022)	Sector	Value (ZARbn),2022	Share (%) WC exports	Share (%), US	Share (%), AGOA related
1	Agriculture	57.96	31.13	4.38	35.10
2	Food	21.79	11.70	7.36	13.20
3	Coke, petroleum products and nuclear fuel	14.27	7.66	0.02	8.64
4	Beverages and tobacco	14.00	7.52	6.61	8.48
5	Other manufacturing groups	9.96	5.35	26.19	6.04
6	Machinery and equipment	6.70	3.60	5.56	4.06
7	Other chemical products	6.60	3.54	9.85	3.99
8	Primary metals	5.94	3.19	0.02	3.60
9	Basic iron and steel products; casting of metal	5.26	2.82	41.70	3.18
10	Motor vehicles, parts and accessories	4.53	2.43	27.68	2.75
	Total AGOA-related exports	165.11	88.66	8.06	100.00
	Total WC exports	186.23			

Source: Quantec and own calculations, 2023

Looking at the top AGOA-related exporting sectors from the Western Cape to the United States, it is evident from Figure 2 that other manufacturing groups topped the list with a total export value of ZAR2.61bn in 2022. This accounted for 19.61% of total AGOA-related exports and for 17.1% of total exports from the Western Cape to the United States in 2022. Agriculture (ZAR2.54bn), basic metals (ZAR2.19bn), food (ZAR1.60bn), and motor vehicles and parts (ZAR1.25bn) were also significant AGOA exports to the United States, which together with other manufacturing groups, comprised the top five AGOA-related exports to the United States in 2022. These export categories collectively accounted for 76.6% of AGOA-related exports and 66.8% of total Western Cape exports to the United States in 2022.

Furthermore, out of the top 10 AGOA-related exporting sectors, motor vehicles registered the highest growth at an average annual rate of 109.87% from 2013 to 2022, followed by basic iron and steel at a growth rate of 99.29%. As Addendum 3 shows, when considering all AGOA-related sectors, the coke, petroleum products and nuclear fuel sectors averaged the highest average growth at 1084.41% per

[3] This is the sum of all the AGOA-related sector exports.
[4] Addendum 1 compiles the full list of AGOA-related exporting sectors and its share to the United States.
[5] A Comprehensive list of the top AGOA-related sectors to the US is tabulated in Addendum 2.

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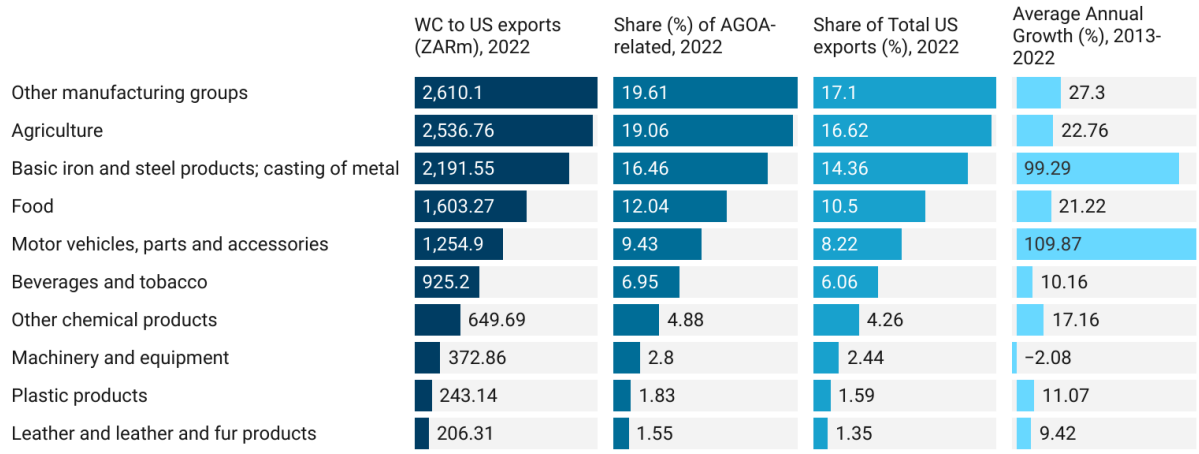
annum, followed by rubber products at 363.46% per annum over the 10-year period spanning 2013 to 2022.

Figure 2: Western Cape's Top 10 AGOA-related Exporting Sectors to the US, 2022



Source: Quantec and own calculations, 2023

5. The Importance of AGOA to the Labour Market in the Western Cape

The labour market plays a crucial role in the development of any economy. Workers supply labour in exchange for wages, and firms demand labour as an input into production. Basic labour theory suggests that the level of labour demand is determined by the output of a firm, among other factors. That is, an increase in a firm's output would result in an increase in labour demand. An extension of this would be to say that as a firm's exports increase, so would the labour demand increase to meet the additional production requirements. Conversely, as workers' productivity increases, the demand for labour should decrease as less labour is required per unit of output. In turn, as the level of employment in an economy increases (labour supply), so does employment in other related sectors increase through growth in spending in the economy – generally through a multiplier effect. This section analyses the labour market in the Western Cape, particularly in regard to the relationship between labour and the considered AGOA-related exporting sectors in the Western Cape.

Total employment in the Western Cape's AGOA-related export sectors reached 368,593 in 2021[6], accounting for 15.96% of the total figure of 2,309,769 employed persons in the province in the considered year. Agriculture was the largest contributor to employment among AGOA-related exporting sectors in the Western Cape, accounting for 7.57% of the total labour stock in 2021, as shown in Figure 3. However, when considering only AGOA-related sectors, 47.72% of AGOA-related labour was concentrated in the agricultural sector. This is expected since the largest AGOA-related exporting sector is agriculture, which indicates the importance of agricultural exports to labour demand, not only within the agricultural sector, but also for the economy of the Western Cape[7].

The food-processing sector follows a similar trajectory, ranking as the second largest employer of the Western Cape's labour pool in AGOA-related exporting sectors and accounting for 2.04% of the total labour stock in the Western Cape in 2021. Again, when considering only AGOA-related exporting sectors, employment share in the food-processing industry increases to 12.85%. In contrast, sectors such as oil and gas, chemicals, metals, and leather industries accounted for less than 1% of the labour stock in the AGOA-related exporting sectors, as can be observed in Addendum 4.

[6] The latest employment data provided by Quantec was for 2021. Therefore, although exports in 2022 is contrasted with the labour market in 2021, this still provides reasonable estimates given the general rigidities of labour market dynamics.
[7] The full list of AGOA-related exporting sector employment data can be found in Addendum 4.

