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Gender-Trade Issues: The Effect of AGOA on Female Participation in African Labour Markets

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Abstract:

Purpose: *This study's primal aim is to investigate the effect of the African Growth and Opportunity Act (AGOA) on one of the gendered outcomes; female labour force participation rate (FLFPR) within the Sub-Saharan region. This study adds to the literature by insinuating the provision of new insights about one of the trade policies that were primarily tailored to trade liberalisation among others, but have gender inclusion spillover effects, especially by utilising the pre-and post-AGOA dataset.*
Design/Methodology/Approach: *While utilising a censorious annual data for 33 countries to sort out the before-and-after time periods from a wide span of 1990 to 2019, this study adopted a hybrid model of the Difference-in-Differences (DID) technique and a non-iterative reweighting procedure: Entropy Balancing (EB). Despite improving the external validity by employing a censorious annual data set, the DID technique counters the selection bias since AGOA membership is not random. Furthermore, the EB takes care of the covariates balancing, thereby improving precision by constructing a "statistically" similar control group.*
Findings: *The findings reveal that AGOA member countries in the region, unlike other non-member counterparts significantly experience improved female labour force participation rates of about 10.8%. That is, AGOA has a positive effect on FLFPR.*
Practical Implications: *This study suggests that policy makers should be inclined to policies that will enable AGOA beneficiary countries to continuously retain their eligibility status. First, improve the rule of law and governance, as a step to combat corruption. Lastly, ensuring that required quotas are met, or at least significant progress is made to reach thereof.*
Originality/value: *Although the effect of AGOA has been studied earlier, the originality of this study stems from the adoption of the hybrid methods to robustly teace out the pure effect of AGOA.*

Keywords: *Trade Liberalisation, Labour Force Participation, Comparative Advantage, Difference-in-differences, Entropy Balancing..*

JEL classification: *C21,F14, J22.*

Paper Type: *Research study.*

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1. Introduction

Gender differences in most socioeconomic outcomes have been widely varied across different spheres of the global community. Specifically, Sub-Saharan Africa (SSA) has been continuously lagging in most, if not all the outcomes. The gender gap in employment and sluggish growth patterns can be attributed to the international trade regulations and rules that introduced additional costs on goods and services within the set that SSA countries have a comparative advantage (Moyo *et al.,* 2018). Furthermore, the severe dependence on foreign aid is also a significant cause of the poor economic performance of the region.

Among a handful of initiatives emanating as a remedial mechanism to the inherent gender gaps in employment rates, one of the free trade agreements (FTAs); the African Growth and Opportunity Act (AGOA) was created between African countries and the United States (US) around 2000. The establishment of this preferential bilateral agreement was meant to ease the accessibility of African goods into the US without being charged tariffs. These African exports range from agricultural products, chemicals, apparel and footwear to electronic products among others (Osabohien *et al.,* 2021).

Grogan (2022) posits that this agreement not only created a strong influx of foreign direct investments (FDI) into Africa, but also created alternative labour-intensive industries within the region. Despite this praiseworthy initiative, positive spill-over effects in the labour markets have been experienced. More so, it has created alternative labour-intensive industries in which female involvement is a critical component and vital economic agent.

Along similar lines, female participation in the labour force has some benefits both at the macro and micro levels. Arguably, female involvement is a vital determinant of growth and development. Female employment contributes to poverty reduction at the family level by upsizing family incomes (Verick, 2018). Globally, gender gaps in most economic outcomes such as educational attainments have been narrowed.

Nonetheless, in terms of economic participation in Africa, women are still latent as opposed to men. Consequently, the aforementioned gender gap in employment decisions by firms is of paramount importance for the African Growth and Opportunity Act (AGOA) and should not be overlooked. Bustelo *et al.* (2019) back this up by defining this gap as a reserve of untapped resources.

As a result, several hazardous effects are likely to emerge if gender-based inequality in employment remains unaddressed within the scope of AGOA. Foremost, it may not only end up in the wrong policy formulation but may also increase the dependency ratios in families and fertility among other micro-level outcomes. This is also theoretically plausible since fertility is one of the core determinants of female labour supply.

At the macro level, as amplified by Moyo *et al.* (2018), only a smaller portion of AGOA beneficiaries made impactful use of AGOA benefits; thereby resulting in doubts about preferential benefits. The deficiency of a homogenous trade policy for equitable growth in the region may then follow suit, emanating from nonconvergence in the policy trajectory.

Against the preceding background, this study aims to agitate on the impact of AGOA trade agreement on one of the gendered outcomes, female labour supply. Specifically, it aims to assess the causal effect of AGOA on female participation in SSA labour markets. The stated objective will be achieved by tentatively answering the following research question: what is the effect of AGOA on female labour force participation?

Emphatically, to the best of the researchers' knowledge, no study has tended to empirically ascertain women's supply of labour in SSA countries since AGOA was initiated. A study of this nature is vital because AGOA act was meant to bridge gender gaps in the African labour markets via export-led growth and economic development channels. A body of studies including those of (Moyo *et al.*, 2018; Tadesse and Fayissa, 2008; Condon and Stern, 2011) tend to evaluate the effectiveness of AGOA.

