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Closing the Gender Gap in Secondary School Enrolment in sub-Saharan Africa: Does women's political empowerment matter?

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Abstract

This study investigates the effect of female political empowerment on gender equality in secondary school enrolment in a sample of 20 sub-Saharan Africa (SSA) countries over the period 2000-2017. Results from Ordinary Least Square (OLS) and Instrumental variable (IV)-Two-Stage Least Squares (2SLS) reveal that the gender gap in secondary education decreases with female political empowerment. Therefore, increasing the representation of women in politics is an important lever of economic policy to improve the secondary education of women, allowing them to be more productive and more fulfilled.

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1. Introduction

Achieving gender parity in education matters for inclusive and sustainable development (Anyanwu, 2016; Chen, 2004). Indeed, girls'education contributes to increase economic growth, improve women's wages and jobs, save the lives of children and mothers, to smaller and more sustainable families, to healthier and better-educated children, to reduce rates of HIV/AIDS and malaria, rates of child marriage, of harm to families from natural disasters and climate change (Sperling and Winthrop, 2016). Furthermore, women's education is essential in the fight against poverty (Anyanwu, 2016). This importance elevates the reduction of gender inequalities to the rank of development priority both in the Sustainable Development Goals (SDGs) and in the African Union's 2063 Agenda.

In view of its importance, this article evaluates the determinants of gender equality in secondary education enrolment in sub-Saharan Africa (SSA) with a focus on women political representation. Joshi and Yu (2014) recognise that increased political participation of the marginalised layers of the society favours the consideration of their interest in public policies. In this line, previous studies find that a greater political participation by women leads to political choices more adapted to their needs and concerns in terms of higher level of government health care spending (Dianda et *al*., 2020; Ng and Muntaner, 2018). Moreover, the empirical literature evidenced that a better representation of women in decision-making spheres leads to lower maternal and infant mortality (Bhalotra et *al*., 2018; Bhalotra and Clots-Figueras, 2014).

In SSA, the increase of women parliamentarian's share is among the most significant political trend of the last years. In 2019, 24% of the region's parliamentarians are women (Inter-Parliamentary Union, 2020). While this is still a relatively low figure, it marks an increase up from 11% in 1997 to 12.1% in 2000. Does this increasing political representation of women improve gender parity in secondary education? We are interested in secondary education gap because while SSA has succeeded in reducing the gender gap at the primary level, reducing the gender gap at secondary and tertiary level remains a great challenge. The gender parity index in primary, secondary and tertiary school enrolment are set respectively at 0.95, 0.88 and 0.75 in 2018 (World Bank, 2020). We hypothesize that the gender gap in secondary school enrolment reduces with the percentage of seats occupied by women in parliament increases.

After the introduction, the rest of the paper is organized into three sections. The second is devoted to methodology and data presentation. The third section presents and discusses the results. The fourth and last section concludes.

2. Methodology and data

Based on the paper of Anyanwu (2016) on the determinants of gender equality in secondary enrolment in Africa, we propose the following general functional form:

$$GESE=f(WPR, X) \quad (1)$$

Equation (1) shows that gender equality in secondary enrolment (GESE) is a function of women's parliamentary representation (WPR) and a set of control variables (X). In particular, we successively estimate the following models:

$$GESE_{it} = \beta_0 + \beta_1 WPR_{it} + \varepsilon_{it} \quad (2)$$

In equation (2), we estimate the effect of women political representation on gender parity in secondary education without control variables. ε_{it} is the error term; i represents the country and t the period.

$$GESE_{it} = \beta_0 + \beta_1 WPR_{it} + \beta_2 (WPR)^2_{it} + \varepsilon_{it} \quad (3)$$

In equation (3), we estimate the effect of women political representation on gender parity in secondary education. We account for the possibility that the relationship between women' s political representation and the GESE index may not be linear. Indeed, there may be an inverse U-shaped relationship between women's political representation and the gender gap in secondary education. The GESE index initially increases as the percentage of women in the primary house goes up, but starts decreasing after women's share in the primary house reaches a certain level. We check this specification by considering a polynomial function of women parliamentarian representation. Here, we don't include control variables.

$$GESE_{it} = \beta_0 + \beta_1 WPR_{it} + \beta_2 (WPR)^2_{it} + \beta_3 PCGDP_{it} + \beta_4 FLF_{it} + \beta_5 NRR_{it} + \beta_6 URBAN_{it} + \varepsilon_{it} \quad (4)$$