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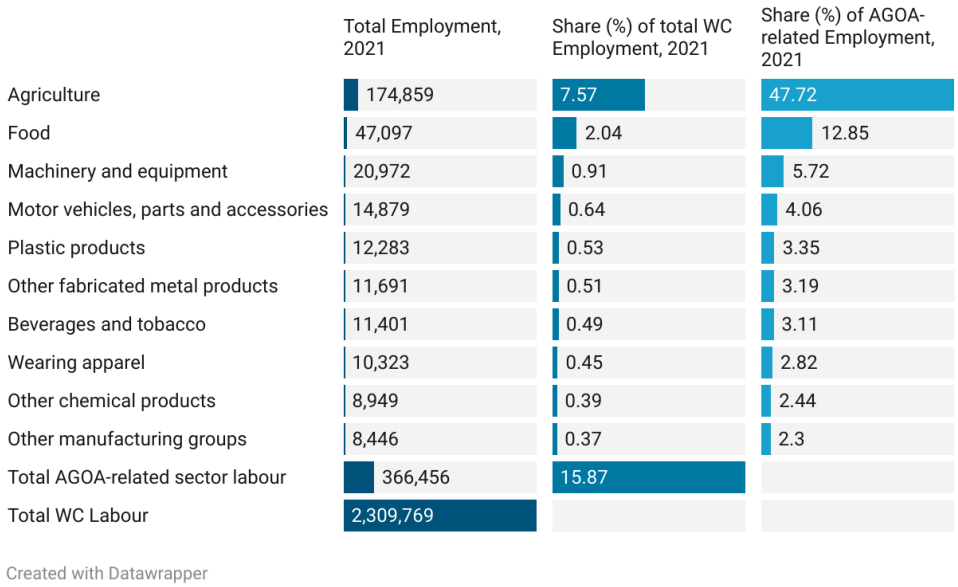
Figure 3: Top 10 AGOA-related Exporting Sectors 2021

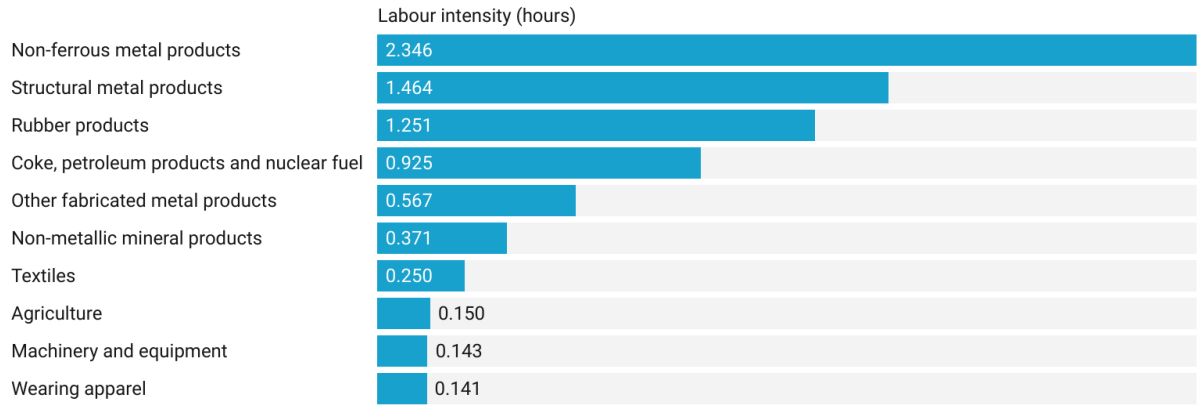


Source: Quantec and own calculations, 2023

As noted, the level of exports is a fundamental theoretical determinant of the level of employment. That is, if the level of exports increases, so would employment in an industry. Conversely, if the level of exports were diminished, one would expect a fall in employment levels. Consequently, the effects of export changes on employment are even more important when considering industries that rely more on labour to produce exports, i.e., those industries that are more labour intensive than others.

Figure 4 shows the top 10 AGOA-related sectors that were labour intensive, and which exported goods to the United States in 2021. Evidently, labour intensity was robust in the non-ferrous metal product industry, which used 2.35[8] labour hours to produce one rand's worth of non-ferrous metals exports to the United States. Structural metals and rubber products were also highly labour intensive, requiring 1.46 and 1.25 hours of labour respectively to produce one rand's value of exports to the United States. It can then be inferred that if a shock to the economy would cause the level of exports to drop across all AGOA-related sectors (such as AGOA expiring), then the relative effects of this shock on labour hours will be concentrated, *ceteris paribus*, in these top labour-intensive sectors.

Figure 4: Top 10 Labour Intensive (hours) AGOA-exporting Sectors to the United States, 2021



Source: Quantec and own calculations, 2023

[8] Labour hours was calculated by multiplying the level of employment in a respective sector by an employee's required working hours per annum (2,080).

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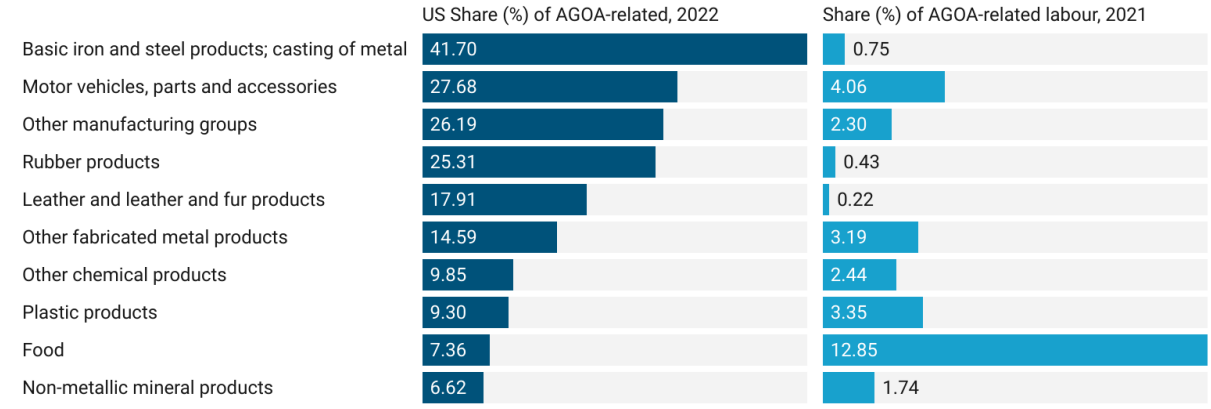
Although non-ferrous metals is the most labour intensive of the AGOA-related exporting sectors to the United States, it accounted for only 0.04% of the Western Cape's total global exports of non-ferrous metals in 2022 (see Addendum 2). Therefore, the absolute or economy-wide effects on the Western Cape's employment levels caused by an adverse shock to exports to the United States (such as AGOA expiring) would be relatively insignificant. However, when considering the United States' share of AGOA-related exports in relation to the employment levels in the relevant sectors, the effects on levels of employment become clear.

For example, from Figure 5 it is evident that the United States accounts for 41.70% of the Western Cape's basic iron and steel exports to the world, while using only 0.75% of the AGOA-related sector's labour force. In contrast, although employment in agriculture accounted for 47.72% of the AGOA-related labour pool, the United States was the recipient of only 4.38% of the Western Cape's global agricultural exports.

