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Impact of Female Labor Participation in African Countries Economic Growth

An Honors Thesis submitted in partial fulfillment of the requirements for Honors in *Economics*.

By

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Under the mentorship of *Dr. Mariana Saenz*.

ABSTRACT

Females are overlooked for employment opportunities either due to stereotypes or misleading views on their productivity and importance to the workplace. Female participation in the labor market has been shown to positively impact economic growth. Highlighting the significant impact of females in the labor force is an incentive for the local government and private sector to actively engage in policies and practices that increase female participation. Given the importance of targeting females, this paper analyzes female labor participation impact on economic growth for 21 African countries between 1991 and 2017. Results show that a 10 percent increase in female labor participation increases on average Gross Domestic Product by 2.7 percent. Female labor participation in the service sector had the largest impact on economic growth.

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I. Introduction

Women compose more than half of the world's population but are underutilized in the labor market (Psacharopoulos and Tzannatos, 1989). According to Turanli et al. (2015) countries in which females are active in the economic, social, and political spheres experience greater development. In contrast, countries with unfavorable views of females experience greater poverty. Greater female labor force participation is critical to improving economic growth (Verick, 2014).

Reduction in gender inequality in the labor market has been linked to greater economic growth. Akyeampong and Fofack (2013) study on Botswana, Kenya, and Senegal found that a one percent reduction in the gender gap in the labor force participation can increase Gross Domestic Product by 0.2 percent. Klasen (2000) found that lower employment gender inequality in East Asia led to greater economic growth compared to Sub-Saharan African and South Asia, which showed higher gender employment inequality.

However, there has been contradicting work discussing the importance of female development in the workforce and its impact on a country's economic development. Some scholars think its importance is overrated compared to other factors that can improve a country's economy. Hickel (2014) states the main factors that improve an economy, like proper infrastructure and access to education, are being overlooked while female labor development is wrongly being given attention as a key driver of the economy.

Aykuz (2015) discusses the relationship between female labor force participation and development. Specifically, Aykuz (2015) discusses the impact that the level of Gross Domestic Product has on female labor force participation. Aykuz's (2015) modernization theory depicts female labor force participation as it changes with a country's economic development.

According to Aykuz's (2015) modernization theory, at lower levels of Gross Domestic Product, female labor force participation is high due to subsistence farming being the main source of income for less developed countries. As a country develops, female labor participation decreases as males take on manufacturing and service jobs to provide for the household and women become stay at home mothers. At higher levels of Gross Domestic Product, female labor participation increases, especially in the service sector. Greater female labor force participation at higher levels of Gross Domestic Product is a result of increasing female educational attainment, allowing females to take on more technical jobs (Luci, 2011).

Considering Aykuz (2015) modernization theory, the objective of this paper is to assess the impact of female labor force participation on economic growth in Africa, and if its impact depends on the level of economic activity. Additionally, research will be done to determine if the impact of female labor force participation depends on the level of economic development and female labor force participation.

The paper is organized as follows. Section 2 discusses the impacts female labor force participation on economic growth. Section 3 addresses the theoretical background to estimate economic growth. Section 4 discusses the data used in the analysis. Sections 5 and 6 discuss empirical estimation and results, respectively. Section 7 provides conclusions and policy recommendations.

II. Literature Review

Female labor force participation can positively affect economic growth by increasing production and creating greater returns to investment (Klasen, 2000). Greater production results from greater access to resources, such as labor, in the production process (Hubbard et al, 2016).

Female labor force participation also has an impact on returns to investment as it relates to the cost of female labor in comparison to the cost of male labor. Hiring women with the same capacity to do the same work as men at a lower wage reduces the cost of production (Schober and Winter-Ember, 2011).

However, greater female labor participation can also be detrimental to economic growth if it reduces gender wage inequality. In a study for middle-income countries, Seguino (2009) found a positive relationship between gender wage inequality and economic growth. Seguino (2009) argues that gender wage inequality stimulates investment and enhances the returns to investments possibly due to lower wages paid to women.

