Economic Growth and Female Labor Participation: The case of Rwanda

By

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Declaration

I declare that this dissertation entitled "*Economic Growth and Female Labor Participation: the case of Rwanda*" is the result of my own work and has not been submitted for any other degree at the University of Rwanda or any other institution

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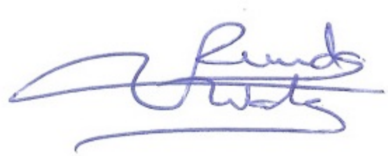
Approval Sheet

This dissertation entitled "**Economic Growth and Female Labor Participation: the case of Rwanda**" written and submitted by Olive Uwimana in partial fulfillment of the requirements for the degree of Master of Science in Data Science majoring in Econometrics is hereby accepted and approved. The rate of plagiarism tested using Turnitin is 18% which is less than 20% accepted by the African Centre of Excellence in Data Science (ACE-DS).



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Dedication

To my Beloved parents especially my father who inspired me to pursue my master's studies;

To the rest of my family for their unconditional support during this journey

To my friends and workmates for their prayers and advices

And most especially to the almighty Lord,

This research is dedicated to you.

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Abstract

Rwanda is known for its higher female labor participation both in the region and worldwide. Currently, it is the first country with a higher number of women in the parliament globally. However, there is still a gender gap in the labor force participation and more women are in the informal sector. This study aims at proving the U-feminization hypothesis in the case of Rwanda to determine if there is a long-run relationship between economic growth and women labor force participation. GDP per capita at constant 2010 US$ was used as an indicator of economic growth. The cointegration test used is ARDL Boundary Approach to determine if they move together in a long run.

After examining the long-run coefficients, it was found that there is a U-shape relationship between economic growth in Rwanda and women labor force participation whereby the economic growth leads to a decline of women labor force participation at first but later they move along proportionally. It was also found that fertility rate affects women labor force participation and unemployment rate as well. The study also revealed that attainment of primary level for girls also reduces the female labor participation and we concluded that it is because they get motivated to continue with higher studies and thus reducing their participation in the labor force.

Since there is still a huge gender gap of labor force especially in men dominated industries, this study suggests that the government establish a quota on the minimum number of women who should be in those industries as a strategy to reduce the gap because the more women work, the more it can help to reduce poverty, decrease fertility rate, and increase GDP per capita as well as income per capita hence boosting the country's economy.

Key words: **Women labor force participation, U-shape relationship, economic growth**

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List of Abbreviations

ADF: Augmented Dickey-Fuller Test

AIK: Akaike Information Criteria

ARDL: Autoregressive Distribute Lag

BNR: National Bank of Rwanda

EA: Education Attainment

EAC: East African Community

FR: Fertility Rate

FLFPR: Female Labor Force Participation Rate

FUR: Female Unemployment Rate

GDP: Gross Domestic Product

GNI: Gross National Income

IMF: International Monetary Fund

ILO: International Labor Organization

NISR: National Institute of Statistics of Rwanda

LDC: Least Developed Countries

PPP: Purchasing Power Purity

UN: United Nations

UNDP: United Nations Development Programme

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Chapter 1: General Introduction

1.1 Background

Historically, due to different aspects such as culture, society norms, wealth and class categorization or religious beliefs, participation of women in labor force has been very low to non-existent all over the world, and Rwanda being a predominantly patriarchal society, there was no exception until recent years. This was mainly due to the largely believed perception that women's place is at home and thus their main role was to care for their households and nurture their children and it was the same trend for generations.

During the colonial era, with the objective of having a labor force that will be utilized in accomplishing their mission, Belgium colonizers followed their predecessors' footsteps (Germans) and established schools to teach local citizens so that they would become clerks, teachers, gardeners, secretaries and other positions in colonizers' administrations. However, the focus was predominantly men. As a way to improve women's social condition and introduce the concept of "gender promotion", they established social welfare programs known as "foyer social" which were housewife training schools where mostly married women and girls were learning how to sew, cook balanced diet meals, iron, clean and mend, briefly how to be good housewives, so at the end it helped the domestication of women even though it was intended to empower them. In other words, colonialism weakened women more because with most being solely the bread winners through paid employment, it strengthened the male supremacy.

However, after the Genocide against Tutsi where the country lost a lot of people largely men and others were brought to justice and thus in prison, and others fugitive at that time, women made up around 60 to 70 percent of the total population of Rwanda, then women had to step and fill the void. In addition, the new government led by H.E Paul Kagame emphasized on the role of women empowerment in the role of the country's social economic development, so gender policies were put in place to facilitate women to integrate the labor force and put incentives and fair laws to facilitate them at workplaces.

According to the International Labor Organization (ILO), labor force participation previously known as economically active population is the rate of a country's working age population (from 15 to 64 years in most countries but it depends on country's laws) in the economy that are engaged actively in the labor market who are currently employed or they are seeking for a job (International Labor Organization, 2017). This indicator is measured using Labor force participation rate (LFPR) and it is measured by expressing the number of people in the labor force as a percentage of working age population. So, it is obtained by considering both employed and unemployed persons and summing them up. In brief, it is computed as follows:

$$\text{LFPR (\%)} = \frac{Labour\ force \times 100}{Working\ age\ population}$$

$$\text{LFPR (\%)} = \frac{number\ of\ employed\ persons + number\ of\ unemployed\ persons \times 100}{Working\ age\ population}$$

To understand more the distribution of the working force, the LFPR is sometimes broke down by sex, age or geographical location. This study aims at assessing the impact that female labor participation has on the economic growth of Rwanda as it is often taken as a role model in terms of women empowerment and reduced gender gap but also for significant economic growth, so we would like to understand the effect and determine if there is a long run relationship among the two using U-shape feminization hypothesis which will be further explained in the next chapters.

1.2 Statement of the Problem

Worldwide, women are the majority in most countries and for our case study Rwanda, women were 50.85% of the entire population in 2019 (Trade Economics, 2020). Despite that factor, women's labor participation rate is still low in most countries especially in the formal sector and lag behind that of men since the past until now. UN Sustainable Development Goal 5 is about gender equality which aims mainly at empowering women and closing the gender gap as a mean to achieve global sustainable development by 2030. In 2018, the female labor force participation rate worldwide was at 48.5% while the male labor force participation rate was at 75%, thus 26.5% difference which is large and needs to be addressed (UN Women, 2018). This goes hand in hand with unemployment because men are less likely to be unemployed compared to men globally. In addition, women percentage in informal and vulnerable type of jobs is very high compared to men's percentage

It is also known that worldwide, generally women are paid less than their male counterparts and this wage gap is even bigger in developing countries because of a lot of informal self-employments. It is also found that women spend 2.5 times more compared to men on unpaid care work and women are more disadvantaged in starting their own businesses. All of those mentioned reasons negatively affect their labor force participation yet women's economic involvement boosts a country's productivity as this study is trying to prove in the case of Rwanda, it increases economic diversification and reduces income inequality among other factors. Moreover, if women are given the chance to achieve higher educational attainment as many countries are trying to achieve, firms would benefit from increased highly skilled employment and be able to increase their productivity thus contributing to the countries' economic growth.

This study analyzes the existence of long run relationship between women labor participation and economic growth of Rwanda by considering variables that help reflect the role of labor force participation on the country's GDP such as female labor participation rate, unemployment rate, fertility rate, and education attainment. This research aims at emphasizing on the role of women empowerment in a country's economic development and develop an econometric model to explain how Rwanda's constant efforts to promote women and give them economic freedom especially through facilitating them to have access to resources as their fellow men, favorable working conditions as well as effective economic capacity building is a good strategy towards the country's sustainable development since there are limited studies done on this topic and most of them are theoretical rather than empirical.

Currently, Rwanda is still a low-income country with a GDP about 818.99 per capita in U.S. dollars. However, the country's 2050 vision is to become a middle-income country and one of the pillars to achieve it is about becoming a data-driven economy so this study is in alignment with having accurate data on how much each economic factor of the economy contributes towards the sustainable economic development of the country.

1.3 Objectives of the Study

The general objective of this study is to determine if there is a long run relationship between female labor participation and the economic growth of Rwanda. The specific objectives for this study are:

1. To determine if there is a U-shaped relationship between women's participation in labor force and economic growth in Rwanda.
2. To unveil if there is a short-term relationship between the country's economic development and our variables (i.e. fertility rate, educational attainment level and unemployment rate)

1.4 Study Questions

The study tries to answer the following questions:

1. At which extent does the economic growth (GDP) contribute to the women labor force participation in Rwanda?
2. Is it a good economic development strategy for Rwanda as a developing country to put women promotion as a cross-cutting issue in all its strategic planning and economic development strategies?