In turn, the motor vehicle sector accounted for 4.06% of the AGOA-related labour force, while 27.68% of the Western Cape's global motor vehicle exports were destined for the United States. The local food-processing labour force also showed a strong reliance on the United States export market, with 7.36% of the province's global food exports destined for the United States, while 12.85% of the AGOA-related labour force was concentrated in the food-processing sector.

It can therefore be inferred that in the case of an adverse shock to the economy, such as the expiry of AGOA, the Western Cape's export products would become less attractive to United States importers. The net effect of this potential decrease in exports to the United States on the overall level of employment would originate disproportionately more from sectors with a greater reliance on the United States, such as those depicted below.

Figure 5: Top 10 AGOA-related Sectors with Highest Share of the Western Cape's Global Exports, 2022



Source: Quantec and own calculations, 2023

This paper now considers the economy-wide effects on employment of AGOA-related exports from the Western Cape to the United States. In doing so, the importance of AGOA-related exports on employment creation can be assessed, not only directly, but also through looking at indirect and induced employment creation from a R1 million increase in exports. To achieve this, use is made of industry multipliers, sourced from Quantec. The results are displayed in Figure 5. Evidently, the agricultural sector was the main beneficiary of employment resulting from exports to the United States in AGOA-related exporting sectors. In 2021, the value of the Western Cape's agricultural exports to the United States reached ZAR2.42bn. This created 6,554 direct jobs, 547 indirect jobs and 1,489 induced jobs to reach an economy-wide total of 8,591 jobs sustained in 2021[9].

[9] The full list of job creation from exports to the United States from AGOA-related exporting sectors can be found in Addendum 7.

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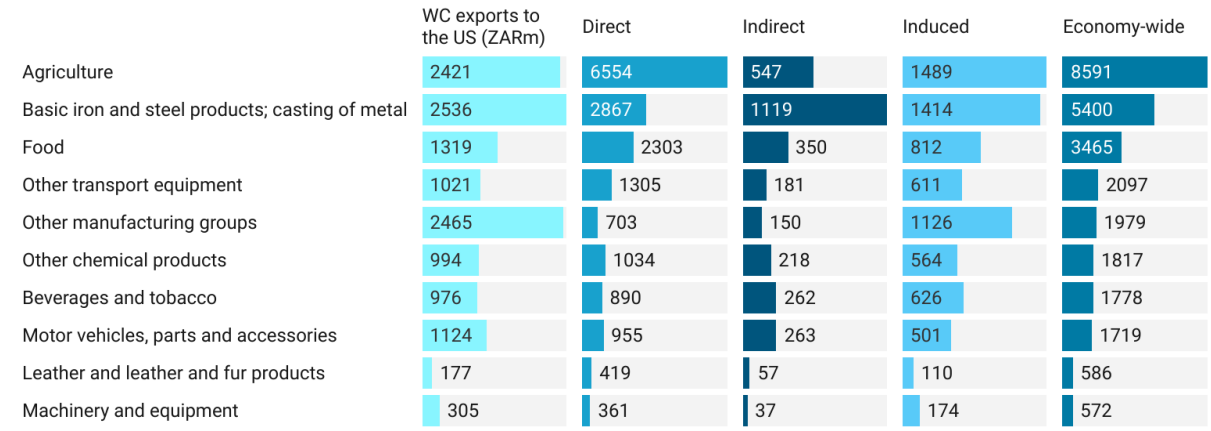
Figure 5: Multiplier Effect on Employment of WC Exports to the United States, 2021



Source: Quantec and own calculations, 2023

6. Theoretical and Empirical Literature Review

Many studies have attempted to assess the impact of AGOA on exports, but fewer attempts have been made to isolate the impact of AGOA on employment. In the published research on the impact of AGOA on employment, methodologies and outcomes varied.

One study by Mulangu (2015) used a difference-in-difference-in-differences approach to evaluate the impact of AGOA on firm-level employment and productivity in the apparel sector in Ghana. The study found that although small, AGOA had a positive impact on employment and productivity.

Yeshiwas (2016) used a linear regression model using time series data to examine the employment effects from AGOA-related Foreign Direct Investment (FDI) in sub-Saharan countries in general and Ethiopia in particular. The study concluded that AGOA-related FDI had a negative effect on employment in SSA countries and an insignificant impact on employment in Ethiopia. The study purports that the reason for this result is that AGOA-related FDI may have been skewed toward investment in capital intensive sectors as opposed to labour intensive sectors.

Sibanyoni (2006) used a case study approach to examine the impact of AGOA on employment in Eswatini (Swaziland). The study finds that while AGOA had been significant in creating employment in Swaziland's textile sector, it was less successful at reducing poverty. This was largely because of an influx of Taiwanese textile firms which entered the local market at the time of inception of AGOA, while simultaneously, many domestic textile firms were forced to shut down due to cheaper Chinese textile imports which flooded the local market.

To assess the impact of AGOA on the apparel and textile industry in Kenya, Cotton (2010) used a literature review approach, complemented by a comparative analysis. The study found that direct employment in the textile manufacturing sector rose from 10,000 to 36,000 from 2000 to 2004 but contracted by 9.6% to reach an employment level of 25,766 in the textile manufacturing industry by 2008. This decline is largely attributed to a decline of 8.9% in investment in the sector, coupled with surging production costs in the local textile sector.

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7. Data Types and Sources

This study utilised annual time series data ranging from 1993 to 2021. Data on Gross Value Added (GVA), employment, average wages, imports, exports, capital productivity and labour productivity were sourced from Quantec's Easy Data platform[10]. This platform sources primary and secondary data from reputable data sources such as Statistics South Africa (StatsSA) and the South African Revenue Services (SARS), and arranges it in a user friendly, online-based system which is accessible to users in the public, private and educational sectors. Data on interest rates and inflation was sourced from Euromonitor[11], while data on the average annual USD/ZAR exchange rate was sourced from the Nedbank Group[12].

8. Empirical Model

The model specification for labour demand in South Africa is adapted from Chikwanha et al (2013), who estimated the determinants of labour demand in South Africa's textile, clothing, and footwear (TCF) industry. The model from Chikwanha et al (2013) is specified as:

$$L_t = \beta_0 + \beta_1 IMP_t + \beta_2 OUT_t + \beta_3 WIR_t + \varepsilon \quad \ldots\ldots(1)$$

Where L is the labour demand in the TCF industry, IMP is the level of imports in the TCF industry, OUT is the output generated by the TCF and WIR is the wage to interest ratio.