However, these studies place more focus on exports, growth, and other health outcomes among others, with limited emphasis on persisting gender gaps. In argument, Thompson (2004) fortifies that AGOA has not extensively impacted the macroeconomic variables of African economies

The primal contributions of this study to the literature are twofold. First, on the policy front, it expands the knowledge body on the effects of the AGOA trade policy, by demystifying whether and how it affects female labour force participation. It adds to the policy dialogue by analysing a larger scale of the SSA countries by employing data from 27 AGOA-eligible and 6 non-eligible countries.

Therefore, the data coverage of an inclusive swath of SSA not only improves the external validity front but also helps understand the trade policy within the African context (Bertrand *et al.*, 2004). In addition, the study insinuates the provision of new insights about policies tailored to gender inclusion, especially by utilising the pre- and post-AGOA dataset.

Lastly, by employing the Entropy Balancing (EB) procedure, the study improves the validity of the DID results in comparison with other several studies. This is done with the resulting weights that are fitted to respective control sample units to construct a statistically similar counterfactual for better comparison between the treatment and control groups. As suggested by Hynes *et al.* (2020), EB has proven not to yield inflated weights like other reweighting procedures such as the common Inverse Probability Weighting (IPW).

Hereafter, this study is structured with the succeeding sections as follows: Section 2 interrogates both theoretical and empirical literature that relates to female labour force participation and the impact of AGOA in the SSA region. Section 3 presents and describes the data used in this study and the associated methodological framework. Section 4 provides the results and their discussions, while Section 5 concludes the study and provides an ending note by recommending some policies.

2. Literature Review

Economics as a discipline is armed with various theories that explain labour force participation and trade. Despite the common neoclassical income-leisure theory by Mincer (1962), is the theory by Samuelson and Stolper (1941). In particular, this theory establishes that even though the traditional belief is that a rise in international trade contributes to the demand for low-skilled labour in developing countries to some extent.

Heckscher-Ohlin (H-O) model (1991) traces the causal arrow from trade openness through the correlative factor prices between developing and developed economies. Becker (1971)'s models are among the few that make it clear that mechanisms such as enhanced competition via trade and the likes of wage-discrimination models are some of the theoretical explanations of the effect of trade on women's involvement in the labour markets.

Economic concepts are intertwined, hence a curtain-raiser into a well-known theory that dwells in the betwixt of FLFP and economic development. This theory posits that there exists a quadratic (U-shaped) relationship between these two variables (Boserup, 1970; Goldin, 1995).

Essentially, the expectation according to this theory is that female labour force participation rates fall in the earlier stages of development and eventually starts to increase at the latter stages of development. For instance, Gaddis and Klasen (2014) found this functional form; although their argument is that it depends on the type of data used, such as the GDP estimates. I believe their argument is plausible because the error margins inherent within the data estimates used have a tendency to alter the results.

To evaluate the impact of AGOA, several authors used various models ranging from panel to impact evaluation and the prominent gravity variants. When it comes to the direction of the impact, some find a positive effect of AGOA. For starters, (Fayissa and Tadesse, 2007; Nouve, 2005) found a positive effect on SSA imports while using the gravity model and dynamic panel models respectively. Further, they explored the data from about 99 various products up until 2006. The general results reported are that AGOA has proved to significantly increase exports of 24 out of 99 categories, with the apparel exports dominating the lots.

On the other hand, the study does not explicitly make it clear on which commodities and their countries of origin reaped the maximal benefits from AGOA and why that is the case.

Along similar veins, Van Grasstek (2003) assessed the utility of AGOA, aimed at obtaining a quantifiable measure on the beneficiary countries. While analysing raw data set of US imports between 2001–2002, this study revealed the following; prior to AGOA inception, about 60% of the top exports from the SSA region, initially had 0% tariff rate in the US.

Cooray *et al.* (2017) explored the impact while using trade openness as a dependent variable on labour force participation rate, with a special emphasis on the effect of political institutions like civil liberties, and democracy in low-income countries for the period 1985–2012. To observe this impact, they used system-GMM and difference-GMM for robustness checks.

Zheng-Zheng *et al.* (2019) assess the effect of trade openness on female labour force participation in Asian countries. They used the panel threshold regression models with data within the periods 1990-2016. Their results indicate a non-linear relationship between trade openness and FLFPR.

However, Younes and Ameur (2023)'s study is among others who demystified how the disentanglement of gender in the Tunisian economy impacts international trade locally. To achieve this, they developed their own theoretical framework that encapsulates both trade and labour markets with disaggregated gender. Wamboye and Seguino (2014) used the three estimation techniques: fixed effects (FE), random effects (RE) and two-stage least squares (2SLS), with panel data for the years 1991–2010.

3. Methodology

3.1 Data Sources

Guided by the literature from Section 2, the variables used in this study include female labour force participation rates, GDP per capita, education, fertility, inflation, trade openness and unemployment. Their full description is presented in Table 1.

The criterion for inclusion of the countries into the sample was guided by the availability of the data and the continuous eligibility of AGOA. Furthermore, the treatment group comprises of countries that joined AGOA in 2000 only. Due to data unavailability, the final sample consists of 33 countries, with 27 being in the treatment and the remaining 6 in the control groups.