1.5. Structure of the Study

The study is comprised of five chapters. The first chapter is the general introduction of the study, the second chapter is the literature review and performance review of how the participation of women in labor force has been over the years but also how other EAC countries have been performing, the third chapter includes the methodology of the research, the fourth chapter illustrates data analysis, presentation and interpretations of findings. The last but not least chapter includes the study's conclusion, summary and recommendations.

Chapter 2: Literature Review

2.1 Theoretical Literature Review

Most empirical studies have highlighted how crucial female labor force participation is on the world's economy as well as individual countries despite that they are still under-represented in the workforce. A council of Economic Advisers from the White House examined this challenge by proving how improved gender parity is a good strategy to enhance political stability as well as reduce conflicts among countries. They gave an example of two countries which are both similarly productive but their fractions of people who are working are different which means that the country with more fraction of people working is more likely to produce more output per person thus increasing their income output. They raised an important point of how you can find high female labor force participation rate in both high GDP countries like Norway but also in low GDP country like Mozambique, nevertheless, they demonstrated how there is a bidirectional correlation between women's work decisions and economic output (White House, 2019).

On a research done using American Community Survey Data, the analysis did show that in fact increased female labor force participation lead to an increase in wages even for men in a long run (Weinstein, 2018).The study was done using female labor force participation rate and the wage growth rate from 1980 to 2010 and the results showed that indeed cities with higher FLFPR experienced more wage growth than the other cities in the United States whereby for every 10% increase in the number of women working, there was also . It was concluded that as women join the workforce not because attitudes work has changed but because there are more employment opportunities, then that would be due to an increased demand and hence leading to wage growth and increase wage mean increased income per capita.

Gender equality is not just a fairness challenge, it is also good for the economy so closing the gender labor force gap especially in the Africa labor market is a good economic strategy. According to the author's estimates, increasing the gender equality in the labor market can result into an increase in GDP within the range of 1% for Senegal up to 50%

in Niger (Woldemichael, 2020). However, there is still a strong stigmatization against women joining manual work-related jobs such as manufacturing, construction or mining and even those who are there are paid less than their male colleagues. It is why currently, in Sub-Saharan Africa countries, 9 out of 10 women who are in the labor force are in the informal sector. The author urges African governments to put strong policies aimed at promoting women economic inclusion especially in white collar jobs through enhancing anti-discriminatory labor laws, giving them access to funds to encourage them to become entrepreneurs and create jobs and working with religious leaders to reconsider gender roles especially those that oppress women and prevent them to make their own financial and work decisions.

Also, according to the “Added-worker” effect, there is a tendency for married women to join the work force when their husbands lose their employment as a way to compensate for family income. This would generally mean that the male unemployment rate is inversely proportional to the female labor force participation rate especially for married people which is also known as intra-family risk sharing. In other instances, low female labor force participation rate is explained by the “discouraged worker” effect which is where a person gives up on looking for employment and withdraw from the labor market because they have met with the challenge of continuous failed job searches and for women it is mostly also influenced by gender unfriendly laws and low employment insurance that exist in many countries.

2.2. Empirical Literature Review

When it comes to empirical researches on women labor force participation and economic development, most of the studies were trying to demonstrate and emphasize on the U-Shaped feminization hypothesis that claims that female labor force participation and economic development, mostly the GDP per capita are mutually inclusive (Lechman, Kaul, 2015).

Appiah (2018) conducted a study using panel data from 1975 to 2015 from 139 developing countries to demonstrate that there is indeed a positive effect that women labor force participation has on GDP growth of developing countries and that of Sub-Saharan African countries. Neoclassical growth model is used to explain the relationship as well as the two steps GMM estimator and the results showed a marginal positive impact that female labor participation has on per capita GDP growth and that there is no difference on the impact that the female labor participation has on developing countries compared to Sub-Saharan African countries.

Economic growth which is obtained by calculating the change in the GDP per capita is the main indicator of the welfare of any economy and women impact in employment on economic development has been a sustainable economic strategy in the new global economy (Erdem, Yücel, & Köseoglu, 2016). This paper uses dataset from 122 both developed and developing countries in the period of 1990 to 2014 and an augmented Solow Growth Model with a Cobb-Douglas production function is used to carry out the empirical analysis with the assumption that both female labor force participation and male labor force participation increase at the same rate and the cointegration analysis to determine the correlation between women employment and economic growth is carried out. The ARDL bounds test interpretation gave a conclusion that the share of women employment positively affects the GDP per capita so if countries want to boost their per capita GDP they should increase women labor force.

Female unemployment rate in Bosnia is 45% of the female labor force and this high unemployment rate for women is generally common among Southern Mediterranean countries. A similar hypothesis was tested to determine if there is a U-shaped relationship between women labor participation and economic growth in Southern Mediterranean countries. The econometric model used confirmed the correlation between the two variables and further suggested that there are barriers hindering women labor force participation that are specific to the region such as the presence of oil whereby most oil-rich countries tend to have male dominated jobs which makes it hard for women to penetrate the job market but also the religious and traditional norms of the patriarchal societies that are most dominant in the region influences a lot the low female labor force participation. This paper also used the GEM-E3- MEDPRO equilibrium model to simulate alternative change scenarios that would happen when female labor participation rate increase in the period leading to 2030 using forecasted income level trends from the period of 2015-2030. These two scenarios suggested that the more female labor participation rate decreases, the more the economic growth also decline in the region and that if regional barriers preventing the rise of women employment were removed, it would lead to an increased economic growth (Tsani, Paroussos, Fragiadakis, Charalambidis, & Capros, 2012).

Female labor participation is both a driver and an outcome of sustainable economic development. This is because as the FLFPR increases, economies are able to boost because of the increased labor supply and productivity (Verick, 2018). Mr. Verick's main argument was that when a country is poorer, women join the workforce out of necessity mainly in the agriculture sector. However, as a country develops, the country's economy shifts from being more agricultural dependent to industrial based and with the social stigmas this mostly benefit men more than women, but as the economy continue to rise and women get more educated and fertility rate falls, then their participation in the workforce increases again. Moreover, outside women labor force participation, policymakers needs to also focus on ensuring quality work environments which are accessible to women because they are more likely to be exposed to unprotected jobs especially during economic crises but they also need to put effort in regular and accurate reporting because female labor participation is most of the times underreported which makes it hard for economists to strategically plan and forecast as well as determine the contribution of women in the economy. However, over the years, the female labor participation rate globally has been declining despite a lot of efforts put in globally to promote women in all different aspects. In 2000, the world female labor participation was at 50.5% but in 2019 the rate was at 47.1% (ILOSTAT Database, 2020). Figure 1 shows a brief trend comparing the female participation rates in different regions between the year of 1998 and that of 2018.

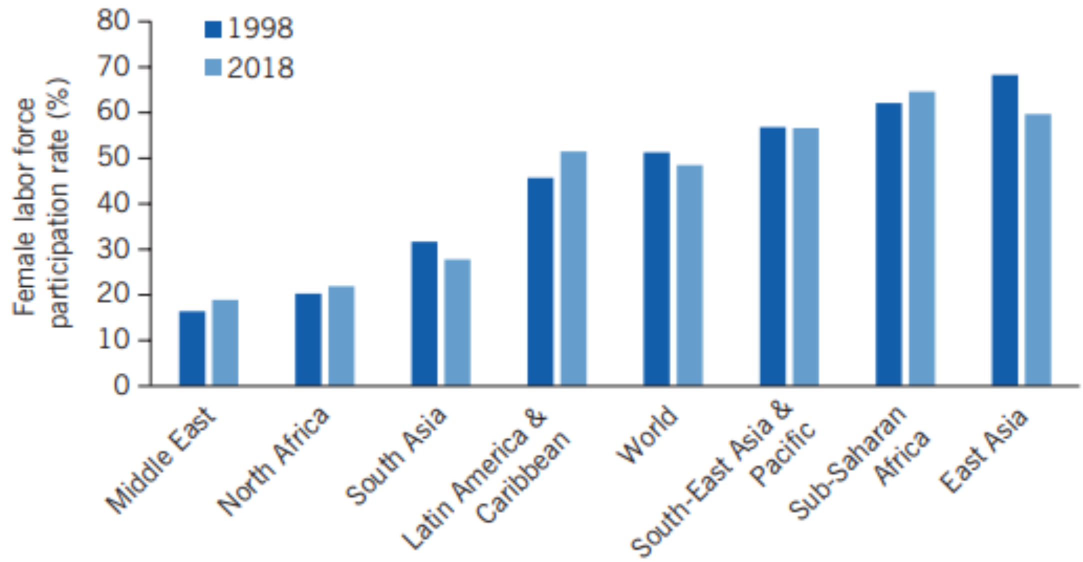

Figure 1: ILO estimates of labor force participation rates across regions (15 and older adult population)