8.1 Model Specification

The model above is modified to involve additional parameters, including a dummy variable to assess the impact of AGOA on employment in the Western Cape. The adapted model is thus specified as:

$$Lt = \beta_0 + \beta_1 GVA_t + \beta_2 IMP_t + \beta_3 EXP_t + \beta_4 LP_t + \beta_5 CP_t + \beta_6 WIR_t + \beta_7 INF_t + \beta_8 AGOA_t + \varepsilon \quad \ldots\ldots(2)$$

The variables are all log-transformed to capture the changes in data and their elasticity as opposed to their level form. In addition, estimation of the above equation using the Ordinary Least Squares (OLS) method may yield biased estimators. Converting variables into their natural logarithmic form ensures that the errors are both homoscedastic and normally distributed – both simplifying assumptions of the classical linear regression model. The following is derived and forms the basis of the estimated model:

$$lnL_t = \beta_0 + \beta_1 lnGVA_t + \beta_2 lnIMP_t + \beta_3 lnEXP_t + \beta_4 lnLP_t + \beta_5 lnCP_t + \beta_6 lnWIR_t + \beta_7 lnINF_t + \beta_8 AGOA_t + \varepsilon \quad \ldots\ldots(3)$$

Where:

lnL_t = log labour at time (t)
$lnGVA_t$ = log Gross Value Added at time (t) and acts as a proxy for output.
$lnIMP_t$ = log value of Western Cape imports from the United States at time (t)
$lnEXP_t$ = log value of Western Cape exports to the United States at time (t)
$lnLP_t$ = log labour productivity at time (t)
$lnCP_t$ = log capital productivity at time (t)
$lnWIR_t$ = log ratio of the annual wage at time (t) to the interest rate (used as a proxy for the cost of capital) at time (t)
$lnINF_t$ = log annual inflation rate at time (t)
$AGOA_t$ = Dummy variable which takes the value of 0 when AGOA was not in effect (from 1993 – 1999) and 1 for when AGOA was in effect (2000 – 2021).
β= Coefficients to be estimated

[10] For more information on Quantec's EasyData service: https://www.easydata.co.za/
[11] Access to information on Euromonitor can be sourced from their website: https://www.euromonitor.com/
[12] Average annual exchange rates can be located from: www.nedbank.co.za/content/dam/nedbank/site-assets/AboutUs/Economics_Unit/Forecast_and_data/Daily_Rates/Annual_Average_Exchange_Rates.pdf

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ε= Error Term

The error term (ε) captures any omitted variables which may not have been accounted for in the model since Lt is not an exact linear combination of the independent variables.

8.2 Definition of Variables and Expectations

The labour variable (Lt) used as the dependent variable in the model refers to the level of or total employment in the Western Cape. It includes formal and informal employment across skilled, semi-skilled and low-skilled categories of employment. Labour data is sourced from Quantec, which uses credible data sources such as the Quarterly Labour Force Survey (QLFS) and Quarterly Employment Statistics (QES) conducted by StatsSA, which provide information about employment levels in South Africa, and in the country's nine provinces.

The GVAt variable is the value of goods and services produced by the Western Cape after deducting the cost of intermediate inputs in the production process and is used as a proxy for output in the economy. We would expect GVAt to have a positive effect on employment since an increase in output would require a higher degree of labour as an input into the production process.

Imports (IMPt) is a measure of the value of Western Cape imports from the United States in the period (t). Although the effect of imports on the level of employment is mixed, this model assumes that an increase in imports would lead to a decrease in the overall employment level. If imported products are assumed to be cheaper, consumers would purchase the imported products instead, leading to lower demand and production of domestic goods and thereby, a reduction in labour demand. Thus, we assume a negative relationship would exist between imports and employment.

Exports (EXPt) is the value of exports from the Western Cape to the United States at time (t). The model expects a positive relationship between employment and exports. That is, as exports increase, so does the foreign demand for domestic goods, which causes an increase in production and thereby an increase in the labour demand to meet the increased demand/production requirements.

Labour productivity (LPt) is the overall labour productivity index in the Western Cape at time (t). The labour productivity index is sourced from Quantec and is generally calculated as the value of output divided by the labour input used to produce that output, using a base year as a reference period (in this case, 2015 was the base year). An increase in the labour productivity index means that more output is produced per unit of labour input and firms would require less labour for one unit of output, thereby reducing the labour demand. Therefore, the model expects a negative relationship to exist between labour productivity and employment.

Capital productivity (CPt) is a measure of the performance of capital used in the production process at time (t). This variable is also sourced from Quantec and is calculated as the value of output divided by the total value of capital input. Capital productivity also has varying effects on labour, but this model assumes that as capital productivity improves, more output is produced per unit of capital, thereby stimulating the demand for labour and economic growth. Hence, a positive relationship is expected between capital productivity and employment levels.

WIR(t) is the wage to interest ratio in the Western Cape at time (t). The wage variable was sourced from Quantec as the annual total real compensation (2015 constant prices) divided by the total labour in year (t). The interest rate was sourced from Euromonitor and acts as a proxy for the cost of capital.

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When the WIR ratio increases, it means that the average annual wage increases by more than the average cost of capital, forcing firms to decrease their demand for labour due to the higher labour costs. The model therefore expects a negative relationship between the WIR and the level of employment.

Inflation (INF(t)) refers to the general level of prices in the Western Cape economy. The variable for inflation is sourced from Euromonitor and is used as an input into the model. When inflation rises, workers experience a decrease in their real income and demand fewer domestic goods. The decrease in demand leads to a decrease in consumer spending which lowers business revenue and in turn, causes a decrease in the level of labour demanded by firms. Through this mechanism, the model assumes a negative relationship to exist between the inflation rate and the level of employment in the economy.

A dummy variable for AGOA was created to capture the period before and after the enactment of AGOA, i.e., the dummy variable takes on the value of 0 for the period 1993 to 1999 and a value of 1 for the period 2000 to 2021. As mentioned, AGOA provides duty-free access to the United States market for all sub-Saharan African countries who qualify for the programme. In essence, exports to the United States are more competitive and are driven by a resource-abundant market. As a result, we would expect AGOA to have a positive relationship on exports, and exports to have a positive relationship on employment. Therefore, we expect that AGOA would have a positive relationship with employment.

9. Data Analysis and Tests: Stationarity, Cointegration and Diagnostic Tests

Yearly time series data spanning the period 1993 to 2021 was used for estimation. In order to use the classical OLS estimation technique, each variable in the model was tested for stationarity, followed by testing for any causal relationship between variables over time. Through this, an assessment could be made about the order of integration, if cointegration existed, and whether the variables exhibited any stationarity trends. Estimating a non-stationary time series regression could lead to spurious coefficients and meaningless results.

The Augmented Dickey Fuller (ADF) test was used to test for stationarity, while the Engel-Granger approach was used to test for cointegration. In the event where the variables exhibited non-stationarity characteristics around its mean, the variable was differenced, which led to stationarity of the series. This informed the decision to use OLS as an estimation technique.

9.1 Descriptive Statistics

The statistical analysis in this study used the Stata 15 software to carry out its estimation function. Measures of central tendency and measures of dispersion are key statistical tools used to analyse and describe data. They provide valuable insights into the characteristics, patterns, and variability of the variables.