Equation (4) is equation (3) and additional control variables. The control variables are Gross Domestic Product per capita in $ US in PPP (PCGDP), the share of female labour force in % of total labour force((FLF), total natural resource rents in % of GDP (NRR) and the share of urban population in % (URBAN). Control variables are chosen based on the literature on the determinants of gender equality in education (Anyanwu, 2016, 2018; Chen, 2004; Østby et *al*., 2016). In the light of previous empirical investigations, we assume that GESE improves with the level of income, the participation of women in the labour market and urbanization (Anyanwu, 2016; Chen, 2004; Østby et *al.,* 2016). However, as Anyanwu (2018) demonstrated, we hypothesise that the educational gap in secondary school widens with rents from natural resources.

$$GESE_{it} = \beta_0 + \beta_1 WPR_{it} + \beta_2 (WPR)^2_{it} + \beta_3 PCGDP_{it} + \beta_4 FLF_{it} + \beta_5 NRR_{it} + \beta_6 URBAN_{it} + \beta_7 INV_{it} + \varepsilon_{it} \quad (5)$$

In equation (5), we add investment rate measured by gross fixed capital formation (% of GDP) as another control variable.

$$GESE_{it} = \beta_0 + \beta_1 WPR_{it} + \beta_2 (WPR)^2_{it} + \beta_3 PCGDP_{t-1} + \beta_4 FLF_{it} + \beta_5 NRR_{it} + \beta_6 URBAN_{it} + \beta_7 INV_{it} + \varepsilon_{it} \quad (6)$$

In equation (6), we control for lagged variable of GDP per capita at (t-1) instead of GDP per capita.

$$GESE_{it} = \beta_0 + \beta_1 WPR_{it} + \beta_2 (WPR)^2_{it} + \beta_3 PCGDP_{t-1} + \beta_4 FLF_{it} + \beta_5 NRR_{it} + \beta_6 URBAN_{it} + \beta_7 INV_{it} + \beta_8 QP_{it} + \varepsilon_{it} \quad (7)$$

In equation (7), we add a dummy for quota policy adoption (QP). The dummy takes 1 if a country has adopted quota policy and 0 if otherwise. Countries which have adopted quotas policies in the sample are Burkina Faso, Burundi, Cap Verde, Cameroon, Ethiopia, Leshoto, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Rwanda, Sao Tome and Principe, Senegal, South Africa and Sudan. Countries which have not adopted quota policies are Chad, Ghana and Nigeria.

A T-test of the difference in sample mean is computed in order to assess whether there is a significant difference between countries which adopted quota policy and countries which did not adopt quota policy in terms of the percentage of women in primary house and the gender parity index in secondary school gross enrolment. Table 1 displays the results.

Table 1. Test of difference in sample mean between countries which adopted quota policy and countries which didn't

	Women political representation		Gender parity in secondary education	
	Quota	No quota	Quota	No quota
Mean	21.802	8.131	91.972	70.786
Difference	-13.671		-21.186	
T-statistic	-15.011		-6.062	

Source: Authors 'computation from data

The main observation drawn from this table is that there is a significant difference at the 1 per cent level between countries which adopted quota policy and countries which did not adopt quota policy in terms of the percentage of women in primary house and the gender parity index in secondary education. To be precise, countries which have not adopted quota policy have lesser women political representation than those which adopted quota policy (8 versus 22) and exhibit a lower gender parity index in secondary education. Considering a dummy variable which takes into consideration quota policies adoption help us to take into account some source of variation in women's political representation.

To take into account income heterogeneity, the sample is subdivided into two sub-samples: low-income countries and high-income countries. In this case, we use the World Bank 2021 classification by income. Low-income countries are the countries which are classified by the World as such. They are Burkina Faso, Burundi, Chad, Ethiopia, Malawi, Mali, Mozambique, Niger, Rwanda and Sudan. High income countries are countries which are classified by the World Bank as at least lower-middle-income economies. They are Cabo Verde, Cameroon, Ghana, Lesotho, Mauritania, Mauritius, Nigeria, Sao Tome and Principe, Senegal and South Africa.

Table 2 shows that countries which have high income have a higher gender parity index in the secondary education than those that have low income.

Table 2: Test of difference in sample mean between high income and low income

	Women political representation		Gender parity in secondary education	
	High income	Low income	High income	Low income
Mean	17.85581	21.69415	99.65334	78.01002
Difference	-3.838338		21.64332	
T-statistic	-2.7243		10.9503	

Source: Authors' computation from data

On the contrary, the results of the sample mean test show that women's political representation is lower in high income countries than in low-income ones. The equation (6) is re-estimated in both sub-samples.