Source: *ILOSTAT Database,2020*

Different researches point out that the decrease in female labor force participation might be due to the increase in girls' school enrollment which reduces their involvement in the labor force. They also added that the cause can be urbanization because majority of women are involved in agricultural related activities, so when cities become urbanized, there is a shift from agriculture to industrial jobs and then since it gives the husbands access to more wages so women are often withdrawn from the labor market to unpaid household work. Generally, in developed countries such as South Africa, there is a linear relationship between education and female labor force participation, however in poorer countries like Burkina Faso and many others, the most uneducated women are the ones that make up most of the female labor force through informal activities while the highly educated ones can afford to stay unemployed (Verick, 2018).

2.3. Performance Review of Female Labor Force Participation in EAC Countries

Labor force sometimes referred as human capital is among the four factors of production. On the other hand, Gross Domestic Product (GDP) is described as the total number of goods and services produced by a country in a given period time. A lot of studies have shown that there is a strong relationship between labor force and the gross domestic product which is an indicator used to evaluate economic growth. Furthermore, often the Cobb-Douglas Production function derived as follows is used to predict an economy's GDP.

$$Y = A * L^{\beta} * K^{\alpha}$$

Where Y represents the total production;

A is a positive constant that indicate the total factor productivity

L represents the labor force or the total number of people used in production

K represents the capital used in production

β is the labor output elasticity.

α is the capital output elasticity.

With the aim of working together to achieve economic growth and sustainable development, 5 countries in the East African region that is Kenya, Tanzania, Uganda, Rwanda and Burundi, signed a monetary union treaty with the objectives of creating a single currency in the region by removing trade boundaries, easy exchange of human capital and harmonization of financial systems to mention a few. So, let's have an overview of how EAC countries have been performing in terms of female labor participation in order to understand how easy mobility of job seekers would be in the region especially in the case of women. The following table highlights the FLFPR for EAC countries in the period of 2009-2019

Table 1: EAC Female Labor Participation rates (2009-2019)

Country / **Time(years)**	Burundi	Kenya	Rwanda	Tanzania	Uganda
2009	80.34	65.27	84.11	85.02	65.84
2010	80.16	66.38	84.08	84.16	66.05

2011	80.02	67.41	84.05	83.23	66.25
2012	79.92	68.38	84.01	83.20	66.46
2013	79.85	69.27	83.94	81.08	66.53
2014	79.75	70.13	83.85	79.84	66.59
2015	80.02	70.96	83.88	79.88	66.65
2016	80.24	71.77	83.89	79.83	66.72
2017	80.38	71.85	83.90	79.79	66.80
2018	80.47	71.93	83.91	79.75	66.87
2019	80.43	72.13	83.93	79.57	67.00
Average	80.14	69.59	83.96	81.40	66.52
Standard Deviation	0.03	2.69	0.00	1.97	0.06

Source: World Bank Database, 2020

As shown in Table 1, Rwanda has the highest FLFPR and Uganda has the least in the five EAC countries. In Burundi, women hold 55.2% of its total labor force. That is explained with the fact that 90% of the entire population lives in rural areas thus more engaged in agriculture sector which has also been observed in other countries that women are most of the times the majority the agriculture sector labor force (UN Women Africa, 2020). In other words, women contribute a lot in Burundi's economy since agriculture makes up 90% of the whole country's exports. Despite the remarkable FLFPR, there is still a very low participation of women in white collar jobs and the patriarchal structure of the Burundian society makes it hard for women to occupy high position jobs, an example is in political offices where they are still considerably under represented as shown in Table 2 below.

Table 2: Women participation in Public offices in 2016

Political Office	Percentage of Women
Ministers	25%
Assistant Ministers	50%
Governors	17%

Directors General	16%
Permanent Secretaries	10%
Provincial Director Primary Education	6%
Provincial Director Secondary Education	11%
Peace Missions	7%
Party leaders	8%

(Brand, 2018)

Apart from assistant ministers, elsewhere they are highly underrepresented, so the government and other stakeholders needs to put on more effort to make sure that it goes beyond the numbers and that women's labor participation and reflected on their increase in income per capita as well as GDP per capita.

Kenya despite having the highest economic growth within the EAC region, it still has relatively low female labor participation compared to other EAC countries which according to different studies it is mainly due to the prevalent involvement of Kenyan Labor force in the informal sector and as more households' income depend on the informal sector, then it is observed that women are more likely employed in the informal sector than in the public, private or formal sector (Atieno, 2006). However, it is more challenging because even within the informal sector women don't have access to the same well-paid works as men do. As a result, more women are occupying the low wages jobs or the family unpaid work like family businesses or agriculture activities without being paid yet they are reported as occupied. It is important to note that there is no significant gender gap in education between men and women, but still attending school for women doesn't guarantee their access to formal sector employment, so clearly there are other gender constraints that needs to be addressed other than education.

In a survey done to understand the key determinants of Women labor force participation in Tanzania, the following key factors were highlighted (Mkenda, 2014). Firstly, location matters where it is more likely for women in urban areas to work than it is for those in rural areas. The second factor is education attainment both for women and their partners which increases the chance for participation of women in the labor market as well as provide skilled human capital in the economy. The other factor is children whereby women especially those in childbearing timeframe are less likely to work, so it would be good strategy to implement effective children care programmes so that it won't be a constraint for women and they can still participate in the labor force and help boost the country's economy.

Being among countries with the highest fertility rate and population growth worldwide, the low female labor force participation is predictable in Uganda. Moreover, Rwanda is also among countries with the highest early and forced girls' marriage whereby around 10% of girls below the age of 15 are married while about 40% of them are married before the age of 18, and the main reason is families trying to preserve their dignity because it is considered as a social dishonor when your girl child have sexual encounters and gives birth without being married (Girl Not Brides, 2018). All those are some of the hinderances to women labor participation because early marriage causes girls to drop out of school and thus reducing their chances of acquiring a decent, well paid and non-vulnerable job and hence affect negatively the per capita income growth of the country.

Conclusively, there has been a significant growth around the region in terms of women labor force participation in the EAC region. However, there is still a lot to be done for this FLFPR not be just numbers but also have an impact to the economic growth of each country. Countries need to learn from each other in terms of policies that have been working to decrease gender constraints as well as establish gender friendly labor force laws to facilitate women to join labor force and not only participate in informal sector and unpaid family related work but also be able to compete fairly with no social or cultural obstacles so that they can contribute to the region's economy and help in attaining the communities' common goals especially considering that they are the majority (60%) of the community. Moreover, empowering girls and women could also be an indirect way to control informal economy and reduce inflation because women mostly tend to be the majority in the informal sector as a way to compensate the economic shocks.

2.4 Female Labor Participation and Economic Growth Trend in Rwanda

Internationally, Rwanda has been often recognized for having a high women labor participation in most of the sectors, and as H.E Paul Kagame likes to say, women are the foundation of a country's development and prosperity. Rwanda still holds the first place globally for the highest number of women representatives in the parliament at 61.3% as of 2018 and this is not only in the parliament but also in other higher public and private offices (World Economic Forum, 2019). However, generally there is still a gender gap as observed in the Labor Force Survey conducted by the National Institute of Statistics of Rwanda (NISR). The following table is a summary of the findings.