AGOA-eligible countries included are Benin, Botswana, Carbo Verde, Cameroon, Chad, Democratic Republic of Congo (DRC), Congo Republic, Eswatini, Ethiopia,

Gabon, Gambia, Ghana, Kenya, Lesotho, Malawi, Mali, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, and Zambia. On the other hand, AGOA non-eligible countries included Algeria, Egypt, Morocco, Somalia, Tunisia, and Zimbabwe.

Table 1. *Variable Descriptions*

Variables	Definitions	Sources
Female Labour Force Participation	Share of labour-active females to total working-age females (% fem pop aged 15-64)	ILOSTAT Database
GDP per Capita	Per Capita Gross Domestic Product (Constant 2010 US$)	World Bank WDI[3], (2013)
Fertility	This is the total number of children that a woman would bear as at the end of her reproductive age.	World Bank WDI, (2013)
Trade Openness	Given as the sum of both imports and exports, as a measure of GDP (%)	World Bank WDI, (2013)
Life Expectancy	The average maximal number of years that a woman is expected to live	World Bank Gender Statistics
Education	Total enrolment rate (gross % females)	World Bank Gender Statistics
Inflation	Average increase in prices, calculated using the GDP deflator approach	World Bank WDI (2013)
Rule of Law	Readily available index measuring the extend of law enforcement within [-2.5, 2.5] range, with -2.5 being worst and 2.5 being the best.	World Governance Indicators
Unemployment	The ratio of job seekers and total potential workers	World Bank (2013)
Year2000	Is the period post AGOA: A binary years dummy with 1 for 2000 to 2019 and 0 for the base years, 1990 to 1999.	

Note*: The data period for the study spanned between 1990 and 2019 with an annual frequency.*

3.2 Estimation Strategy

Traditionally, it is common in the Randomised Controlled Trials (RCTs) that researchers tend to manage closely the randomness of the assignment of units of analysis (such as patients) into the two categories, treatment and control groups as well as their comparison in outcomes. As amplified by Leatherdale (2019), the virtue of randomly assigning the units of analysis into both treatment and control groups is of critical importance since it implicitly means that on average, these two groups possess similar attributes, either known or unknown in the pre-intervention period.

[3]*Throughout this paper, the acronym WDI simply refers to the World Development Indicators.*

This equality in the baseline is sensible because it guarantees that the existing confounding effects are only attributable to the treatment, thereby precisely isolating the causal impact of the program at hand.

Unfortunately, despite these imperative features, RCTs are rarely practical since they are mostly considered unethical. The resulting effect of this is the non-randomness nature of the program, which yields the problem of selection bias.

To mimic this problem, the common techniques adopted within the scope of impact and causal evaluations are Difference-in-Difference (DID), Instrumental Variables (IV), Propensity Score Matching (PSM), and the Regression Discontinuity Design (RDD) as outlined by Khandker et al. (2009). This study utilised the DID approach owing to its merits and contextual underpinnings of AGOA eligibility.

The critical drawback of AGOA eligibility is the inherent endogeneity. Primarily, eligibility depends on several factors such as the rule of law, location (target is SSA), and the US market accessibility among others. Furthermore, endogeneity arises because eligibility is decided up by the US president.

Therefore, AGOA eligibility is partly dependent and endogenous with the US politics (Moyo et al. 2018). This is a clear indication that AGOA eligibility is not random and estimating its effect will be distorted by selection bias. So, as a remedial measure, the DID technique that this study used, mocks out and estimates the pure impact of AGOA (the treatment) on female labour force participation while alternatively controlling for macroeconomic and other determinants of labour supply.

3.3 Difference in Differences

Historically, the difference in differences (DID) saw the light just in the middle of the nineteenth century, when John Snow's legendary study was published; this study highlights that cholera is mainly transmitted by water supply, and not air (Bedi *et al.*, 2020; Dimick and Ryan, 2014). Kotarja (2022) argues that DID has remained a workhorse technique in the sphere of causal inference especially when pre- and post-intervention changes in outcome variable are compared with those of the contemporaneous outcome of the control.

Moreover, Lehner *et al.* (2011) describes the difference between these outcomes as an actual estimate of the counterfactual. Therefore, based on the aforementioned properties; given both the treated and untreated groups trend similarly with time, then the effect of the treatment is efficient for removing the confounders.

Out of about 41 AGOA eligible countries, a sample of 27 countries was selected based on the availability of data from 1990-2019 as well as the other 6 non-eligible countries. To tentatively answer a research question of interest, this study employed

the DID method as outlined earlier (Bertrand *et al.*, 2004; Athey and Imbens, 2006; Imbens and Wooldridge, 2007). Primarily, DID identifies the changes in the outcomes of the two groups; the treatment group (AGOA-eligible) as well as the control group (AGOA non-eligible). Specifically, the data needed for such analysis is the data prior to AGOA as well as the data after its inception.

In this study, letting country *i* be in a specific group, say group $A_i = [0,1]$, whereby $A_i = 1$ is the treatment (eligible) and $A_i = 0$ the control groups respectively, and the observations of these groups are in period T_i in [0,1], whereby T_1 is the time period post the treatment or AGOA, and T_0 the baseline period. Most importantly, each sample unit *i* is observed for both periods T_0 and T_1.