Standard deviation and variance are both measures of dispersion. Kurtosis measures the peakiness or flatness of the series. The kurtosis of a normal distribution averages around 3. If the kurtosis value of a variable is above 3, it means the variable is peaked relative to normal and below three – the variable is flat relative to normal. In this case, all the variables are flat relative to normal besides our inflation variable.

The mean and the median provide information about the centre of a frequency distribution. The median is a strong measure of the centre of a distribution and is less sensitive to outliers than the mean. It is

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evident that the mean and the median in the series below are relatively equal, indicating that the model does not suffer from any outliers.

Skewness measures the series' distribution around the mean. Table 3 shows that the values of skewness of the variables are all close to 0, indicating that the series is relatively normal, which is a key assumption of the OLS estimation technique.

Table 3: Summary Statistics

stats	lnemploy	lnGVA	lnimports	lnexports	lnLP	lnCP	lnWIR	lnINF	AGOA
N	29	29	29	29	29	29	29	28	29
mean	14.33223	26.80835	21.77507	21.6493	4.509457	4.53647	9.42222	1.740857	0.7586207
sd	0.0908148	0.2422724	0.7593653	1.13676	0.1278643	0.0915724	0.4289457	0.3699192	0.4354942
variance	0.0082473	0.0586959	0.5766356	1.292223	0.0163493	0.0083855	0.1839944	0.1368402	0.1896552
skewness	0.591957	-0.3178619	-0.2663958	-0.5867665	-0.4619567	-0.8354518	-0.2256838	-0.5916673	-1.208734
kurtosis	2.093747	1.551687	1.675874	2.652473	1.872609	2.31339	1.639131	3.443263	2.461039
median	14.29739	26.89505	21.99655	21.74577	4.543827	4.582924	9.494367	1.743091	1
min	14.21688	26.39706	20.29371	19.12102	4.250208	4.330075	8.728367	0.722706	0
max	14.51032	27.09703	22.76033	23.5227	4.698478	4.62957	10.06192	2.307573	1

9.2 Correlation of Variables

A correlation matrix was used provide information about the linear relationship between dependant variables. As is evident in Table 4, it is clear that most of the variables are highly correlated with each other, deduced by a correlation coefficient greater than 0.5. High correlation between variables could cause problems of multicollinearity, which leads to unreliable and unstable estimates of the explanatory variables of the dependant variable. To overcome this issue, the difference of each variable was calculated and used in the estimation. The correlation matrix after differencing the variables is shown in Table 4.

Table 4: Correlation Matrix

	lnemploy	lnGVA	lnIMP	lnEXP	lnLP	lnCP	lnWIR	lnINF	AGOA
lnemploy	1								
lnGVA	0.8749	1							
lnIMP	0.875	0.9826	1						
lnEXP	0.8872	0.9207	0.923	1					
lnLP	0.7812	0.973	0.9504	0.912	1				
lnCP	0.6435	0.8968	0.8742	0.8288	0.9119	1			
lnWIR	0.7776	0.9384	0.8892	0.8473	0.9525	0.8306	1		
lnINF	-0.4532	-0.4774	-0.4196	-0.5281	-0.4989	-0.4646	-0.567	1	
AGOA	0.6564	0.8015	0.7661	0.8403	0.8064	0.8913	0.7818	-0.4904	1

9.3 Stationarity Analysis

9.3.1 Unit Root Tests

As noted, accepting a model which exhibits signs of non-stationarity of its variables would lead to spurious regression results, i.e., false relationships between variables, unreliable forecasts, and inefficient estimates. To test for stationarity of the variables, the study used the ADF test with one lag and a trend term. Table 5 shows the results of the unit root test before differencing the variables. As can be seen, all variables showed non-stationarity, except for capital productivity and inflation, which exhibited signs of stationarity in its level form.

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Table 5: Unit Root Test Results

Variable	Test Statistic	p-value	Stationarity
lnemploy	-0.303	0.9251	Non-stationary
lnGVA	-2.005	0.2843	Non-stationary
lnimports	-1.611	0.4777	Non-stationary
lnexports	-1.766	0.3976	Non-stationary
lnLP	-1.563	0.5023	Non-stationary
lnCP	-2.957	0.0391	Stationary
lnWIR	-0.587	0.874	Non-stationary
lnINF	-3.968	0.0016	Stationary
AGOA	-1.803	0.3791	Non-stationary

After transforming the variables into their differenced form, the ADF test was re-run to assess the stationarity of the variables. The results are shown in Table 6 below. From the table, it is clear that all variables were stationary after differencing, which showed the efficient use of the OLS estimation technique.

Table 6: Unit Root Test Results after Differencing

Variable	Test Statistic	p-value	Stationarity
lnemploy	-4.507	0.0015	Stationary
lnGVA	-4.013	0.0084	Stationary
lnimports	-6.508	0.0000	Stationary
lnexports	-5.525	0.0000	Stationary
lnLP	-4.237	0.0039	Stationary
lnCP	-5.207	0.0001	Stationary
lnWIR	-3.226	0.0793	Stationary
lnINF	-4.200	0.0045	Stationary
AGOA	-5.196	0.0000	Stationary

9.3.2 Correlation after Differencing

It is clear from Table 7 that by differencing the variables, the multicollinearity problem was solved. Hence, the efficient use of OLS can proceed as a viable estimation technique.

Table 7: Correlation Matrix after Differencing

Variable	d.lnemploy	d.lnGVA	d.lnIMP	d.lnEXP	d.lnLP	d.lnCP	d.lnWIR	d.lnINF	d.AGOA
d.lnemploy	1								
d.lnGVA	0.4517	1							
d.lnIMP	0.2982	0.5142	1						
d.lnEXP	0.0295	0.1027	0.4336	1					
d.lnLP	-0.5916	0.201	-0.0277	0.1843	1				
d.lnCP	0.3591	0.8592	0.4754	0.3618	0.3662	1			
d.lnWIR	-0.465	-0.3951	-0.4966	-0.1846	0.3737	-0.2192	1		
d.lnINF	0.2179	0.4419	0.4898	0.2284	-0.0462	0.3027	-0.5009	1	
d.AGOA	0.4309	0.2095	-0.0514	0.0681	-0.2854	0.3313	0.136	0.0128	1

9.4 Autocorrelation

Testing for the existence of autocorrelation is important in time series analysis because it provides valuable insights into a variable's dependence on its past values. The existence of autocorrelation in the model could lead to inefficient parameter estimates, inaccurate inferences, and inadequate model fit. The Breusch-Godfrey test was used to test for autocorrelation in the model. The test statistic of 2.621 indicates that there is no autocorrelation in the model. This therefore demonstrates that the residuals of the model are independent and identically distributed.

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Table 8: Breusch-Godfrey Test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	2.621	1	0.1055

H0: no serial correlation

9.5 Heteroskedasticity

Heteroskedasticity refers to the event in which the residuals of the error term are not constant across all levels of the independent variables. In other words, the dispersion of the residuals changes as the value of the independent variable changes. This could lead to inefficient and biased estimates, inaccurate standard errors, and inefficient model fit. To test for heteroskedasticity, the Breusch-Pagan Hettest was used. The results of the Hettest are displayed in Table 9 The test confirms the presence of heteroskedasticity and to address this issue, robust standard errors were used in the regression analysis.