Table 3: Labor Force Participation Rate in percentage according to sex, age and place of residence

Age group	Rwanda			Urban			Rural		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
15-19 yrs	27,3	30,7	29	36,1	23,3	30,1	25,1	32,3	28,7
20-24 yrs	49,8	62,5	55,9	58,8	63,7	61,1	46,5	62	54
25-29 yrs	60,4	81,3	70,1	71,2	86,6	78,7	56,4	79,1	66,8
30-34 yrs	60,1	83,6	71,7	72,8	93,9	84,0	56,7	80,3	68,1
35-39 yrs	56,1	80,3	67,7	75,1	91,0	83,5	51,8	77,2	63,7
40-44 yrs	52,1	79,2	64,9	75,2	93,9	84,9	46,8	74,8	59,6
45-49 yrs	55,6	72,3	63,2	71,8	87,8	79,9	52,4	68,3	59,4
50-54 yrs	42,8	64,8	53,1	64,1	80,5	73,2	39,9	61,5	49,6
55-59 yrs	37,2	57,2	45,6	53,7	73,3	63,7	35,1	54,1	42,8
60-64 yrs	27,9	46,8	36,2	39,1	70,2	53,1	26,4	43,5	33,9
65-69 yrs	17	32,7	23,6	33,1	51,6	41,6	15,2	30,3	21,6
70-74 yrs	9,4	23,8	15,3	3,1	43,2	18,6	10	22,1	15
75+ yrs	4,5	7,8	5,7	5,9	6,6	6,2	4,3	7,9	5,7
Total	45,1	62,8	53,4	60,5	73,6	67	41,3	59,9	49,9

Source: NISR Labor Force Survey, 2019

It can be observed that generally across all ages, the female labor participation rate is high in urban cities compared to rural areas. This will be more explained in the economic growth trend whereby the Rwanda's GDP has been depending on the service sector more than the agriculture sector as it has always been in recent years. The gender labor force gap is more observed among people who are married and are still living together.

Table 4: Level of Education Attainment Rate

Area	Level of education completed	Total		
		Female	Male	Total
Rwanda	None	49	45,7	47,2
	Primary	28,1	30,6	29,5
	Lower secondary (Ordinary Level)	5,7	6,1	5,9
	Upper secondary (Advanced Level)	10,6	9,8	10,2
	University	6,6	7,8	7,2
	Total	100	100	100
Urban	None	24,5	19,9	22
	Primary	26	26,2	26,1
	Lower secondary (Ordinary Level)	9,8	11,1	10,5
	Upper secondary (Advanced Level)	19,8	20,2	20
	University	20	22,6	21,4
	Total	100	100	100
Rural	None	57,7	54,4	55,9
	Primary	28,9	32	30,6
	Lower secondary (Ordinary Level)	4,3	4,4	4,4
	Upper secondary (Advanced Level)	7,3	6,3	6,8
	University	1,8	2,8	2,3
	Total	100	100	100

Source: National Institute of Statistics in Rwanda, 2019

Despite having the highest girls' educational enrollment in primary education in the East Africa, there is still a gap in terms of attainment rate (Leigh, 2019). This implies that the dropout rate is still more common in girls than it is in boys due to different challenges such as poverty or early pregnancy. Surprisingly, also according to the labor survey in

2019, the percentage women who are the contributing family worker is 6.6% while it is 1.2% for men which demonstrate how women labor force participation is crucial to the Rwandan economy. Women who are doing unpaid household work are at a percentage 7.9% while for men the percentage is 5.0%. There is still a huge gap in the agriculture forestry and fishing sector because women employed in that sector at a percentage of 46.1% while for men it is 30.6%. Transportation is a sector which is still highly men centered across the world and in Rwanda only a percentage of 0.4 of women are in that sector while men are 9% which is a large gender parity that needs to be addressed to help women who are passionate to join this industry but are constrained by the social stigmatization around it to be empowered and maximize their potential. This gender gap is even huge in construction industry with 3.7% of women and 14.2% of men and that's the same with other industrial oriented jobs like plant and machine operators were men are on the percentage of 5.2 while for women it is only 0.2% yet for the service and sales workers women stand at a higher percentage of 22.5 versus 17.8% of men (NISR Labor Force Survey, 2019). As of 2019, women in the formal sector are 28.2% while men at 26.8%, an achievement for reduction of gender labor force gap.

In terms of fertility rate, we have the following trend:

- In 2017 the fertility rate was at 4.13 births per woman

- In 2018, the fertility declined to 4.100 births per woman

- In 2019, the fertility rate also declined to 4.026 births per woman

- Based on current statistics, in 2020 the fertility rate is a 3.95 births per woman (UN, 2020).

This is a really good economic improvement which can be proven that the female labor force participation is helping the country control the population growth through decreased fertility rate

2.4.1. Economic Growth

In 1998, after years of political instabilities, the new established government created a development framework known as "vision 2020" whereby one of the main goals was to grow from low income country to lower- middle income country by 2020 (the global threshold to measure low middle income country is in the range of $ 1,006 to $ 3,975). Specifically, the country aimed at achieving an average per capita GDP of $1,240, an average GDP growth rate of approximately 8%, reduction in the maternal death rate up to 200 from 1070, reducing the number of households/people under the poverty line to reach the percentage of less than 10 percent households in the whole country to mention a few (Nimusima, Karuhanga, & Mukarutesi, 2018).

However, most of these goals were not attained fully because currently the nominal per capita GDP in 2019 was $825, the maternity death rate was 248 deaths in 100,000 births, the population percentage under poverty decreased significantly but it is at 39.1% (UNDP, 2020). So, in regards to this, Rwanda set another economic framework instead of vision 2035 aiming at achieving the goal of becoming an upper-middle income country by 2035 and high-income country by 2050. How about the economic growth over the years? The figure below shows the significant trend of the country's GDP growth over the period of 10 years.

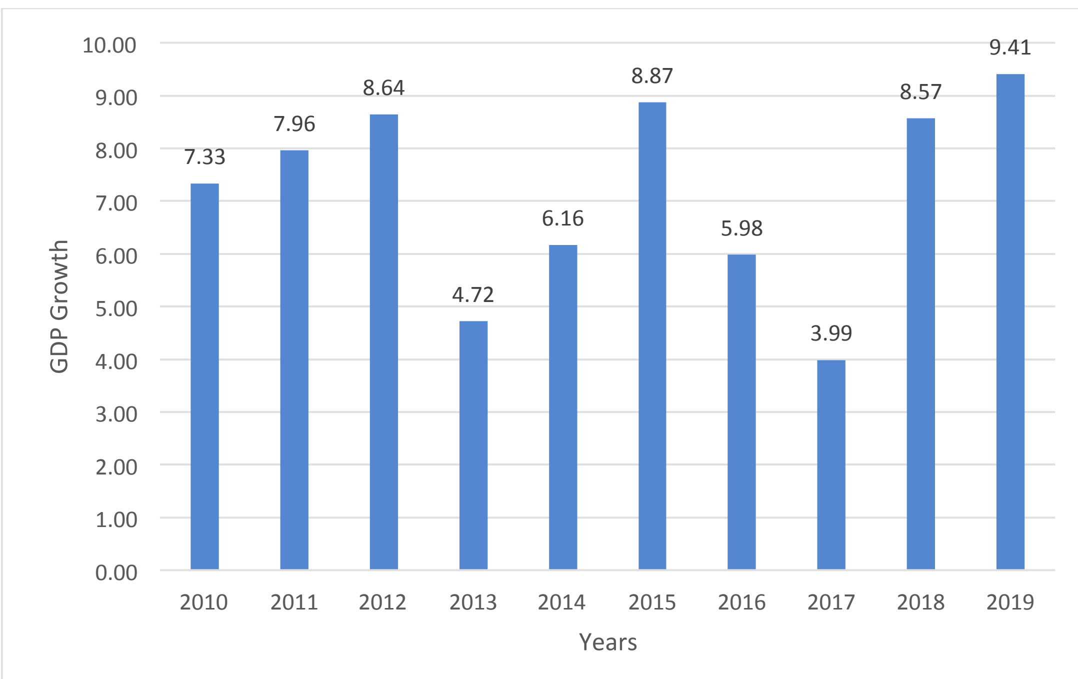

Figure 2: Rwanda's economic growth for 2010- 2019 (Source: World Bank Database, 2020)

This steady economic growth is promising and Rwanda's economy is among the fastest growing economies in East Africa following Ethiopia. As the figure 4 shows, the sectors which has been contributing a lot to the country's GDP are mainly services and industry and the good image of the country has intentionally contributed a lot in that because for instance it is ranked as the safest African country and the 2nd most popular destination for conferences worldwide which increases the number of people coming in the country either to attend meetings and conferences or to invest and start their businesses in Rwanda. In the sector, the main contributing industry is the real estate business and the defense as well as compulsory social security services