Additionally, letting $Y_{it}(0)$ and $Y_{it}(1)$ denote the potential outcomes such as female labour force participation rate before and after the treatment at time *t* respectively, and the following average outcomes $\bar{Y}_0$ and $\bar{Y}_1$ before and after respectively. Hence, the outcome of country *i* at some time *t* can be represented as follows:

$$Y_{it} = \begin{cases} Y_{it}(0) & \text{if } T_0 \\ Y_{it}(1) & \text{if } T_1 \end{cases} \tag{1}$$

Where, T_0 represents the baseline period as before; T_1 the period after the enactment of AGOA. So, to tease out the causal effect of this policy, the DID procedure estimates the average treatment effect on the treated (ATT), which was denoted by δ_{DID} for the purpose of illustration and clarity. Moreover, the ATT can be expressed mathematically as follows:

$$\delta_{DID}(ATT) = E[Y_{it}(1) - Y_{it}(0)] \tag{2}$$

$$= \Delta_1 - \Delta_0 \tag{3}$$

$$= (E[Y_{it}|A_i = 1, T_1] - E[Y_{it}|A_i = 1, T_0]) - (E[Y_{it}|A_i = 0, T_1] - E[Y_{it}|A_i = 0, T_0]) \tag{4}$$

Therefore, the above set of equations estimate the average impact of the treatment, especially in the post treatment period. The ATT is estimated to be the difference between the average outcomes of both the treated and control groups, both before and after the intervention, hence the name "difference in differences." This is shown by equation (3), whereby the first difference operator (delta) was used.

As Khandker *et al*. (2009) outlined, the difference in differences procedure takes care of the selection bias by "differencing out" the existing disparities between the two groups, treated and control that are common in the baseline period, having no direct relationship with the treatment or programme.

Practically, the baseline DID regression model can be expressed in a two-way fixed effects (TWFE) framework as follows:

$$FLFP_{it} = \varphi + \delta_{DID}(T_1 \times A_i) + \beta_1 T_i + \gamma A_i + \pi \boldsymbol{X}'_{it} + \varepsilon_{it} \quad (5)$$

Where δ_{DID} is the coefficient of interest, and a coefficient of the product of AGOA treatment (A_i) and the post AGOA time period (T_1), spanning 2001–2019, and it captures the difference between AGOA eligible and non-eligible countries in changes in FLFP both before and after 2000; $FLFP_{it}$ is the outcome variable, the female labour force participation rates in country *i* at time *t*.

Also, from above, A_i and T_i are included to depict any average effects that are both time and country specific, either treated or not treated. $\boldsymbol{X}_{it}$ is a vector that contains other factors that are crucial determinants of FLFP (for instance, education, income, inflation, trade openness, fertility and life expectancy).

Lastly, ε_{it} denotes an idiosyncratic error term. Although the potential thread to the DID estimator is that it is likely to be biased when the parallel trend assumption does not hold, Meyer (1995) suggests that longer panel data series in both time periods (before and after) can resolve it. For further clarity, these underlying assumptions are discussed in detail in the estimation validations below

3.4 Entropy Balancing

There is a concern in the data utilised in this study. The African economies are not homogenous, some are male dominant, some massive oil and fuel exporters while others are more inclined to agricultural exportation. This heterogeneity may lead to inclusion of units with relatively lower number of firms, export volumes and so forth. So, to address this issue, this study used the entropy balancing (EB) procedure. Among a handful of the data pre-processing techniques such as the commonly used propensity score matching (PSM), EB has proved to possess imperative merits (Hainmueller, 2012).

Most importantly, EB reweights the outcomes of the control group so that it depicts the expected counterfactual of the treatment group. EB meritoriously incorporates the information of the known; the moments (*m*) of the control while alternatively adjusting the weights for balancing the covariates properties and moments accordingly (Hainmueller and Xu, 2013).

Also, EB does not yield inflated weights, as opposed to other techniques such as the Inverse Probability Weighting (IPW) while maintaining efficiency unlike PSM (Hynes *et al*. 2020). According to Hynes *et al*. (2020) the EB procedure yields the

weights (w_i) that stem from the entropy distance (*H*) minimisation problem presented below:

$$\min_{w_i} H(w) = \sum_{\{i|A_i=0\}} w_i \log\left({}^{w_i}/_{b_i}\right) \quad (6)$$

Subject to the two constraints; the balance as well as the normalising constraints

$$\sum_{\{i|A_i=0\}} w_i c_{ri}(x_i) = m_r, \quad \forall r \in \{1, \dots, R\} \quad (7)$$

and

$$\sum_{\{i|A_i=0\}} w_i = 1\,, \quad w_i \geq 0 \quad \forall i \in A_i = 0 \quad (8)$$

Whereby $b_i = \frac{1}{k_0}$ is the initial (base) weight, and k_0 is the collection of the sampled units in $A_i = 0$ (the control group); $c_{ri}(x_i) = m_r$ is a collection of *R* constraints that balance, applied on the control variables' moments of the control group that has been reweighted while A_i is a dichotomous treatment status, with 1 if country *i* is AGOA eligible or not (control condition).