Table 9: Breusch-Pagan Test for Heteroskedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of diff_lnemploy

         chi2(1)      =     0.02
         Prob > chi2  =   0.8906
```

9.6 Test for Cointegration

To test for cointegration, the study used the Engle-Granger procedure, together with OLS, to estimate the long run equation with variables integrated by order 0. Table 10 shows the results of the analysis:

Table 10: Result of the Long Run Relation of the Model

Dependent variable: lnemploy

Variables	coef	se
lnemploy	.	(.)
lnGVA	0.7490***	(0.1304)
lnimports	-0.0210	(0.0257)
lnexports	0.0557**	(0.0203)
lnlabourproductivity	-0.8632***	(0.2921)
lncapitalproductivity	-0.4677*	(0.2497)
lnWIR	0.0046	(0.0638)
lninflation	-0.0080	(0.0109)
AGOA	-0.0060	(0.0405)
Constant	-0.5068	(2.3618)
Observations	28	
R-squared	0.9734	
Rob SE	YES	

Robust standard errors in parentheses

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

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The result of the long run model shows that only labour productivity and AGOA are significant variables in explaining the variation in employment levels. To avoid a spurious regression, a residual based cointegration test was performed on the long run model to assess the stationarity of the residuals. The result is shown in Table 11:

Table 11: Augmented Dickey Fuller Test for Residuals of Long Run Model

Dickey-Fuller test for unit root Number of obs = 26

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.504	-3.743	-2.997	-2.629

MacKinnon approximate p-value for Z(t) = 0.0079

The result of the ADF test on the long run model shows that there is cointegration of the variables in the long run model. This is confirmed by the significant p-value = 0.0079 from the ADF test above. It is therefore prudent to estimate the short run error-correction model as the model of choice for estimation.

10. Model Estimation and Results Discussion

The results of the short run error-correction model are shown in Table 12. The results show that 79.57% of the variation in the employment levels in the Western Cape is explained by the GVA in the Western Cape, Western Cape imports from the United States, Western Cape exports to the United States, labour productivity in the Western Cape, capital productivity in the Western Cape, the wage to interest ratio, inflation, and the presence of AGOA. Consequently, 20.43% of the variation in the employment level is explained by variables not included in the model and thereby captured by the error term. Moreover, the high F-stat shows that the model is specified correctly and is a good fit.

All variables have the expected signs. The model shows that a 1% increase in labour productivity is associated with a 0.65% decrease in the level of employment. This result is statistically significant at the 1% level of significance. Another statistically significant variable is the capital productivity variable. An interpretation regarding the outcome can be made, as a 1% increase in capital productivity is associated with a 0.66% increase in the level of employment. The main outcome of the model is that the presence of AGOA increases employment levels in the Western Cape by 0.02% in the short run. This result is statistically significant at the 1% level of significance.

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Table 12: Error-Correction Model

Dependent variable: Diff_lnemploy		
Variables	coef	se
diff_lnemploy	.	(.)
diff_lnGVA	0.1258	(0.3128)
diff_lnimports	-0.0100	(0.0231)
diff_lnexports	0.0076	(0.0126)
diff_lnlabourproductivity	-0.6592***	(0.1184)
diff_lncapitalproductivity	0.6644*	(0.3505)
diff_lnWIR	-0.0000	(0.0000)
diff_lninflation	-0.0170	(0.0102)
AGOA	0.0153**	(0.0052)
L.residuals	0.3111	(0.3572)
Constant	0.0009	(0.0052)
Observations	24	
R-squared	0.7957	
Rob SE	YES	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

11. Conclusion

The Western Cape has historically adopted an export-led approach to economic growth. This is reflected by a relatively high export-to-GDP ratio of nearly 30% in 2022. Furthermore, the United States has fast become one of the Western Cape's most important global export markets, ranking in the top five destination markets in the last five years and placing second in 2022 with a share of 8.20% at an average annual growth rate of 15.73% over the past 10 years from 2013 to 2022.