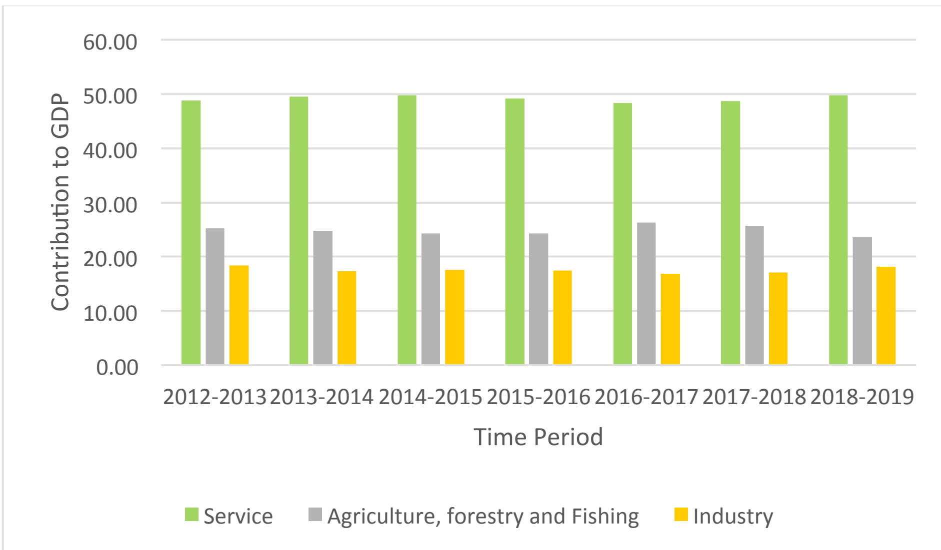

Figure 3: Sectors contribution to the GDP in Rwanda (Source: National Institute of Statistics of Rwanda, 2020)

Chapter 3: Research Methodology

3.1. Data Description

The data about female labor participation rate was obtained both from the Labor Force Survey of 2019, a survey conducted by the National Institute of Statistics of Rwanda every year as well as from the International Labor Organization (ILO) Database. The labor force participation rate used in this study is the number of women aged from 15 years and above who are participating in the economy actively as labor supply to produce goods and services. They might either be employed or not.

For the Gross Domestic Product (GDP) per capita, the data used was from the World Bank and was converted into their natural logarithms which will be explained further in Chapter 4. The value considered was the Purchasing Power Purity (PPP) at a constant 2010 US$, The World Bank was also used as a source to obtain data about fertility rate, unemployment rate and the educational attainment level. All the dataset was from the annual data in the timeframe of 1990 to 2019.

3.2. Model

3.2.1 Description of the Econometric Model

As a way to determine if the U-Shape feminization hypothesis is also relevant in the case of Rwanda. Using the literature contributions especially by Goldin (1994), we base on the following equation (1) in a form of a second degree polynomial regression to derive our model using the female labor force participation rate (FLFPR) as the response variable while the natural log of GDP per capita (LnGDPpc) is considered as the explanatory variable:

FLFPR= $\alpha + \beta_1 LnGDPpc + \beta_2 (LnGDPpc)^2 + \varepsilon$,………………………….. (1)

Where FLFPR is the female participation rate, LnGDPpc is the natural log of the GDP per capita considering the Purchasing Power Purity (PPP), and ε is the error term. Generally, subscript "i" is used to represent countries but in our case, we are only analyzing Rwanda

To reflect the stochasticity of our dataset, we also consider the notion of time in our equation and we have the following equation:

FLFPR$_t$= $\alpha + \beta_1 LnGDPpc_t + \beta_2 (LnGDPpc_t)^2 + \varepsilon_t$………………………..(2)

Where t represents time period (year)

However, we would like to consider the control variables, which are those variables that affect highly the female labor participation and our equation is as follows:

FLFPR$_t$= $\alpha + \beta_1 LnGDPpc_t + \beta_2 (LnGDPpc_t)^2 + \omega X_t + \varepsilon_t$…………….(3)

In the above equation X_t symbolizes the set of all control variables (i.e. fertility rate, unemployment rate and educational attainment).

The U shape relationship will be confirmed if $\widehat{\beta_1}$<0 and $\widehat{\beta_2}$>0

3.2.2. Variables

3.2.2.1 Gross Domestic Product Per Capita

By definition, Gross Domestic Product (GDP) per capita is a measurement used to calculate a country's economic outside per individual and it is obtained by dividing the total GDP by the population of the country (Chappelow, 2020). This is often calculated on a yearly or quarterly basis. This is a metric used to measure a country's economic growth along with the GDP since it indicates the value of goods and services produced in an economy by the people.

Some studies have been done on how economic development affect positively the female labor force participation due to different factors such as increased school enrollment for girls, better working conditions and wages, increased demand and so forth but there are limited researches on the reverse impact. Thus, this relationship aims at showing that female labor participation rate has a positive impact on the economic growth of a country. In this study, we are trying to establish the of U Shape relationship whereby the female labor participation declines first as the economy grow especially for low income countries like Rwanda because countries tend to move from an Agriculturally based economy to more industrial until it reached the peak level then later it increases as the GDP per capita increases. That's what will explain the relationship however, it might also be what is known as inverse U shape relationship whereby the findings might indicate that the female labor participation increases first as the GDP per capita grow but later decreases due to a number of factors such as the discouraged worker effect and others.

3.2.2.2. Fertility Rate

Fertility rate sometimes referred to as total fertility rate is the total number of birth (children) per woman that she is expected to give birth to during her childbearing period on average (Roser, 2017). Globally, the fertility rate on average is 2.5 children per individual woman. Low income countries are more affected by the high fertility rate since high fertility rate leads to overpopulation which reduces both the GDP per capita and income per capita and makes public services less accessible since the population has increased, so such countries are always aiming at reducing their fertility rate through population growth control policies whereby some of them are strict ones like declaring a minimum number of children each household is allowed to have and impose taxes on any extra child, an example is China, but other measures are also for long run effects such as investing in girls' education and more access to contraceptives.

Childbearing and caring are biologically and socially believed to be a woman's responsibility and they take much of a woman's time that most of them decide to only dedicate their time on that and not engage in any other kind of labor. Moreover, as a family adds another child on the existing ones, it also adds the cost of childcare yet the income is not increasing so some decide to abandon the labor force because of that.

Additionally, some countries have inflexible maternity laws that discourage women to work during their maternity time and thus decreasing the participation of women in the labor force. Conclusively, there is generally a negative relationship between female labor participation and fertility late because as more women join the workforce, they tend to prefer giving birth to few children so that they can have time for the two activities but also to progress professionally because most employers are more profit oriented so they would prefer to hire more men or women who have exceeded the childbearing time. So, we are expecting to observe a negative relationship between the two.

3.2.2.3. Unemployment Rate

As briefly explained in Chapter 1, unemployment rate is the percentage of the total number of people in the labor force who have reaching the working age (15 and above in most countries) and are willing to work and are looking for but have not managed to get employed (Chappelow, 2020). It is considered a “lagging indicator” because it increases or decreases depending on how other factors in the economy are performing. The female labor force participation has increased over time compared to the past and even though there is still a gender labor force gap, it has reduced it significantly. Without going into much hypothesizes, generally the unemployment rate is calculated as follows:

Unemployment rate (UR)= $\frac{Total\ Number\ of\ unemployed\ people}{total\ number\ of\ people\ in\ the\ Labor\ Force}$

and in our context of women labor participation rate, then,

Female Unemployment rate (FUR)= $\frac{Total\ Number\ of\ unemployed\ people}{total\ number\ of\ women\ in\ the\ Labor\ Force}$

In this study, in other to estimate the relationship between our two variables (female labor force participation rate and female unemployment rate), we will use the “added worker” effect hypothesis and by assuming so, it would indicate that as more women decide to join the workforce due to increased male unemployment rate, then by keeping the quality of jobs constant, there will be a rise in female labor force participation and a decrease in unemployment rate among women. Therefore, there is a negative relationship between female labor force participation rate and female unemployment rate.