4. Research Results and Discussions

4.1 Descriptive Statistics

This first subsection of the results provides the descriptive statistics of the variables used in this study. To that effect and for coherence, it first starts with the summary statistics and then the pairwise correlation matrix follow suit.

4.2 Summary Statistics

From the literature, a plethora of variables have been identified as significant determiners of female labour force participation rate. Although this study's focus was to find the impact of AGOA on this outcome, several other variables had to be well controlled for. So, depending on data availability, some of these controlled variables were selected from the sample units.

To that effect, Table 2 shows the summary statistics of the variables utilised in the analysis in perseverance to answering the research question. It is comprised of the mean, standard deviation minimum and the maximum.

Primarily, Table 2 has been split into two main groups, the control as well as the treatment groups. It is also imperative to note that all these data presented are without any balancing procedure. The control group has about 150 observations (N×T) while the treatment group has mostly 810 observations.

Table 2. *Summary Statistics - Before Reweighting*

	Control Group (AGOA ineligible)					Treatment Group (AGOA eligible)				
VARIABLES	**NT**	**mean**	**sd**	**min**	**max**	**NT**	**mean**	**sd**	**min**	**max**
FLFPR (%)	150	33.45	22.79	12.31	80.34	810	62.87	14.22	34.07	89.63
education	149	100.0	13.21	51.94	116.3	744	94.41	25.50	17.84	156.4
Rule of Law	150	-0.529	0.593	-1.852	0.282	810	-0.464	0.674	-2.229	1.671
fertility	150	3.134	0.712	1.991	4.862	810	4.996	1.358	1.360	7.426
Trade openness	150	56.92	15.31	23.98	109.5	784	79.75	38.98	19.68	220.4
Unemployment (%)	150	15.59	7.217	2.981	30.74	810	11.35	10.28	0.111	47.18
Life Expectancy	150	69.16	8.976	44.85	78.72	810	57.94	7.946	27.57	77.89
Inflation	150	9.242	26.35	-27.05	225.4	810	58.79	959.5	-31.57	26,76
FDI	150	1.873	1.692	-0.324	9.425	810	3.823	8.799	-11.20	161.8
Log GDP	150	7.818	0.390	6.745	8.349	810	7.160	1.003	5.318	9.707

Source: *Author's Calculation using data from WDI and WGI.*

The data shows that female participation is higher in AGOA eligible countries than in the non-eligible countries. However, it is difficult to posit that these differences are due to AGOA because of the nature of the two sample-groups. Also, any outliers within the control group may have a relatively larger effect on the mean FLFP in that group.

Among the groups, AGOA ineligible countries (control) have the two mostly volatile variables; inflation and FLFP. This volatility is captured by high standard deviations. On the other hand, the eligible countries (treated) likewise have inflation as one of the highly volatile variables. This volatility is depicted by high standard deviations. Some of the variables tend to spread out because of the presence of the outliers. An explicit case is the case of Zimbabwe which had the persistent rate of inflation known as hyperinflation.

The average determinants of FLFPR differ statistically between the two groups, probably because of the different country specific features especially when it comes to the institutions within the different economies.

As formerly outlined, the EB reweighting procedure is imperative for reducing the bias by creating a statistically similar counterfactual, the summary of the covariates after this transformation is given in Table 3.

Pertaining the moments, the highest moment included and presented for the control variables is the third, the skewness. Statistically, there are no differences in terms of distributions between the treatment group and the control after the weighting.

Table 3. *Control Variables After Reweighting*

	Without Weighting			After EB Weighting		
VARIABLES	**Mean**	**Variance**	**Skewness**	**Mean**	**Variance**	**Skewness**
Education	90,59	585,3	-0,5887	102,1	506,2	-0,5323
Rule of Law	-0,5372	0,488	-0,0459	-0,36	0,7027	0,2723
Fertility	4,665	2,466	-0,07625	4,622	2,284	-0,2723
Trade openness	71,28	12,52	1,316	80,26	16,98	1,371
Unemployment	13,04	98,82	1,001	11.3	69,59	1,123
Life Expectancy	60,17	114,7	-0,05107	49,49	124,4	-0,1171
Inflation	80,75	1746865	20,15	8,12	262,6	1,804
FDI	3,021	113,2	10,72	4,072	271,9	7,983
Log GDP	7,348	0,8925	-0,00285	7,223	0,8667	-0,1391

Source: *Author's Calculations with Stata 17.0.*

4.3 Correlational Analysis

Theorists state that correlation does not necessarily imply causation (Horton, 2023). For analytical purposes, the pairwise correlation is a basic indicator of multicollinearity. As argued by Brooks (2008), ignoring the issues of multicollinearity can pose several problems. For starters, it may result in seemingly "good" regression results, with high Adjusted R-Squared and insignificant individual variables with high standard errors.

Lastly, the closer the variables are to perfect collinearity, the larger the confidence intervals for the estimates. Therefore, it increases the chances of committing Type II error; failing to reject the null hypothesis while it should be rejected.