It has been found for female labor force participation to have a differential impact on economic growth, depending on the country's stage of economic development. In a panel data analysis for 44 countries, Turanli et al. (2015) found a positive overall relationship with female labor force participation and economic growth. Turanli et al. (2015) found female labor force participation had varying levels of impact on the economic development of the countries researched. Female labor force participation had a higher impact on more developed countries because of the infrastructure that aids employment, such as getting better access to education. Verick's (2018) argument on the impact of female labor force participation on Gross Domestic Product is on the quality of the female labor force participation. Verick (2018) argues that the more women move into the service sector from the agricultural sector, the bigger the impact of female labor force participation on economic development. Countries might have the same female labor force participation rate but countries with more women in the service sector will develop economically at a faster rate, all things being equal.

The impact of female labor force participation on Africa's economies Gross Domestic Product is positive. Akyeampong and Fofack (2013) found that a 1 percent reduction in the labor force gender gap in Botswana, Kenya, and Senegal increased Gross Domestic Product by 0.2 percent. Verick (2018) identified female labor participation as a key driver of growth and development in African countries, like South Africa and Tanzania. Verick (2018) explains there is a potential increase to Gross Domestic Product due to higher labor input. As women earn money, the household's income increases thereby leading to more consumption of goods and services which increases Gross Domestic Product.

III. Economic model

The Cobb Douglas production function is used to assess the impact of female labor participation on economic growth. The Cobb Douglas production function has been used to assess the impact of female labor force participation on Gross Domestic Product (Khatun and Afroze, 2016). The Cobb Douglas production function estimates total output as a function of labor and capital. Specifically, the Cobb Douglas function is defined as:

$$Q(Y, K) = AL^{\beta} K^{\alpha} , \quad (1)$$

where Q is total output, L refers to the labor force, K is capital, A is the total factor productivity, and β and α are output elasticities of labor and capital, respectively.

In addition to labor and capital, other variables can lead to changes in output. Artardi and Sala-i-Martin (2003) argue that education, health, geography, openness to trade, and public spending also affect economic output. Adding other variables to the estimation of equation (1)

will reduce estimation bias (Litchenberg and Zilberman, 1985). Additionally, given my interest in female labor force participation, the labor force variable in equation (1) is further divided between female and male labor force participation. Therefore, the production function to estimate is defined as,

$$Q = A(Fem.Labor)^{\beta_1} (Male.Labor)^{\beta_2} K^{\alpha} Life^{\omega_1} Educ^{\omega_2} Trade^{\omega_3} Geo^{\omega_4} Gov^{\omega_5}, (2)$$

where *Fem.Labor* is female labor force participation, *Male.Labor* is male labor force participation, *Life* is life expectancy, *Educ* is a proxy for education, *Trade* is the country's trade value, *Geo* is the country's geographical location, *Gov* stands for government expenditure, and ω_1 to ω_5 are constants. For further analysis, female labor force participation is further divided between female labor force participation in the agricultural, service, and industrial sector.

IV. Data and Descriptive Statistics

The data used for this study was taken from the World Bank Indicators (2017)¹ for the period 1991-2017. Table 1 below provides a brief definition of the variables and their descriptive statistics. The standard deviation is greater than the mean for all variables except for life expectancy, which shows the vast difference between values between countries in the dataset.

¹ The countries used in the analysis are: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Cote d'Ivoire, Eswatini, The Gambia, Guinea, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, and Tanzania.

Table 1: Descriptive Statistics for variables

Variable	Definition	Mean	Standard Deviation
Dependent Variable			
Real GDP	Total output in a country, adjusted for inflation (US 2010 constant US dollar)	17260563014	59060867483
Independent Variables			
Fem. Labor	Female labor force participation	2981180	4236766
Fem. Labor Agriculture	Female labor force participation in the agricultural sector	1899145	2131199
Fem. Labor Industry	Female labor force participation in the industrial sector	207048	459323
Fem. Labor Services	Female labor force participation in the service sector	883363	2170099
Male. Labor	Male labor force participation	3453362	5163525
K	Acquisition and creation of assets (US 2010 constant US dollar)	3591533446	10085170570
Life	Number of years a person is expected to live (years)	54.57	7
Educ.	Number of children enrolled in primary school	2565744	4356792
Trade	The net difference between exports and imports (US 2010 constant US dollar)	8081900196	21201557692
Geo	Country is located in the tropics (=1) (two parallels at about 23.5 degrees latitude North and South of the equator)	0.5714286	0.4953086
Gov.	Government expenditure on goods and services (US 2010 constant US dollar)	1717659865	4324974703