3.2.2.4. Educational Attainment Level

Educational Attainment Level is the degree or level of which a person reached during his/her schooling. In the case of Rwanda, this is measured in terms of Primary level, Lower secondary school level (ordinary level), upper secondary school level (advanced level), university or Bachelor's, and post graduate level. It is important to note that there is a difference between school enrollment and educational attainment because some people use them interchangeably while they are different. For instance, when you apply for a job, they inquire about the last degree acquired not attended since when you drop out in the middle, you are not considered as one who have acquired all the taught skills depending on the level.

As often discussed, women are paid less compared to their male counterparts for doing a similar job. Moreover, the majority of women in the labor force especially in low income countries are working in the informal sector and that often does not necessitate educational attainment. However, as a woman acquire required job market skills through school, it gives her a competition advantage and the ability to negotiate for a better pay. So, in other words, educational attainment affects positively the female labor participation. Consequently, we are expecting a positive relationship between the two variables.

3.3. Data Analysis Techniques and Methods

Since the study aims at finding the cointegration among the series, multivariate cointegration is the best approach to use when you have to run a single model with more than one independent variables. The first step involves testing for the existence of unit root tests. We used Augmented Dickey- Fuller test (Filler, 1976, Dickey and Fuller, 1979) and Philips Perron Test in order to see either a series is a random walk in comparison to the alternative that is stationary. From these unit root tests we will be able to determine the other of integration for each time series. As we have a limited sample size, we use Autoregressive Distributed Lag Model (ARDL) approach by Pesaran et al. (2001) to study the cointegration of our variables because compared to other approaches like the Engle- Granger (1987) or Johansen Test (1988) on the maximum likelihood, it is the most flexible when you are dealing with low number of observations. Moreover, with ARDL boundary test, the series could have different orders of integration and it would not affect the cointegration test but for the two other approaches mentioned, it would not work because they require all the series to be stationary either all at level or all at first difference.

Before analyzing the cointegration of our variables, we first use the Schwarz Information Criteria (SIC) to determine the optimal lag length and then estimate my equation using the Unrestricted Error Correction Model as known UECM by comparing the F-statistic of the model with boundary test critical values. Then at the end, I analyze both the short-term and long-term coefficients to determine the relationship in my variables.

Chapter 4: Presentation Results and Discussion

As stated in Chapter 3, the data used in this research is from the period of 1990-2019 and the following is the summary descriptive statistics of the dataset used.

Table 5: Summary Statistics of the dataset, 1990-2019

Indicator	Mean	Standard Deviation	Minimum	Maximum
Female labor force participation rate	84.96	0.87	83.85	88.08
GDP per capita at constant 2010 US$	520.33	16719.32	220.54	904.74
Female unemployment rate	5.76	0.08	4.73	6.37
Fertility Rate	5.24	0.44	4.03	7.18
Educational attainment	21.76	17.73	11.20	32.40

From the calculations, we can see that female labor force participation rate and female unemployment rate as well as fertility rate are the variables that have lower standard of deviations but GDP and educational attainment have standard deviations that are relatively higher because before there has been a significant growth/change observed.

4.1. Stationarity Tests

In order to avoid inaccurate cointegration results as well as determine the dataset trend properties, the first step is going to test for the existence of unit root tests in our time series using both Augmented Dicker-Fuller Test (ADF) test and Philip and Perron Test. Since my data is on a yearly basis (annual), I used 2 as maximum lag for the ADF test.

Table 6: Unit Root Tests

	Augmented Dicker- Fuller Test			**Phillips and Perron Test**		
	Level	**First Difference**	**Remarks**	**Level**	**First Difference**	**Remarks**
FLFPR	-2.958919	-8.441903*	I (1)	-2.860182	-10.52493*	I (1)
LNGDPpc	-3.987819*	-8.721630	I (0)	-3.987819*	-9.218143	I (0)
FUR	-3.216537*	-4.220685	I (0)	-2.681037	-3.707715*	I (1)
FR	-5.999851*	-4.200289	I (0)	-4.880893*	-4.145997	I (0)
EA	0.010816	-4.560056*	I (1)	-0.231913	-4.43117*	I (1)

Note: FLFPR: Female Labor Force Participation Rate, LNGDPpc: Natural Log of per capita GDP at constant 2010 US$, FUR: Female Unemployment Rate, FR: Fertility Rate, EA: Educational attainment, at least who completed primary school (female)

- Means the ADF t-statistic which is greater than the critical value at 5% significance level.

I (0) indicates being stationary at level

I (1) indicates being stationary at first difference

For Phillips and Perron Test, Bartlett Kernel and Andrews Bandwidth as the automatic selection.

From the results, it is showing that all the variables are all stationary but at different levels of integration. Female labor force participation rate is stationary at first difference and intercept both at ADF test and Phillips Perron Test. GDP is stationary at level and intercept when using ADF test but also with Phillips Perron Test. For unemployment rate, it is stationary at level and trends and intercept using ADF test and when using Phillips Perron Test, it is stationary at first difference. The fertility rate is stationary at level and trends and intercept for both Phillips Perron Test and ADF Test. Last but not, the educational attainment is stationary at first difference and trends for both tests. Even though all the variables are stationary at different levels, it would not hinder our cointegration analysis because we are using ARDL approach. The next step is to select the lag criteria for cointegration.

4.2 Optimal Lag Length Selection

As we are trying to find the correlation or cointegration between certain variables, it is also crucial to find the maximum optimal lag length for our boundary test and it is computed below. Again, as the data set is not big, the Akaike Information Criterion is the most suitable to use compared to SIC, HQ or FPE.

VAR Lag Order Selection Criteria
Endogenous variables: FLFPR LNGDPPC FUR FR EA
Exogenous variables: C
Date: 09/26/20 Time: 18:38
Sample: 1990 2019
Included observations: 28

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-126.5470	NA	0.008287	9.396212	9.634106	9.468938
1	8.007471	211.4427	3.42e-06	1.570895	2.998257	2.007254
2	77.91989	84.89365*	1.67e-07*	-1.637135*	0.979696*	-0.837144*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Figure 4: Lag Selection

So, we can conclude that the optimal lag is 2 based on the results as shown from E-views computation from both Akaike Information Criterion (AIC) and Schwartz Criteria (SC).

4.3. ARDL Cointegration Test

Using the determined optimal lag of 2, we continue to determine the cointegration of variables using F-statistic tests. The Null hypothesis is that there is no level relationship (no cointegration) by using each variable as a dependent variable. Since there is only 29 years of data, then we use 1 as the maximum lag of regressors and for the fixed regressors specification of trend, unrestricted constant is used. Before establishing the long-run relationship, we need to first define our unconstrained error correction Model (UECM) which is as follows:

$$\Delta FLFPR = \alpha + \sum_{i=1}^{k} \gamma_{1i} \Delta FLFPR_{t-i} + \sum_{i=1}^{k} \beta_{1i}\, LnGDPpc_{t-i} + \sum_{i=1}^{k} \beta_{2i}\, (LnGDPpc)_{t-i}^{2} + \gamma_{2i} FLFPR_{t-1} + \beta_3 LnGDPpc_{t-i} + \beta_4 (LnGDPpc)_{t-i}^{2} + \omega X_{t-i} + \varepsilon_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

ARDL Long Run Form and Bounds Test
Dependent Variable: D(FLFPR)
Selected Model: ARDL(1, 0, 0, 0, 1, 0)
Case 3: Unrestricted Constant and No Trend
Date: 09/26/20 Time: 21:11
Sample: 1990 2019
Included observations: 29

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	75.43927	22.88930	3.295831	0.0034
FLFPR(-1)*	-0.966812	0.209294	-4.619386	0.0001
LNGDPPC**	0.451699	0.513423	0.879779	0.3889
_LNGDPPC__2**	0.107657	0.143254	0.751513	0.4607
FUR**	-0.144287	0.792429	-0.182082	0.8573
FR(-1)	0.436066	1.259532	0.346212	0.7326
EA**	-0.112890	0.211076	-0.534831	0.5984
D(FR)	-6.583718	5.504217	-1.196122	0.2450

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDPPC	0.467204	0.526079	0.888087	0.3846
_LNGDPPC__2	0.111353	0.147424	0.755323	0.4584
FUR	-0.149240	0.814798	-0.183162	0.8564
FR	0.451035	1.302896	0.346178	0.7327
EA	-0.116765	0.216019	-0.540532	0.5945

EC = FLFPR - (0.4672*LNGDPPC + 0.1114*_LNGDPPC__2 -0.1492*FUR + 0.4510*FR -0.1168*EA)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	3.680169	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04
			Finite Sample: n=30	
		10%	2.578	3.858
		5%	3.125	4.608
		1%	4.537	6.37

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-4.619386	10%	-2.57	-3.86
		5%	-2.86	-4.19
		2.5%	-3.13	-4.46
		1%	-3.43	-4.79

Figure 5: ARDL Long Run Bound Test

The above figure shows the results when FLFPR is tested for cointegration with other variables. The condition of the hypothesis is that if the F value is below the I (0), you cannot reject the null hypothesis but if it is higher than I (1), you reject the null hypothesis of no cointegration.