From the correlation analysis[4], the decision of female to participate in the labour market, life expectancy, rule of law, unemployment and GDP per capita have negative correlation while the rest have a positive one. There is no evidence of multicollinearity between the variables since the highest (absolute) correlation is between fertility and Log GDP per capita (-72%). Following the analysis of the correlation, the study does not drop any of the variables since there is no evidence of perfect collinearity.

4.4 Difference-in-Differences Main Results

The analytical results of this study stem from two thematic categories of the baseline model. Firstly, the DID model without any weighting and the last one, the DID model with the EB procedure weights balancing the controls. The dependent variable in the four models presented below is the female labour force participation

[4]*The pairwise correlation matrix is included in the Appendices, clearly labelled as Figure 3.*

rate (FLFPR). Resultantly, the baseline models by extension may be referred to as the determinants of female labour supply models. For understanding, a negative coefficient implies that, a variable of interest decreases female labour force participation rates and the opposite is also true. Table 4 presents the results from the baseline model, i.e., equation (5).

Table 4. *DID Main Results*

(Y = FLFPR)	DID Without Balancing		DID & Entropy balancing	
VARIABLES	(1)	(2)	(3)	(4)
AGOA	-1.1395	-0.7022	14.5710***	8.9511***
	(0.9173)	(1.0763)	(4.9710)	(2.4378)
year2000	1.8107***	2.2397**	-12.7076***	-9.5862***
	(0.3821)	(1.0298)	(4.6443)	(2.3309)
AGOA*year2000	8.5965***	10.9364***	9.3045**	10.8089***
	(1.0376)	(2.3443)	(4.0903)	(2.0061)
Education		-0.0684**		0.1188***
		(0.0283)		(0.0196)
Rule of Law		-1.2770		-3.6952***
		(0.8678)		(0.8324)
Fertility		-0.0239		-5.1378***
		(0.5853)		(0.5492)
Trade openness		-0.0044		-0.0090
		(0.0178)		(0.0104)
unemployment		0.0858		-0.7443***
		(0.1242)		(0.0602)
Life Expectancy		0.0732		-1.0490***
		(0.0679)		(0.0736)
Inflation		0.0002***		-0.0242
		(0.0000)		(0.0257)
Log GDP		-0.5419		-5.6430***
		(1.1322)		(0.7931)
FDI		-0.0206		
		(0.0235)		
Constant	50.7458***	53.3455***	52.3558***	-256.6702
	(3.3154)	(11.2381)	(3.7383)	(174.7677)
Observations	960	867	867	867
R-squared	0.2276	0.2767	0.1785	0.6870
Controls included	No	Yes	No	Yes

Robust standard errors in parentheses

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

Source: *Author's Calculations using Stata 17.0.*

Table 4 provides the main results from the DID regression as well as the entropy balanced DID regression estimates. Throughout this section, it is imperative to note that the first two models have not been adjusted for any of the weightings (not balanced). Contrary to this, the last two models are reweighted.

The reweighting procedure by entropy balancing ensures that the first three moments; the mean, variance as well as skewness of the covariates are statistically similar between the control and treatment groups. On the same note, the model of interest and of paramount importance in this study is model (4).

This model has been controlled for various macroeconomic variables to minimise the chances of the problems associated with the omitted variable bias (OVB). Additionally, the models (1) and (3) have not been controlled for any other control variables.

When it comes to the interpretation of these results, it is interesting to note that the coefficient of interest from the baseline model; equation (5) is the DID estimator, denoted with δ_{DID}. This is the coefficient of the product of AGOA treatment and the post AGOA time period (year 2000). This coefficient of interest as can be obtained from the preferred technique, DID with EB, suggests that on average and all else equal, AGOA has significantly increased, the female labour force participation rate in SSA.

These results are in line with the theoretical underpinnings of the Stolper-Samuelson theorem, suggesting that trade liberalization has some spill-over effects that are inherent in the extensive margins of labour supply. It increases the FLFPR by approximately 10.8%. This is also significant at the 1% level of significance. Empirically, Cooray *et al.* (2017) also found the results in alignment with this conclusion.

Although not significant, trade openness has a negative effect on FLFPR, and this is not a new phenomenon in the case of a developing country. For instance, Mujahid (2013) found the negative relationship as well. More so, fertility and unemployment also tend to decrease the FLFPR and this effect is significant at the 1% level. This also is in line with theory, especially unemployment via the discouraged worker route Yasemin (2013).

As can be expected, the more children a woman bears, the more time she needs to take care of such children. That is, more time will be devoted to children upbringing than the labour activities. This study's fertility effect is in line with the results obtained by Ngoa and Song (2021). On the other hand, education as stipulated by the preferred model, amplifies that women in SSA tend to experience positive returns to education. In supplement, Borjas (2017) argues for the same reasons.

The schooling effect is normally referred to in the economics literature as the returns to education, stemming from the human capital investment theory.

From the same specification, the coefficient of log GDP, a proxy for income as suggested by Idowu and Owoeye (2019), is negative and highly statistically significant. That is, all else being equal, an additional 10 Dollars per capita decreases female labour force participation by approximately 1%.