Total global AGOA-related exports reached ZAR165.11bn in 2022, accounting for around 88.66% of total Western Cape exports. Although the United States accounted for only 8.02% of total AGOA-related sector exports, its importance varies within sectors. For example, exports to the United States accounted for 41.70% of Western Cape's basic iron and steel exports to the world, and for more than 20% of the province's global exports in motor vehicles, rubber, and other manufacturing products respectively. Looking at direct AGOA-related exports to the United States, other manufacturing, agriculture, basic iron and steel, and food processing were the leading AGOA-related exports to the United States in 2022.

To place the importance of these exports within the context of the labour market, a cross-comparative analysis of the employment sustained within these export markets was conducted. Agriculture and food processing were the leading sectors for AGOA-related employment in the Western Cape. However, although agriculture was the leading AGOA-related exporting sector to the world and accounted for 47.72% of the AGOA-related labour force, only 4.28% of agricultural goods was destined for the United States. In turn, food-processing exports to the United States accounted for 7.36% of global food exports, while representing a 12.85% share of the AGOA-related labour force. This could indicate that food processing is relatively more important to AGOA-related employment creation in the Western Cape than agriculture.

Finally, the results of the statistical analysis indicate that, overall, the presence of AGOA has had a significant impact on employment creation in the Western Cape. More particularly, the presence of AGOA has led to a 0.02% increase in the employment levels in the Western Cape. This result is statistically significant at the 1% level of significance.

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12. Addenda

Addendum 1: Western Cape Total AGOA-related Exports, 2022

Sector	WC Global Exports (ZARm), 2022	WC to US exports (ZARm), 2022	US Share (%) of AGOA-related, 2022
Agriculture	57963.11	2536.76	4.38
Food	21791.63	1603.27	7.36
Coke, petroleum products and nuclear fuel	14265.81	2.56	0.02
Beverages and tobacco	13999.51	925.20	6.61
Other manufacturing groups	9964.61	2610.10	26.19
Machinery and equipment	6702.06	372.86	5.56
Other chemical products	6595.94	649.69	9.85
Primary metals	5937.71	0.90	0.02
Basic iron and steel products; casting of metal	5255.87	2191.55	41.70
Motor vehicles, parts and accessories	4533.13	1254.90	27.68
Wearing apparel	3317.93	138.28	4.17
Textiles	2635.08	51.04	1.94
Plastic products	2614.86	243.14	9.30
Basic chemicals	2472.45	156.37	6.32
Non-ferrous metal products	1662.58	0.60	0.04
Other transport equipment	1387.70	51.07	3.68
Leather and leather and fur products	1152.22	206.31	17.91
Other fabricated metal products	1118.46	163.23	14.59
Structural metal products	609.63	32.16	5.28
Non-metallic mineral products	459.53	30.40	6.62
Rubber products	344.20	87.12	25.31
Wood and wood products	329.60	3.50	1.06
Total AGOA-related exports	165113.61	13311.00	8.06
Total WC exports	186225.47	15264.13	8.20

Source: Quantec and own calculations, 2023

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Addendum 2: United States Contribution to Western Cape's AGOA-related Exporting Sectors, 2022

Rank (2022)	Sector	WC Global Exports (ZARm), 2022	WC to US exports (ZARm), 2022	US Share (%) of AGOA-related, 2022
1	Basic iron and steel products; casting of metal	5255.87	2191.55	41.70
2	Motor vehicles, parts and accessories	4533.13	1254.90	27.68
3	Other manufacturing groups	9964.61	2610.10	26.19
4	Rubber products	344.20	87.12	25.31
5	Leather and leather and fur products	1152.22	206.31	17.91
6	Other fabricated metal products	1118.46	163.23	14.59
7	Other chemical products	6595.94	649.69	9.85
8	Plastic products	2614.86	243.14	9.30
9	Food	21791.63	1603.27	7.36
10	Non-metallic mineral products	459.53	30.40	6.62
11	Beverages and tobacco	13999.51	925.20	6.61
12	Basic chemicals	2472.45	156.37	6.32
13	Machinery and equipment	6702.06	372.86	5.56
14	Structural metal products	609.63	32.16	5.28
15	Agriculture	57963.11	2536.76	4.38
16	Wearing apparel	3317.93	138.28	4.17
17	Other transport equipment	1387.70	51.07	3.68
18	Textiles	2635.08	51.04	1.94
19	Wood and wood products	329.60	3.50	1.06
20	Non-ferrous metal products	1662.58	0.60	0.04
21	Coke, petroleum products and nuclear fuel	14265.81	2.56	0.02
22	Primary metals	5937.71	0.90	0.02

Source: Quantec and own calculations, 2023