Using the F-statistic results which is higher than I (0) then we can reject the null hypothesis of no cointegration. When other variables are also used dependent variables, it gives out different findings as it is summarized in the following table.

Table 7: F-statistic testing for all the variables

Dependent Variable	F statistic	I (0) at 5%	I (1) at 5%	Observation
LNGDPpc	7.403847	2.62	3.79	Reject the null hypothesis so there is cointegration
FUR	2.327365	2.62	3.79	Fail to reject the null hypothesis so no cointegration
FR	13.34966	2.62	3.79	Reject the null hypothesis so there is cointegration
EA	0.481965	2.62	3.79	Fail to reject the null hypothesis so no cointegration

On the other hand, it is also possible to use the t-statistic value and evaluates if it's either below I (0) or above I (1) at 5% significance level bound. If it is in the middle of the two, then you conclude that it is indecisive because you don't have enough information to reject or fail to reject the null hypothesis.

4.4 Long Term Relationship Analysis

The first step was to use Akaike Information Criterion to determine the best long-term model. From the findings, it is shown that the best ARDL autocorrelation is at ARDL (1,0,0,1,0, 1,0)

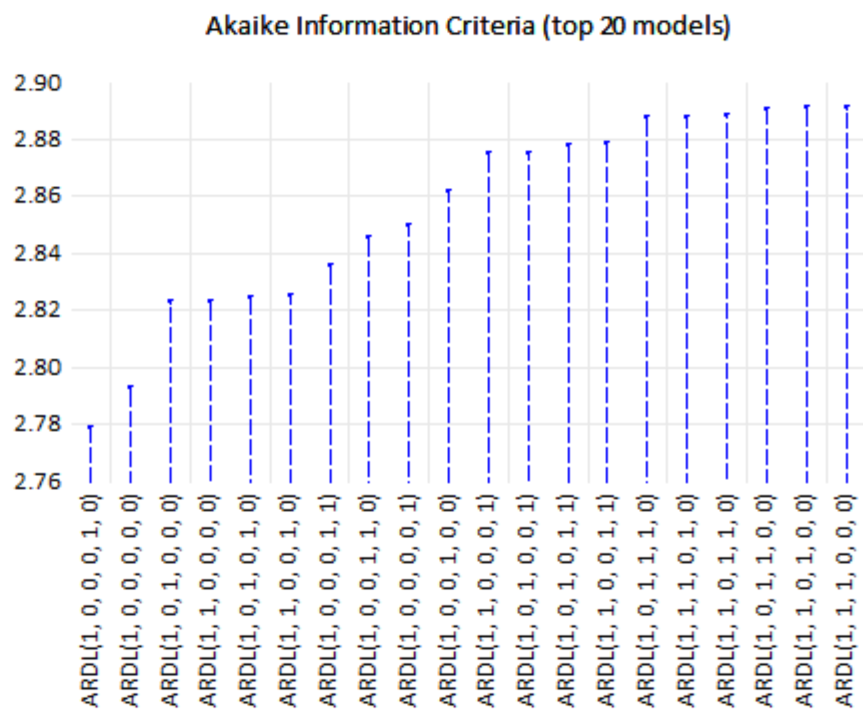

Figure 6: Akaike Information Criteria for top 20 models

And using ARDL (1,0,0,1,0, 1,0), we have got the following long run and estimated results coefficients

Table 8: ARDL Long run Coefficients

Variable	**Coefficient**	**t-statistic value**	**Probability**
FLFPR	0.060	0.178	
LNGDPpc	-1.136	-0.020	0.984
$LNGDPpc^2$	0.108	0.022	0.982
FR	-4.660	-1.021	0.321
FUR	-0.443	-0.291	0.166
EA	-0.024	-0.063	0.951
C	78.325	2.781	0.012
Long Term Coefficients			
LNGDPpc	-1.208	-0.020	0.984
$LNGDPpc^2$	0.115	0.022	0.982

FR	-11.289	-2.584	0.019
FUR	-0.471	-0.270	0.790
EA	-0.026	-0.062	0.951
C	78.325	28.160	0.012

Based on the results we can see that the rate of economic growth (GDP per capita) is negative but the ratio of the economic growth ($GDPpc^2$)is positive. This implies that the economic growth declines the women labor participation at first. For our control variables, it shows that fertility rate affects women labor force participation negatively and that's the same for female unemployment rate. For education attainment of at least primary school also affects negatively the labor force participation.

4.5 Heteroskedasticity and Serial Correlation Testing

In order to show that the error terms are normally distributed and that our regression coefficients are accurate, we test for heteroskedasticity of our model. There are different tests available to test for that, and we used Breusch Pagan Test, and the null hypothesis is that there is homoskedasticity (or no heteroskedasticity).

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.465910	Prob. F(7,18)	0.8465
Obs*R-squared	3.988247	Prob. Chi-Square(7)	0.7811
Scaled explained SS	11.80467	Prob. Chi-Square(7)	0.1072

Figure 7: Breusch Pagan Heteroskedasticity Test

From the computed test, we can confidently conclude that we failed to reject the null hypothesis since the value for Observed R-Squared is higher than 5% significance (0.05). So, there is no heteroskedasticity in our data.

We also tested for serial correlation using LM Test, and the following is the summary of the findings.

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.503028	Prob. F(2,16)	0.6139
Obs*R-squared	1.538126	Prob. Chi-Square(2)	0.4634

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 09/27/20 Time: 11:04
Sample: 1994 2019
Included observations: 26
Presample missing value lagged residuals set to zero.

Figure 8: Serial Correlation LM Test

The Observed R squared value is also greater than 5% significance value, so we can attest that there is no serial correlation of the error terms in our model.

4.6. Model Stability

By using the Cusum Test, the following is the result chart/graph

Figure 9: Cusum Diagnostic Test

As the figure indicates, there is stability in our model since the blue dotted line lies in the middle of the two red dotted lines and that indicates that the parameters of the model are stable at 5% significance.

4.7. Interpretation of Empirical Results

From the results we have proven our model assumption from equation (3) where our condition is that if $\widehat{\beta_1}$<0 and $\widehat{\beta_2}$>0 where $\widehat{\beta_1}$ is the coefficient of LNGDPpc while $\widehat{\beta_2}$ is the coefficient of LNGDPpc^2. From our results β_1= -1.208<0, and $\widehat{\beta_2} = 0.115$>0, Therefore, we can conclude that there is a U-shape long run relationship between female labor force participation and economic growth in the case of Rwanda. This is because for some countries, like Turkey and others even when there is cointegration but $\widehat{\beta_1}$>0 and $\widehat{\beta_2}$<0, then it said to be an inverse U-shape relationship or downward U shape. For the case of Rwanda, as the economy is becoming more service-based, it often leads to increased women involvement in a long run so that explains the cointegration observed in our model.

Moreover, it shows that all the control variables including educational attainment affect negatively the female labor participation while for other studies done, the educational attainment was proven to affect positively the female labor participation because women get to be employed for white collar jobs but that applies mainly after completion of secondary school. So, this imply that finishing primary school in Rwanda especially when you are girl doesn't guarantee you a job or a formal one at that which means that for woman to get more competitive advantage on the job market, she has to advance and finish at least secondary school especially considering the results show a negative correlation between their participation in the labor force and female unemployment rate. The results also confirm the hypothesis that women in low income countries mostly work out of necessity because of poverty and most of them are employed or self-employed in the informal sector but as the country get more industrialized, the rate decreases until its reaches a peak and then starts increasing steadily with the GDP which is also the case for Rwanda which can easily be observed even from the dataset since the female labor participation rate has been decreasing over the years while also the agricultural contribution to the GDP has been the same while the service and industry sectors have been increasing.