As theory depicts, any increment in income (non-labour income) tend to make it easier to buy an additional hour of leisure. Despite the theoretical plausibility, Zheng-Zheng *et al*. (2019) also find the coinciding results, although the coefficients' magnitudes differ. Lastly, the balancing procedure tend to increase the R-squared of the model of interest significantly. This pivotal difference in R-Squared values suggests that EB procedure improves the fitness of the model covariates, since it improves the comparability of the treatment and control variables.

Thus far, all the variables discussed from the results are economic. However, some of the variables that are noneconomic in nature affect FLFP. Contrary to expectations, the betterment of the rule of law tends to result in a decline in FLFP rate. This effect is also significant at the 1% level.

Although these findings are not in support of the theoretical premise, they are consistent with Ngoa and Song (2021)'s findings. They found rule of law and control for corruption to have a negative and significant effect on female labour force participation in Africa.

4.5 Parallel Trend Test Results

From the previous section, more emphasis was put on the importance of the validity of the parallel trend assumption. It is on this argument that
Table ***5*** below shows the parallel trends test results.

Table 5. *Parallel Trends Test*

H_0: Linear trends are parallel	
F (1, 31) = 0.18	
Prob > F = 0.6775	
Conclusion:	Fail to reject H_0

Source: *Author's Calculation using Stata 17.0.*

Having tested for the plausibility of the parallel trends assumption, a pivotal test for the validity of the DID estimation strategy, the results are reported in Table 5 above. Because the p-value (p = 0.6775) is greater than the level of significance (0.05),

there is no enough evidence, leading to the failure to reject the null hypothesis, thereby confirming the validity of parallel trend and so the DID technique plausibility.

5. Conclusions and Recommendations

Having utilised the macro-datasets, this study, sets out to assess the impact of AGOA on female labour supply. This objective was achieved with the help of the DID technique, well known for countering the problem of selection bias, especially in quasi-experiments where the treatment assignment is not random.

To mitigate any potential violation of the parallel trends assumption and inequality between the number of countries in the sample and treatment groups, the entropy balancing (EB) procedure was used. This non-iterative balancing procedure assigns the weights that are imperative in constructing a 'statistically similar' counterfactual, thereby reducing any potential biases in the DID estimator (Cefalu *et al.*, 2020).

From the summary of statistics, this study found that on average 63% and 33% of females partake in the labour force; for treated and control groups respectively. Further, despite fertility, life expectancy and foreign direct investment (FDI), other macroeconomic factors such as GDP per capita, inflation, unemployment, and trade openness determine female labour supply.

Theoretically, these are plausible determinants and they affect female labour participation by means of different routes. This plausibility is also backed by a plethora of empirical evidence, ranging from micro, macroeconomic to political aspect of the economic discipline (Madanizadeh and Pilvar, 2019; Nordås, 2003).

Lastly, the empirical findings of this study show that AGOA had a positive effect on female labour force participation. These findings further suggest that the economies that are AGOA eligible experience a 10%-point increment in female labour force participation. This is robust under different specifications and not sensitive to inclusion of other determinants of FLFP.

5.1 Policy Implications

In line with theory, suggesting that trade is a critical determiner of female labour force participation, following the enactment of AGOA agreement, there has been relatively incremental trends in FLFPR over time especially in AGOA eligible countries. Thereby suggesting that there is a significant increasing pattern of FLFPR or a sectoral change, that is, there are new entrants. The other possible channel is a shift from an informal sector such as the agricultural sector, to disseminate into the industrial sector.

AGOA's impact on FLFPR proves to be significant. These findings infer that the initiatives by AGOA such as Trade Capacity Building (TCB) have proved to be pivotal. So, they should not cease but be improved because of their aggregated significant impact. Based on the results, this study suggests that policy makers should be inclined to policies that will enable AGOA beneficiary countries to continuously retain their eligibility status. They include the following:

- First, improve the rule of law and governance, as a step to combat corruption.
- Lastly, ensuring that required quotas are met, or at least significant progress is made to reach thereof.

The need for striving to remain AGOA eligible should be amplified because it helps economies utilise the potential workforce in an effort to grow such economies. To that effect, if they strengthen their institutions, improve rule of law and meet their AGOA-eligibility standards, they can thrive and experience growth via the well-known export-led hypothesis route.

All these are vital channels to usher Africa into inclusive growth. It is highly anticipated that this would benefit the continent. Will it not be amicably amazing?

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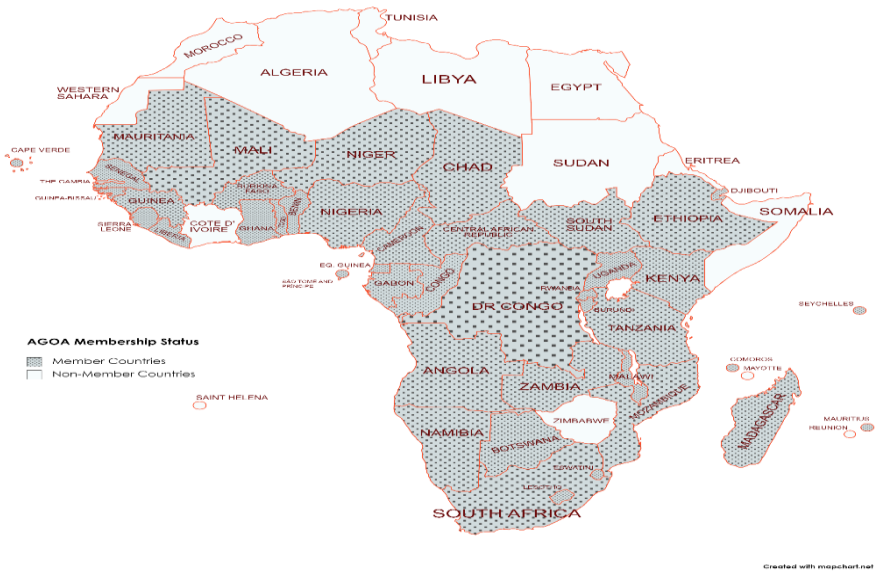
Appendices:

Figure 1. *AGOA Membership Status of African Countries*



Source: *Author's design with Mapchart.net*.

Figure 2a. *The Gender Gap Chat*

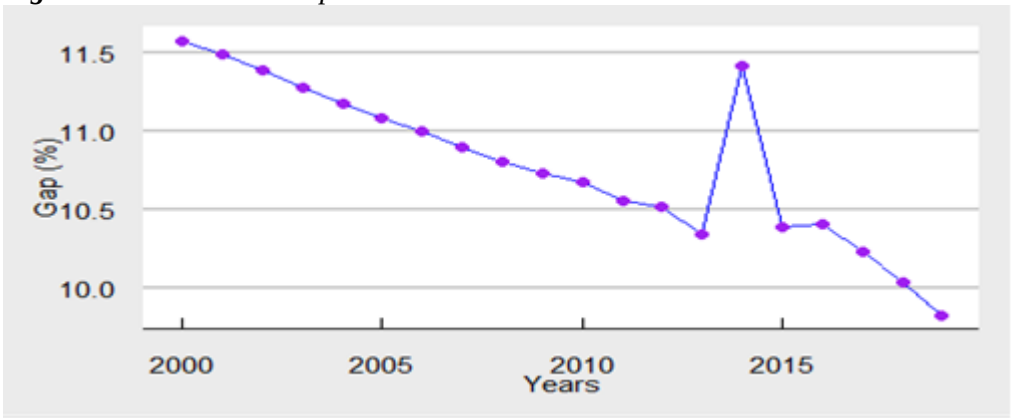
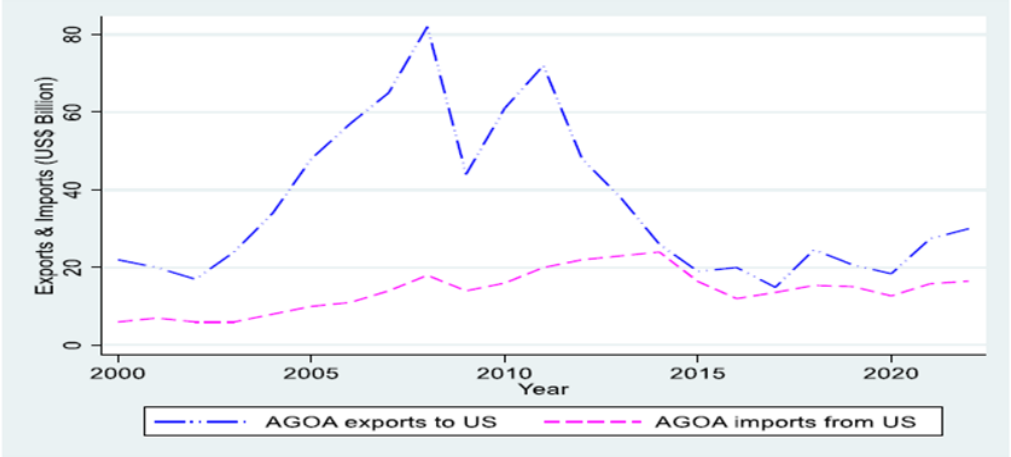


Figure 2b. *AGOA Exports & Imports to the USA*



Sources: Author's own with data sourced from a) WDI, b) *https://agoa.info/data/total-trade.html*

Figure 3. *The Correlation Matrix*

	FLFPR	Educ	Rule of law	Fertility	Trade Openness	unemployment	life expectancy	inflation	FDI	Log GDP
FLFPR	1									
Education	-0,0453	1								
Rule of law	-0,3016*	0,2616*	1							
fertility	0,5231*	-0,5078*	-0,5312*	1						
Trade Openness	0,0513	0,3615*	0,1962*	-0,1469*	1					
Unemployment	-0,4847*	0,3134*	0,3552*	-0,5745*	0,3417*	1				
Life expectancy	-0,5937*	0,3404*	0,4782*	-0,7239*	-0,0772*	0,2588*	1			
Inflation	0,0351	-0,0553*	-0,0856*	0,0694*	-0,0349	-0,0369	-0,0495	1		
FDI	0,0296	0,0099	-0,0839*	0,0589*	0,1733*	-0,0162	-0,023	-0,021	1	
Log GDP	-0,5892*	0,3239*	0,3127*	-0,7153*	0,0848*	0,564*	0,5314*	-0,0526	0,0004	1

Source: *Author's Own using Stata 17.0.*