Female labor force participation is expected to have a positive impact on economic growth. Seguino (2009) found female labor development to have a positive effect on Gross Domestic Product due to the reduced costs incurred by firms which pay women less for the same

quality of work as men. Turanli et al. (2015) interprets the positive impact of female labor force participation on economic growth as a result of greater access to input resources but argues that its impact depends on the level of economic development of the country. I expect female labor participation in the service sector to have the greatest impact on economic growth. Verick (2018) states that female labor in the service sector has the biggest impact on economic development as it requires less capital and has lower entry-level costs. Male labor force participation is also expected to have a positive impact on economic growth, which could be partially attributed to economic and socio-cultural discrimination favoring males (Ali and Shields, 2010).

Capital, life expectancy, education, and trade are expected to increase economic growth. Ding and Knight (2008) found that increases in physical capital led to greater rates of economic growth in China. Population health, proxied by life expectancy, is expected to positively impact production as it reflects workers' health conditions and worker's life productivity. Artadi and Sala-i-Martin (2003) found that economic growth in Africa could increase by 2 percent if the population had better access to healthcare. Good health helps people maximize their productivity levels. Education measured as primary education enrollment is expected to also increase a country's economic output. Artadi and Sala-i-Martin (2003) found a 1.5 percent increase in economic growth due to greater educational levels. Rahman (2010) found education leads to better human capital as it causes humans to be more knowledgeable and innovative on processes to grow businesses. Education also leads to advancement in technology which helps businesses develop machinery that increases efficiency. Trade is also expected to increase economic growth. Openness to trade benefits countries because it leads to more exports, which leads to improved terms of trade and higher total factor productivity (Miller and Upadhyay,

2000). Trade can also give countries access to technology. Artadi and Sala-i-Martin (2003) show openness to trade can potentially increase economic growth by 0.67 percentage points.

Country's geographical location and government spending also impact economic growth. Research has shown an inverse relationship between economic growth and countries in tropical location (Sachs 2003). Geography is expected to have a negative relationship with economic output due to tropical diseases affecting animal and human health. Tropical areas are also expected to be less developed due to the threat of diseases (Artadi and Sala-i-Martin, 2003).

Greater public spending has shown to be detrimental to economic growth (Sala-i-Martin et al., 2003; Barro, 1988). Mitchell (2005) lists many reasons why government spending has a negative relationship with economic growth. Barro (1988) argues that the government can interfere with people's innovative contributions and negatively affect local businesses that offer similar products/services to the government.

V. Econometric Estimation

To analyze the data, the Ordinary Least Square (OLS) method is used to estimate the Cobb Douglas production function as described in equation (2). By taking the log of Cobb Douglas function the regression function to estimate is:

$$\begin{aligned} \mathbf{Log(Q)} = & \mathbf{A} + \beta_1 \mathbf{log(Fem.Labor)} + \beta_2 (\mathbf{Male.Labor}) + \alpha \mathbf{log(K)} + \omega_1 \mathbf{log(Life)} \\ & + \omega_2 \mathbf{log(Educ)} + \omega_3 \mathbf{log(Trade)} + \omega_4 \mathbf{log(Geo)} + \omega_5 \mathbf{log(Gov)} \end{aligned} \quad (3)$$

Equation (3) is also estimated by classifying female labor force participation by economic sector (i.e. agriculture, service, and industry sectors), by the level of Gross Domestic Product (i.e. low and high), and by the level of female labor force participation (i.e. low participation and

high participation). The variables, male labor force participation and education are dropped to avoid multicollinearity issues in the estimation. Autocorrelation is tested using the Breusch-Godfrey test and I fail to reject the null hypothesis of no serial autocorrelation at the 1 percent significance level. The Newey-West method in Stata is used to account for both heteroskedasticity and autocorrelation.

VI. Discussion of Results

Table 2 and Table 3 show the estimation results from the estimation of Real Gross Domestic Product. Table 2 assesses the impact of female labor participation on economic growth and Table 3 assesses the impact of female labor force participation in the agriculture, service, and industry sectors on economic growth.