The data used are annual and cover 20 SSA countries over the period 2000-2017 due to their availability. The explanatory variable of interest, women's political representation, is approximated by the percentage of female parliamentarians in the national parliament (lower house) and is from the Inter-Parliamentary Union (2020). The other variables come from the

World development indicators dataset of the World Bank (2020). Table 1 below summarises some descriptive statistics of the main variables used over the period 2000-2017.

Table 3: Descriptive statistics of the main variables

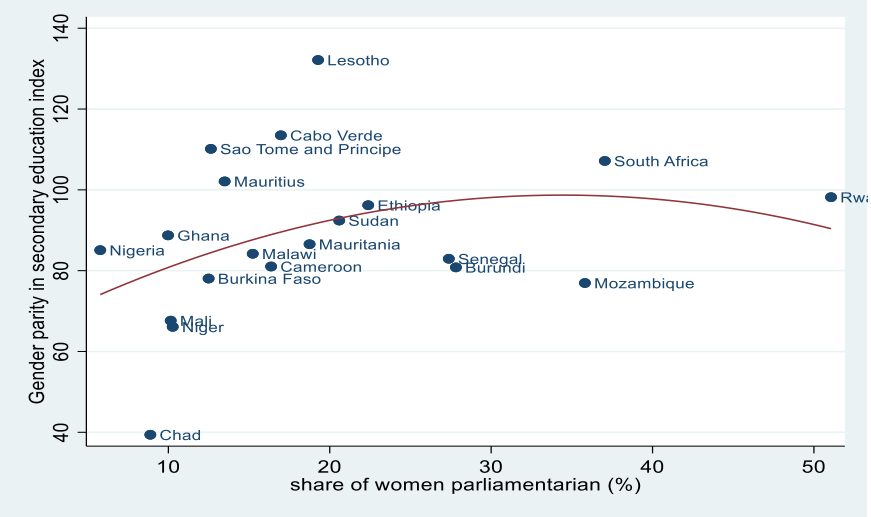
Variable	Obs.	Mean	Std. Dev.	Min	Max
gender parity in secondary school enrolment	327	88.732	20.886	28.660	138.830
Percentage of women in primary house (%)	343	19.769	13.1578	1.200	63.800
GDP per capita, PPP (current international $)	359	3579.223	3683.409	478.294	21415.1
Gross fixed capital formation (% of GDP)	325	21.772	8.0445	2.7811	59.723
Female Labour force (% of total labour force)	360	43.634	6.726	27.835	55.247
Total natural resources rents (% of GDP)	359	9.791	8.3174	.001	42.660
Urbanisation (% total population)	360	35.111	16.515	8.246	71.968

Source: Authors' computation from data

From table 3, it appears that during the period, the proportion of women parliamentarians ranged from 1.2 % in Niger between 2000 and 2003 to 63.8% in Rwanda between 2013 and 2016, for an average of 19.77%. The sample GESE index ranged from 28.66% in Chad in 2000 to 138.83 in Leshoto in 2010 with an average established at 88.73%.

Figure 1 shows a non-linear inverted U-shaped relationship between average gender parity in secondary education and the proportion of women parliamentarians over the period 2000 to 2017.

Figure 1: Humped-shaped correlation between women political representation and GESE index in SSA, 2000-2017



Source: Authors' computation from data

To estimate the parameters of the models, we first use robust ordinary least squares estimates (table 4). Second, as another robustness check, we use instrumental variables (IV)-two stages least squares (2SLS) as some variables may be endogenous (Table 5). For examples, women political representation and GDP per capita are endogenous due particularly to reverse causality. Following Atangana Ondoa (2018, 2019) endogenous variables are instrumented by their own lags.

Instruments should be correlated with the endogenous regressors, and they should be orthogonal to any other omitted characteristics and not correlated with the error terms in the equations. As Table 5 shows, the test of Sargan is not significant. In other words, the

instruments are not correlated with the error terms, meaning that the instruments are valid. In addition, the Kleibergen-Paap rk LM is significant at 1% (Table 5). For this reason, the null hypothesis that the first stage is under-identified can be rejected, so the instruments are correct.

3. Estimated effects of women political representation on gender parity in secondary education in sub-Saharan Africa

Tables 4 and 5 show the results of the estimates. These results robustly suggest that parliamentarian representation of women has a positive and statistically significant (at 1% level) effect on gender equality in secondary education in sub-Saharan Africa. These results do not qualitatively change even we consider the level of income. They do not also change qualitatively even if we estimate the equations with or without control variables and consider that women political representation has a non-monotonic relationship with gender equality in secondary education.