Chapter 5: Summary, Conclusion and Recommendations

5.1. Summary of the Study

This study analyzed the relationship between women labor force participation and economic growth in the case of Rwanda as the country has been championed for its effort to empower women in all aspects and trying to reduce the gender labor force gap among women and men. The main objective is to determine if GDP per capita as an indicator of economic growth of the country has a long run relationship on the female labor force participation. However, the study also had specific objectives of determining if there is a U-shaped association between female labor participation and economic growth, as well as determine if there is a short-term relationship between the control variables (infertility rate, female unemployment rate, and educational attainment) and the country's economic development but also recommend policies that can be implemented by both the government and other concerned stakeholders in order to reduce the gender gap that still exist in the labor force and ensure maximization of the human resources potential that still remain unutilized due to hindrances such as religious and traditional beliefs.

Even though there is still a limited number of literatures on the role of women labor participation on economic development, some researches have been done especially in religious countries and other countries with lower labor participation such as India to have factual evidences that can encourage policy makers to make a change, but generally most studies met a challenge of not accurate or not updated data on female labor force participation especially since a majority of women in the labor force works in the informal sector. However, majority of the findings were that there is indeed a U-shaped or inverted U-shaped relationship between the two variables. The data used in this study were collected from National Bank of Statistics of Rwanda and World Bank Database as well International Labor Organization (ILO) Database and they dated from the period of 1990 to 2019. Since the dataset is small, this study used ARDL Boundary Test instead of the mostly used cointegration tests like Johansen Test and Engle Granger Test but also because variables were integration at different levels. After determining that there is a cointegration when FLFPR, we also found the long-run coefficients and they helped us to conclude that our model shows a U-shape relationship between female labor participation and economic growth or GDP per capita.

5.2. Conclusion

In most models for testing the U-feminization hypothesis, it is often found that the coefficient for LNGDPpc is negative while the coefficient for LNGDPpc is positive to confirm the long-run U shape relationship between an economy's GDP and the female labor force participation and it was the same for our model which means that Rwanda follow the same trend and that the country is indeed in its early stages of development and it is moving from an agricultural based economy to a more service oriented and industrialized one. Even the data indicate it because the FLFPR in 1990 was 87.86 and it has been decreasing steadily and in 2019 it was at the percentage of 83.93. From the findings we can also conclude that there is more "discouraged- worker" effect than the "added-worker" effect in Rwanda because the female employment rate affects negatively the female labor participation as the results indicated. When it comes to Educational level attainment, as we had only considered primary level completion, the results showed that it also reduces the female labor force participation. This is confirmed by the fact that there has been more female school enrollment in secondary school in recent years than male school enrollment. That explains then the low female participation rate affected by the primary school completion of women because they are spending more time in school instead of working which is also a good effect in reducing child labor and early marriages

Since we established the existence of the long run relationship between the economic growth and women labor force participation, then ensuring that women have access to quality and decent employment is a good economic strategy for the country so that as they may not also be economically active but also contribute positively to the economic development of the country. In addition, there is a need to ensure policies aimed at reducing fertility rate are being implemented and families are sensitize so that they understand the importance of birth control to them as individuals and the country as large hence increasing women's labor force participation.

5.3. Recommendations

The main objective of this study was to analyze the relationship between the economic growth and female labor participation in Rwanda. The study findings showed that there is undoubtedly a long run relationship between economic growth and women labor force participation. When a woman can earn her living, she is able to support herself and her family. Moreover, it is often said that when you empower a woman you are empowering a nation due to their role to impact future generations. So, the following are few policies/recommendations that can help enhance women's role in the labor force and the country's development:

- Since most women are hindered by household responsibilities, the country can emphasize on paid Paternal Leave so that women and men can share childcare responsibilities and learn to be responsible fathers of the future as well as create a bond with their child.

- Encourage employers especially those in the private sector who are in those men dominated fields to hire more women by establishing a national quota on women's participation in certain industries such as manufacturing, mining, construction and others which are men dominated.

- Encourage women's entrepreneurship by giving incentives to women-led projects so that they can create their own employment and also employ others hence contributing to the economy.

As stated in the introduction of this study, women make the majority of Rwandan Population however in terms of labor participation, there is still a huge even though not huge. So, if they get more inclusive in the economy, they can contribute positively and help boost the country's GDP so that Rwanda can achieve its 2035 and 2050 visions of becoming middle income country and upper income country respectively. However, much effort should also be put to increase more their educational attainment to higher educational levels so that they can use their skills on the labor market and have more competitive advantage.

As a recommendation to future researchers on this topic, I would suggest to also include secondary school and tertiary school attainment which could show the positive contribution of education on female labor participation. Moreover, even though published data are still limited, they can try to obtain quarterly data and then use Johansen and other cointegration tests to evaluate also the U-shape relationship among those variables. As there is still limited literature on the topic, future researchers can also do a study on the five countries making the East African Community to analyze the situation in the case of all the five countries.

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Appendix

Appendix A: ARDL Test

Dependent Variable: FLFPR
Method: ARDL
Date: 09/27/20 Time: 09:36
Sample (adjusted): 1994 2019
Included observations: 26 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): D(LNGDPPC(-2)) D(_LNGDPPC__2(-2)) D(FR(-2)) D(FUR(-2)) D(EA(-2))
Fixed regressors: C
Number of models evalulated: 32
Selected Model: ARDL(1, 0, 0, 1, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FLFPR(-1)	0.059904	0.337191	0.177657	0.8610
D(LNGDPPC(-2))	-1.135822	56.26217	-0.020188	0.9841
D(_LNGDPPC__2(-2))	0.108404	4.926237	0.022005	0.9827
D(FR(-2))	-4.659560	4.562141	-1.021354	0.3206
D(FR(-3))	-5.953812	4.127002	-1.442648	0.1663
D(FUR(-2))	-0.443397	1.525604	-0.290637	0.7747
D(EA(-2))	-0.024465	0.390857	-0.062594	0.9508
C	78.32534	28.16048	2.781393	0.0123

R-squared	0.332435	Mean dependent var	84.58492
Adjusted R-squared	0.072827	S.D. dependent var	0.972533
S.E. of regression	0.936451	Akaike info criterion	2.954220
Sum squared resid	15.78492	Schwarz criterion	3.341327
Log likelihood	-30.40486	Hannan-Quinn criter.	3.065693
F-statistic	1.280525	Durbin-Watson stat	2.140896
Prob(F-statistic)	0.314155		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix B: Dataset Used

Period	GDP per capita at constant 2010 US$	Female labor Force Participation Rate	Female Unemployment Rate	Fertility Rate	Educational Attainment (At least completed primary
1990	380.65	87.86	4.73	7.18	11.20
1991	381.82	87.67	4.78	6.94	12.69
1992	427.26	87.34	4.88	6.71	13.54
1993	420.10	86.85	5.20	6.51	13.79
1994	220.54	86.32	5.50	6.32	14.07
1995	303.32	85.65	5.71	6.17	14.82
1996	331.94	85.58	5.81	6.05	15.00
1997	353.96	85.49	5.89	5.96	16.93
1998	355.27	85.07	6.03	5.84	18.13
1999	344.03	84.77	6.14	5.77	18.46
2000	352.50	84.48	5.94	5.64	18.97
2001	368.59	84.83	5.99	5.54	18.98
2002	407.52	84.32	6.24	5.44	19.64
2003	410.16	84.28	6.37	5.34	21.33
2004	434.44	84.24	6.27	5.24	22.19
2005	466.60	84.20	6.18	5.13	22.76
2006	498.21	84.17	5.85	5.02	23.03

2007	522.91	84.15	5.59	4.89	23.51
2008	565.97	84.13	5.48	4.77	24.04
2009	585.46	84.11	6.09	4.64	24.92
2010	612.34	88.08	6.08	4.52	25.64
2011	644.76	84.06	5.96	4.41	26.34
2012	68.46	84.01	5.92	4.22	26.80
2013	698.38	83.94	5.91	4.25	27.67
2014	723.23	83.85	5.79	4.20	28.04
2015	767.60	83.88	5.83	4.16	28.08
2016	792.62	83.89	5.88	4.12	28.20
2017	802.75	83.90	5.78	4.09	29.87
2018	848.80	83.91	5.58	4.04	31.83
2019	904.74	83.93	5.58	4.03	32.40

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