Table 2: Estimation of Log (Gross Domestic Product)

Variables	Coefficients	Robust Std. Err.	p-value
Log (Fem. Labor) *	0.2733	0.0180	<0.001
Log (K)	-0.0134	0.0083	0.105
Log (Life Expectancy)	0.0008	0.0012	0.473
Log (Trade) *	0.2737	0.0322	<0.001
Geo *	-0.1387	0.0171	<0.001
Log (Gov) *	0.5444	0.0361	<0.001

*, **, *** indicates significant effects at the 1%, 5%, and 10% level, respectively.

R-squared=0.9156

Table 3: Estimation of Log (Gross Domestic Product) using Female Labor Participation by Sectors

Variable	Coefficients	Robust Std. Err.	p-value
Log(Fem. Labor Agriculture) *	0.0662	0.0107	<0.001
Log (Fem. Labor Service) *	0.1801	0.0160	<0.001
Log (Fem. Labor Industry) *	0.0854	0.0134	<0.001
Log (K)	0.0003	0.0085	0.971
Log (Life)	0.0011	0.0012	0.362
Log (Trade) *	0.2346	0.0275	<0.001
Geo *	-0.1174	0.0160	<0.001
Log (Gov) *	0.4787	0.0317	<0.001

*, **, *** indicates significant effects at the 1%, 5%, and 10% level, respectively.

R-squared=0.9314

Results in Table 2 and Table 3 indicate that female labor force participation significantly affects economic growth in Africa. A 10 percentage point increase in female labor force participation increases economic growth by 2.7 percent. Additionally, the female labor force participation in the service sector shows the greatest impact on economic growth compared to participation in the agriculture and industry sectors. Results show that a 10 percent increase in female labor participation in the service sector increases economic growth by 1.8 percent on average. Lahoti and Swaminathan (2013) also found female labor force participation in the service sector had the greatest impact on economic growth.

Results in Table 2 and 3 also show that the country's trade and government's expenditure on goods and services significantly increase economic growth in African countries. However, the country's geographical location is an impediment to greater economic growth. Results indicate that countries located in the tropics have between 0.11 and 0.136 percent lower economic growth on average.

Tables 4 to 7 show the estimation results broken by the level of Gross Domestic Product and female labor force participation. Results indicate that female labor force participation has a

greater impact on economic growth in those countries with higher Gross Domestic Product. An increase in female labor force participation by 10 percent increases economic growth by 3 percent in more developed countries vs 1.7 percent in less developed countries. The latter results can be explained by the greater access to infrastructure and other resources such as education in more developed countries

Table 4: Estimation of Log (Gross Domestic Product) - Countries Grouped by Gross Domestic Product Level

Variables	Low Gross Domestic Product		High Gross Domestic Product	
	Coefficient	P values	Coefficient	P-values
Log (Fem. Labor)	0.1720*	<0.001	0.2933*	<0.001
Log (K)	0.0383*	<0.001	-0.0693*	<0.001
Log (Life)	0.0010	0.148	0.0026	0.108
Log (Trade)	0.4843*	0.000	0.2502*	<0.001
Geo	0.0099	0.257	-0.2167*	<0.001
Log (Gov)	0.2926*	<0.001	0.5512*	<0.001

*, **, *** indicates significant effects at the 1%, 5%, and 10% level, respectively.
Low: R-squared=0.9544; High: R-squared=0.8893

When assessing the impact of female labor participation by sectors of the economy, results indicate that female labor participation in the industry has a negative impact on economic growth for less developed countries. The negative impact could be explained by the opportunity cost of not employing females in the agriculture sector, the largest economic sector in the less developed countries. For the more developed countries, results indicate that female labor force participation in the service sector has the largest impact on economic growth, while female participation in the agriculture sector has a negative impact. The latter result shows the importance of the service sector in more developed countries. Improving female participation should be sector specific. Less developed countries should focus on female labor force participation in the agriculture sector, while more developed countries should focus on female

participation in the service sector. Countries with higher economic output should not put emphasis in policies to support women in the agricultural field but should try to steer them to more service and industrial jobs.