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Addendum 3: Top AGOA-related Exporting Sectors from the Western Cape the US, 2022

Rank (2022)	Sector	WC to US exports (ZARm), 2022	Share (%) of AGOA-related, 2022	Share of Total US exports (%), 2022	Average Annual Growth (%), 2013-2022
1	Other manufacturing groups	2610.10	19.61	17.10	27.30
2	Agriculture	2536.76	19.06	16.62	22.76
3	Basic iron and steel products; casting of metal	2191.55	16.46	14.36	99.29
4	Food	1603.27	12.04	10.50	21.22
5	Motor vehicles, parts and accessories	1254.90	9.43	8.22	109.87
6	Beverages and tobacco	925.20	6.95	6.06	10.16
7	Other chemical products	649.69	4.88	4.26	17.16
8	Machinery and equipment	372.86	2.80	2.44	-2.08
9	Plastic products	243.14	1.83	1.59	11.07
10	Leather and leather and fur products	206.31	1.55	1.35	9.42
11	Other fabricated metal products	163.23	1.23	1.07	45.67
12	Basic chemicals	156.37	1.17	1.02	29.09
13	Wearing apparel	138.28	1.04	0.91	13.97
14	Rubber products	87.12	0.65	0.57	363.46
15	Other transport equipment	51.07	0.38	0.33	22.40
16	Textiles	51.04	0.38	0.33	13.59
17	Structural metal products	32.16	0.24	0.21	54.26
18	Non-metallic mineral products	30.40	0.23	0.20	35.65
19	Wood and wood products	3.50	0.03	0.02	51.95
20	Coke, petroleum products and nuclear fuel	2.56	0.02	0.02	1084.41
21	Primary metals	0.90	0.01	0.01	-9.63
22	Non-ferrous metal products	0.60	0.00	0.00	37.95
	Total AGOA-related exports to US	**13311.00**	**100.00**	**87.20**	**14.69**
	Total WC exports to US	**15264.13**			**15.73**

Source: Quantec and own calculations, 2023

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Addendum 4: Comprehensive List of AGOA-related Labour in Exporting Sectors

Sector	Total Labour, 2021	Share (%) of total WC labour, 2021	Share (%) of AGOA-related labour, 2021
Agriculture	174,859	7.57	47.72
Food	47,097	2.04	12.85
Machinery and equipment	20,972	0.91	5.72
Motor vehicles, parts and accessories	14,879	0.64	4.06
Plastic products	12,283	0.53	3.35
Other fabricated metal products	11,691	0.51	3.19
Beverages and tobacco	11,401	0.49	3.11
Wearing apparel	10,323	0.45	2.82
Other chemical products	8,949	0.39	2.44
Other manufacturing groups	8,446	0.37	2.30
Wood and wood products	8,361	0.36	2.28
Textiles	7,131	0.31	1.95
Non-metallic mineral products	6,389	0.28	1.74
Structural metal products	5,945	0.26	1.62
Other transport equipment	4,845	0.21	1.32
Coke, petroleum products and nuclear fuel	3,586	0.16	0.98
Basic chemicals	3,267	0.14	0.89
Basic iron and steel products; casting of metal	2,766	0.12	0.75
Rubber products	1,592	0.07	0.43
Non-ferrous metal products	814	0.04	0.22
Leather and leather products	812	0.04	0.22
Metals	48	0.00	0.01
Total AGOA-related sector labour	**366,456**	**15.87**	
Total WC Labour	**2,309,769**		

Source: Quantec and own calculations, 2023

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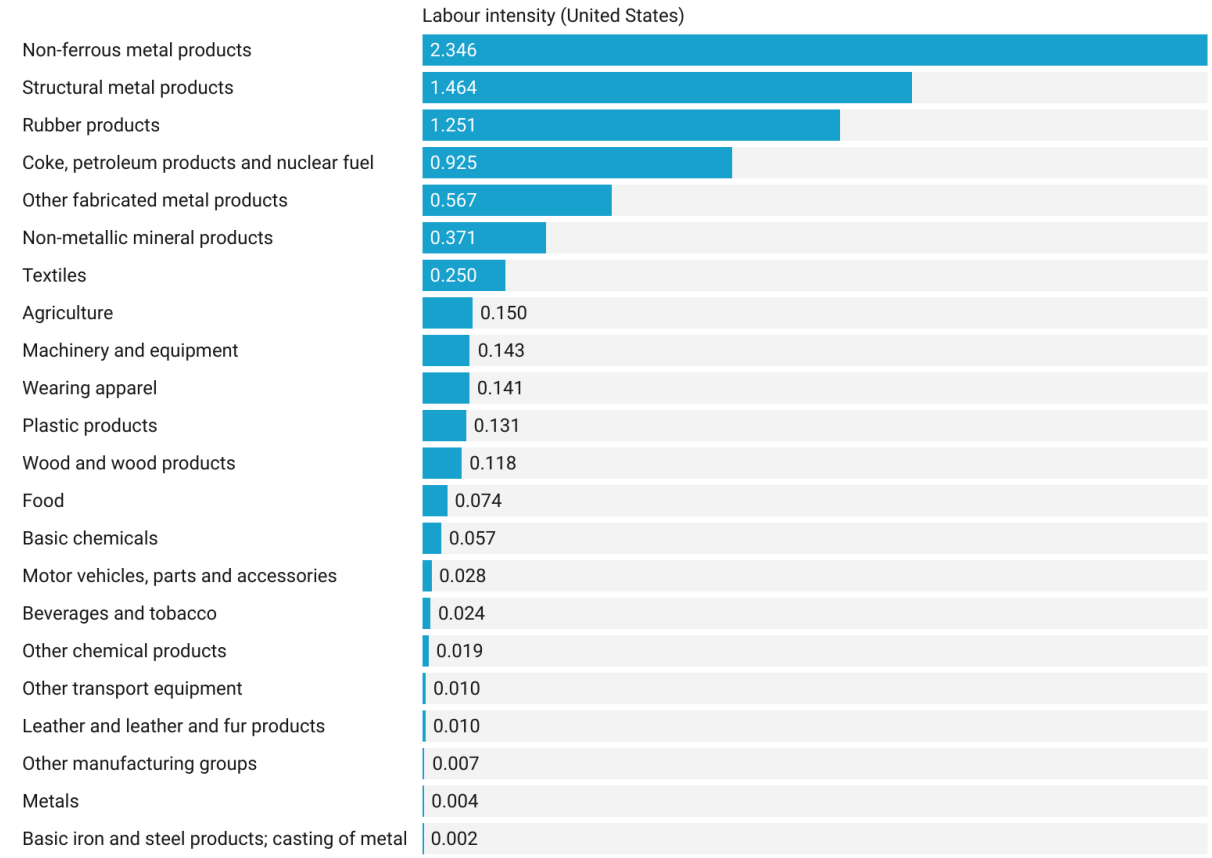
Addendum 5: Comprehensive list of the Labour Intensity in AGOA-related Exporting Sectors, 2021



Source: Quantec and own calculations, 2023

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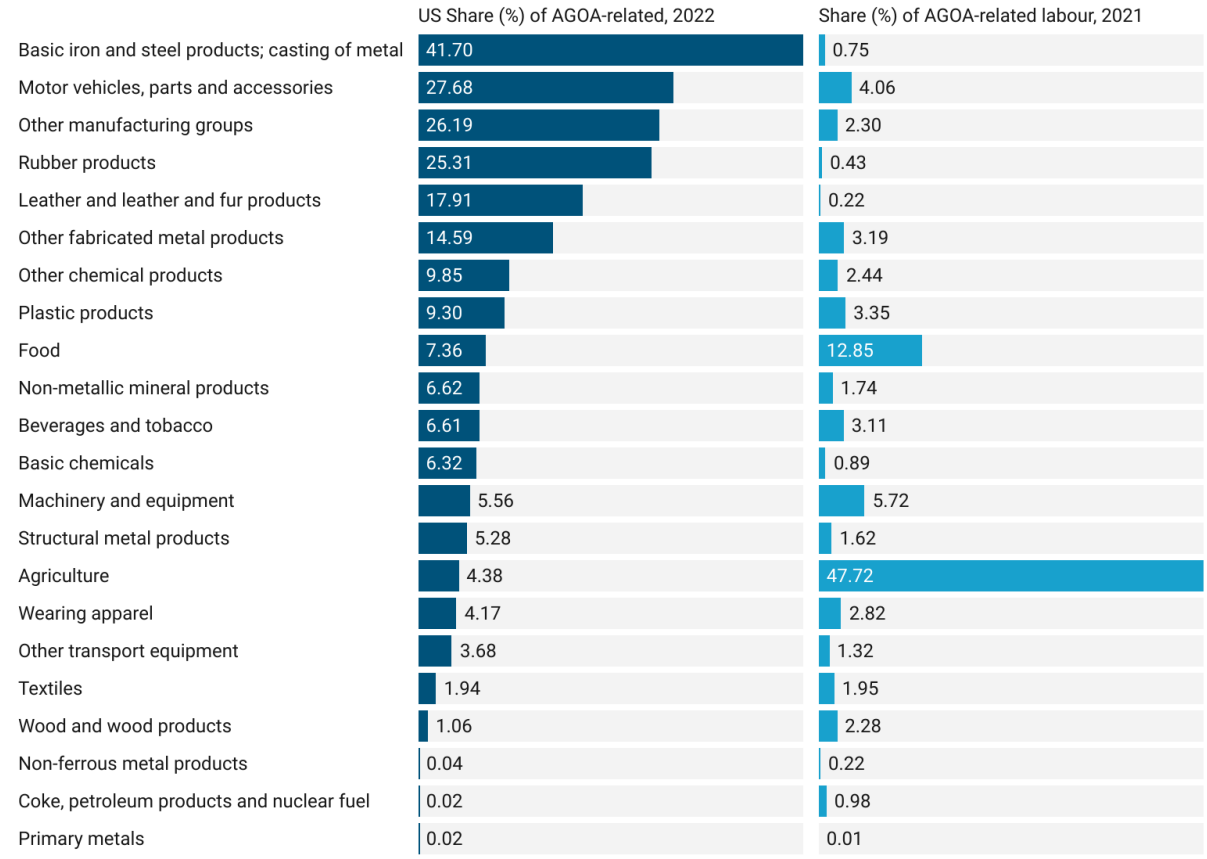
Addendum 6: Comprehensive List of the Labour Intensity in AGOA-related Exporting Sectors, 2021



Source: Quantec and own calculations, 2023

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Addendum 7: Multiplier Effect on Job Creation from Exports to the US from AGOA-related Exporting Sectors, 2021

	WC exports to the US (ZARm)	Direct	Indirect	Induced	Economy-wide
Agriculture	2421	6554	547	1489	8591
Basic iron and steel products; casting of metal	2536	2867	1119	1414	5400
Food	1319	2303	350	812	3465
Other transport equipment	1021	1305	181	611	2097
Other manufacturing groups	2465	703	150	1126	1979
Other chemical products	994	1034	218	564	1817
Beverages and tobacco	976	890	262	626	1778
Motor vehicles, parts and accessories	1124	955	263	501	1719
Leather and leather and fur products	177	419	57	110	586
Machinery and equipment	305	361	37	174	572
Wood and wood products	147	346	60	91	497
Plastic products	195	277	37	105	418
Wearing apparel	153	278	26	79	384
Basic chemicals	120	76	34	61	172
Textiles	59	108	7	34	150
Other fabricated metal products	43	60	14	27	100
Non-metallic mineral products	36	44	7	21	72
Metals	25	16	5	15	36
Structural metal products	8	12	5	5	22
Rubber products	3	6	1	1	8
Coke, petroleum products and nuclear fuel	8	1	1	3	6
Non-ferrous metal products	1	0	0	0	1

Source: Quantec and own calculations, 2023

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