Table 4: OLS estimates of the effects of women political representation on gender parity in secondary education

Variables	Gender parity in secondary education							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Women political representation	0.484*** (0.086)	1.188*** (0.278)	0.871*** (0.232)	1.180*** (0.222)	1.161*** (0.229)	1.006*** (0.265)	0.878*** (0.251)	1.710*** (0.367)
(Women political representation)^2		-0.013*** (0.005)	-0.007* (0.004)	-0.011*** (0.004)	-0.011*** (0.004)	-0.009** (0.004)	-0.002 (0.004)	-0.021*** (0.008)
GDP per capita			0.001** (0.00)	0.001*** (0.000)				
Gross fixed capital formation				0.371*** (0.138)	0.338** (0.139)	0.349** (0.139)	-0.607*** (0.161)	1.072*** (0.163)
Female labour force			-0.151 (0.168)	-0.0158 (0.167)	-0.045 (0.169)	0.035 (0.182)	-0.862*** (0.183)	1.505*** (0.221)
Natural resource rents			-0.912*** (0.121)	-0.697*** (0.117)	-0.748*** (0.118)	-0.676*** (0.133)	-0.595*** (0.125)	-0.329** (0.134)
Urbanisation rate			0.271*** (0.067)	0.128* (0.073)	0.137* (0.074)	0.166** (0.077)	-0.257* (0.135)	-0.726*** (0.109)
GDP per capita(t-1)					0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.001)	0.002*** (0.000)
Quota policy adopted						4.044 (3.441)		
Constant	79.35*** (2.039)	72.70*** (3.216)	79.05*** (8.912)	59.53*** (9.748)	62.93*** (9.980)	56.03*** (11.57)	121.4*** (11.16)	12.03 (13.49)
Number of countries	20	20	20	19	19	19	10	9
Number of observations	312	312	312	283	270	270	149	121
R-squared	0.094	0.114	0.412	0.467	0.468	0.471	0.629	0.631
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: robust standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1. (7) Effects of women political representation on gender parity in secondary education in low-income countries in SSA. (8). Effects of women political representation on gender parity in secondary education in high-income countries in SSA.

Source: Authors 'computation from data

The results are also robust to the estimation techniques: OLS and IV-2SLS. As such, we find that a one unit increase in the proportion of women parliamentarians is associated with 0.484-1.710 units increase in gender equality in secondary education. The results robustly suggest that the increase in the proportion of seats held by women in national parliaments contributes significantly to the reduction of gender gap in secondary education in SSA.

Table 5: IV-2SLS estimates of the effects of women political representation on gender parity in secondary education

Variables	Gender parity in secondary education							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Women political representation	0.495*** (0.071)	1.322*** (0.323)	1.008*** (0.261)	1.150*** (0.240)	1.145*** (0.240)	1.098*** (0.311)	0.885*** (0.250)	1.522*** (0.496)
(Women political representation)^2		-0.014*** (0.005)	-0.009** (0.004)	-0.011*** (0.004)	-0.011*** (0.004)	-0.011** (0.005)	-0.002 (0.004)	-0.017* (0.009)
GDP per capita			0.001*** (0.000)	0.001*** (0.000)				
Gross fixed capital formation				0.594*** (0.194)	0.595*** (0.194)	0.597*** (0.192)	-0.495** (0.213)	1.176*** (0.184)
Female labour force			-0.237 (0.152)	0.111 (0.162)	0.108 (0.162)	0.127 (0.164)	-0.807*** (0.191)	1.497*** (0.267)
Natural resource rents			-0.928*** (0.133)	-0.794*** (0.135)	-0.798*** (0.135)	-0.778*** (0.152)	-0.625*** (0.131)	-0.322*** (0.120)
Urbanisation rate			0.265*** (0.050)	0.082 (0.071)	0.079 (0.071)	0.087 (0.085)	-0.357** (0.139)	-0.759*** (0.114)
GDP per capita(t-1)					0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Quota policy adopted						1.146 (4.523)		
Constant	79.47*** (2.221)	70.92*** (4.089)	81.72*** (8.399)	53.06*** (9.900)	53.39*** (9.871)	51.65*** (10.64)	118.8*** (13.04)	13.65 (16.47)
Number of countries	20	20	20	19	19	19	10	9
Observations	254	254	254	232	232	232	125	107
R-squared	0.096	0.121	0.459	0.490	0.490	0.490	0.667	0.637
F-statistic	1961.993	561.277	401.955	1.8e+04	1.9e+04	1.9e+04	6114.191	8040.225
Kleibergen-paap rk LM Statistic p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sargan J statistic p-value	0.414	0.280	0.424	0.361	0.361	0.379	0.318	0.165

Notes: robust standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1. (7) Effects of women political representation on gender parity in secondary education in low-income countries in SSA. (8). Effects of women political representation on gender parity in secondary education in high-income countries in SSA.