Table 5: Estimation of Log (Gross Domestic Product) - Countries Grouped by Gross Domestic Product Level

Variables	Low Gross Domestic Product		High Gross Domestic Product	
	Coefficient	P values	Coefficient	P values
Log (Fem. Labor Agriculture)	0.1301*	<0.001	-0.0516**	0.024
Log (Fem. Labor Service)	0.1244*	<0.001	0.4393*	<0.001
Log (Fem. Labor Industry)	-0.0410***	0.078	0.0870*	<0.001
Log (K)	0.0428*	<0.001	-0.0565*	<0.001
Log (Life)	0.0007	0.378	0.0007	0.686
Log (Trade)	0.4983*	<0.001	0.1121*	<0.001
Geo	-0.0134	0.236	-0.0777*	0.001
Log (Gov)	0.2635*	<0.001	0.5102*	<0.001

*, **, *** indicates significant effects at the 1%, 5%, and 10% level, respectively.
Low: R-squared=0.9617; High: R-squared=0.9228

Table 6 and Table 7 show the estimation results broken by the level of female labor force participation. Results indicate that in countries in which females have greater participation in the labor force, females have on average a greater impact on economic growth. When broken up by sectors, in countries with high female labor participation, females' participation in the agricultural and industrial sectors have a greater impact on economic growth, compared to those countries with low female labor force participation. Only female participation in the service sector had a greater impact on economic growth for countries with low female labor force participation compared to those with high female labor force participation.

Table 6: Estimation of Log (Gross Domestic Product) - Countries Grouped by the Level of Female Labor Force Participation

Variables	Low Participation		High Participation	
	Coefficient	P values	Coefficient	P values
Log (Fem. Labor)	0.3051*	<0.001	0.3654*	<0.001
Log (K)	-0.0017*	<0.001	-0.0590*	<0.001
Log (Life)	0.00005	0.148	0.0012**	0.017
Log (Trade)	0.7224*	<0.001	0.1798*	<0.001
Geo	0.0180	0.257	-0.3307*	<0.001
Log (Gov)	0.0958*	<0.001	0.5996*	<0.001

*, **, *** indicates significant effects at the 1%, 5%, and 10% level, respectively.

Low: R-squared=0.9831, High: R-squared=0.9247

Table 7: Estimation of Log (Gross Domestic Product) - Countries Grouped by the Level of the Female Labor Force Participation)

Variables	Low Participation		High Participation	
	Coefficient	P values	Coefficient	P values
Log (Fem. Labor Agriculture)	0.0457*	<0.001	0.1914*	<0.001
Log (Fem. Labor Service)	0.2242*	<0.001	0.1996*	<0.001
Log (Fem. Labor Industry)	0.0184	0.161	0.0671*	<0.001
Log (K)	-0.0480*	0.002	0.0022	0.844
Log (Life)	0.0010	0.180	0.0016*	<0.001
Log (Trade)	0.7086*	<0.001	0.1426*	<0.001
Geo	-0.0350*	0.008	-0.2928*	<0.001
Log (Govt.)	0.0889*	<0.001	0.4573*	<0.001

*, **, *** indicates significant effects at the 1%, 5%, and 10% level, respectively.

Low: R-squared=0.9866, High: R-squared=0.9492

Other results in Table 6 and Table 7 show geographical location to negatively impact countries with high female labor force participation. However, the effect of geographical location is small or statistically insignificant for countries with low female force participation. Another interesting result is the effect of life expectancy on economic growth. Life expectancy has only a positive significant impact on countries with higher female labor participation. Improving long term worker productivity is important in countries where female worker participation in the labor market is high.

VII. Conclusion

This paper aims to show the importance of women in the workplace to motivate political and business leaders to take up policies to promote female labor participation. Specifically, I assess the impact of female labor participation on economic growth in African countries. Results indicate the significant contribution of females to economic growth. Specifically, the participation of females in the service sectors shows the greatest impact on economic growth. However, when grouping the countries into low and high female participation, results indicate that the impact is higher in countries with low participation of females in the labor market.

Results support the importance of female development programs such as Women in Technology and Girls Who Code. These programs have conferences and sponsor events to bring education to women, helping them to be better equipped for the workforce. Policies directed toward female training, especially in the service sector, have the potential to significantly improve economic growth in African countries. Improving economic wellbeing, in turn, can improve other measures of development such as education, healthcare access, and life expectancy.

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