Source: Authors 'computation from data

They are in accordance with our theoretical expectations. Indeed, a close participation of women in the political sphere allows them to better articulate their interests so that they are taken into account in public policies (Hooda, 2016; Joshi and Yu, 2014). Therefore, as the politics of presence theory posits it, there is a close link between the number of women elected and the advancement of women's interests (Phillips, 1995). As collective political actors, elected women are more likely to speak, advocate, symbolise and act on behalf of women than their male counterparts, since they share, at least to some extent, the same experiences (Ng and Muntaner, 2018). Therefore, given the gap in secondary school enrolment in SSA, a better representation of women in decision-making spheres will result in

advocacy and actions in favour of reducing this gap. The results support the finding of Burchi (2013) and Burchi and Singh (2020) that female politicians pay more attention to the education of girls and women's political representation affects significantly more girls' than boys' education and therefore contributes towards alleviating the gender gap in education. Likewise, women parliamentarians holding political positions are seen as role models for other women. This increases their educational aspirations and achievements, and therefore improves female educational attainment levels and subsequently reduces gender gap in education (Beaman et *al*., 2012).

To test the hypothesis that women political representation has a non- monotonic relationship with gender equality in secondary education in SSA, the squared gender equality in secondary education is included as an explanatory variable. The quadratic term is negative in sign and significant in all regressions, except for low income SSA countries where the sign is negative and not significant (Tables 4 and 5). The result provides evidence of an inversed U-shaped relationship between women's political representation and the gender gap in secondary education. It suggests that although higher levels of women political representation are positively associated with gender equality in secondary education in SSA, the effect is not constant. The GESE index initially increases as the percentage of women in the primary house rises up, but starts decreasing after women's share in the primary house reaches a certain level. Considering equation (3) and columns 2 in tables 4 and 5 as main results, this level is between 45.69% (for OLS) and 47.21% (for IV-2SLS). We tested this hypothesis at least for another robustness checks. This relationship suggests that the marginal effect of women political representation exhibits decreasing returns for gender equality in secondary education.

The dummy variable related to quota policies adoption has the right positive sign but is not significant with both estimation methods. This result means that the adoption of the quota policies in favour of women does not influence the GESE if it does not translate into an increase in women parliamentarians.

For the rest of the control variables, only GDP per capita and natural resource rents has the right sign and are robust in all estimates. As it can be seen in Table 4 and 5, the coefficients associated with income per capita is positively associated with gender equality in secondary education. In some societies there is an asymmetry in parental incentives to educate their sons and daughters so that daughters lose out in the intrahousehold allocation of education (Kingdon, 2002). Since then, when parents' incomes are low and they are unable to meet the school fees of all children, the arbitration is in favour of the boys. But as incomes increase, girls are more likely to be enrolled like boys, thus reducing the enrolment gap in education. This result is in accordance with the findings of previous studies that increased income leads to greater investments in girls' schooling and improved gender equality in education (Anyanwu, 2016; Easterly, 1999; Glick and Sahn, 2000). However, it calls into question studies which have failed to detect a statistically significant link between income level and gender equality in education (Chen, 2004; Østby et *al*., 2016).

The coefficient of natural resources rents is negative and significant at conventional levels. The gender gap in secondary school enrolment widens with the share of natural resource rents in GDP. The result supports those of Schultz (2007) that a greater reliance on natural resources for exports is associated with greater gender inequality in terms of education.

4. Conclusion

This paper has analyzed the effect of women political empowerment on gender gap in secondary education in a sample of 20 SSA countries over the period 2000-2017. From the estimates made using OLS and IV-2SLS, it emerges that gender equality in secondary education improves with the proportion of seats in parliament occupied by women. Moreover, gross domestic product per capita favours gender parity in secondary education while natural resources rents widen gender gap. Our results suggest that in order to close the gender gap in secondary school enrolment in the region, women political empowerment is essential.

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Appendix 1.: List of countries

Burkina Faso, Burundi, Cabo Verde, Cameroon, Chad, Ethiopia, Ghana, Lesotho, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, South Africa and Sudan