Government Spending on Education and Closing the Gender Gap: The Case of Developing Economies

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Abstract

Within the context of the Sustainable Development Goals (SDGs), the gender equality in education is considered one of the most challenging goals for most developing economies. Using Panel Least Square with Regional Dummies (LSDV) for a sample of Developing countries over the period 1990 to 2014, the study estimates the factors responsible for possibly narrowing down the gender gap in education for the primary, secondary, and tertiary levels. More specifically, and among many other factors, the study focuses on the response of gender gap in education to economic growth, information communication technology (ICT), openness, and public spending on education, female population, and regional dummies to estimate their impact on closing the gender gap in education and provides predictions on the ability of these countries to close the gap by 2030 if they depend solely on government spending on education and no other factor. The results show that with about 14 years to go for the SDGs to be concluded, bridging the educational gap is still a challenging goal for many developing countries. For the off-track countries, increasing government spending only will not be enough to close the gender gap in education and has to be accompanied with other policies such as increasing economic growth and expanding the use of telephones, cell phones, and internet, in order to accelerate the closure the gender gap in education.

JEL classification: O1; O4; I2
Keywords: SDGs; Developing Countries; Government Spending; Development; Economic Growth

INTRODUCTION

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Globally, gender inequality in education is considered one of the main problems facing developing countries. Accordingly, within the context of the Sustainable Development Goals (SDGs), the gender equality in education is considered one of the most challenging goals for most developing Countries (united nation). There is no doubt on the importance of educating women. Educated women are more aware of their rights, can change the culture of the community against discrimination, and have more opportunities in the political field and in decision-making that affect their society. Educated mothers are more likely to bring up their children in better way, such as to supporting equality between sons and daughters in health care, food, and learning opportunities. The qualitative improvement and decrease in number of children due to low fertility rate among educated women contribute in building human capital that leads to poverty reduction and economic growth (Qaisrani & Ahmed 2014:6).

Despite the expected role of the economic growth in bridging the gender gap in education, large number of researchers highlights several factors that must complement economic growth in narrowing down the gender gap in education. Proponents of either ICT or public expenditure on education, argue that economic growth is achieved by facilitating and spreading access and widening infrastructures of ICT and increasing and spreading schools can ease access and improve the quality of education which all have statistically significant impact on gender gap in education. Supporters of globalization claim that economic growth needs to be complemented by openness, liberalization of trade, and international financial flows to increase the possibility of overcoming gender inequality in education. On the other hand, there are some doubts about the expected favorable effect on the gender gap. The economic growth will not achieve the aim of gender equality in education if there is a lack of adopting a redistributive social spending policy (Bourguignon, et al. 2008) or if the country is at the early stages of economic growth (Dollar & Gatti 1999:13). Globalization may put downward pressures on public spending, which negatively impact female education (Seguino 2007:1). ICT is still considered a luxury good for the majority of people in developing countries because of poor and costly infrastructure, illiteracy and other social obstacles (Gurumurthy 2004:23).

In general, economic growth is considered one of the main factors that have a positive impact on gender equality in education through poverty reduction and increasing job opportunities. On the other side, the economic growth increases the available recourses to the

government that can be allocated to support the poor and secure them against disease and hunger, which is reflected on the lives of families, including females (Duflo 2011) and accordingly helps in closing the gender gap (Seguino 2007:3). Furthermore, the neoclassical theory confirms that increasing economic growth provides more job opportunities for women and therefore reduces the gender gap. However, the theory does not take into account some of the social considerations, which are often a source of gender inequality (Kucuk 2013:76). Given that economic growth is not a sufficient condition to achieve better gender equity (Seguino 2006:24), waves of thinking begin on the theoretical level concerning other factors that can have an impact on gender equality in education.

For instance, ICT is considered a promising educational approach that can increase in the level of female education and thus reduce gender inequality. This can happen through two pathways: facilitating access to education and improving the quality of education. Access to education can be achieved through e-learning, by using Internet, radio, television, and video conferencing (Qaisrani & Ahmed 2014:5). Reliance on ICT in the education process is characterized by flexibility of access and studying times, as well as the availability of reaching women that are facing distant barriers in education especially in rural and remote places, and other social barriers that limit females to go to school (Chen 2004:10). Even if there no reliance on ICT as learning tools, it can be taken as a tool to spread awareness among the population about the importance of female education and to spread culture of equality and reduce discrimination against women, which is reflected positively on increasing female education (Gurumurthy 2004:39; Qaisrani & Ahmed 2014:5). In addition, the ICT has an essential role in improving the quality of education. Moreover, ICT contributes in the awareness of developed and modern teaching methods that will be reflected positively on the quality of education (Qaisrani & Ahmed 2014:5).

Despite the expected role of ICT in bridging the gender gap in education, the impact could be limited in many developing economies because of physical, cultural, and social obstacles. Accordingly, the government spending on public education is a key factor in increasing female enrollment in schools and thereby reduces the gender inequality in education. Given the fact that in countries where the number of children exceeds the capacity of schools, boys are often more likely to attend school. Any increase in government expenditure on school construction, which increases the capacity of schools to enroll children, will increase

especially girls as the boys are already enrolled in schools. On the other hand, studies have shown that female enrollment in school is sensitive to the cost of elementary education; therefore increased public education expenditures and providing subsidized educational services will increase female education. On the other side, increased public education expenditures will not help in closing the educational gap between males and females if spending is allocated to raise the quality and efficiency of the educational process (Chen 2004:10-12).

Furthermore, supporters of globalization argue that economic growth that is accompanied by trade liberalization, capital flows and openness will have greater favorable impact on gender equality (Seguino 2007:1). Trade liberalization and globalization increase trade opportunities and output (Arora 2012:148) that leads to the provision of job opportunities for women compared to men because of former competitive position in wages. This expected job opportunities encourages families and communities to invest more in women's human capital (Shultz 2006:7). Additionally, globalization implies opening new industries and new markets to accommodate products, which contributes in increasing wages and improving working conditions. However, in developing countries, there are doubts on the role of trade liberalization and globalization in closing gender gap due to institutional, economic and social factors. For instance, there is a limited impact of globalization on women's participation because of customs and cultures that control female's possibility to work or get education especially in rural areas (Arora 2012:148-150). Consequently, women tend to work in the informal sector, which is characterized by low barriers to entry and requiring less education, low skills, and low productivity. What makes matters worse is even for skilled and educated women; they are often employed in low-wage sectors such as the garment industry, where there is always discrimination in wages against married women (UNCTAD 2008:11-13). Moreover, reducing the role of the state in economic activity and thus lower government spending associated with globalization will reflect negatively on gender equality (Seguino 2007:1). The increase in exports of raw materials resulting from trade liberalization will be reflected negatively on health and education of women due to providing job opportunities for them since childhood in the form of needs low-skilled labor (Potrafke and Ursprung 2011:2; Shultz 2006:7). Based on above, it is difficult to predict the impact of globalization on gender equality in education.

In general there is a disagreement on what factors are more important for gender equality in education. The objective of this paper is to study the determinants of the gender gap in education for a group of 54 developing economies and to use the role of government spending on education to project the ability of these countries to close the gender gap by the year 2030, which is the conclusion of the SDGs. The paper is divided into five sections, literature review is presented in section 1, data and estimation methodology is explained section 2, and estimation results are discussed in section 3. Conclusion and policy implication of the study are presented in section 4. Finally, references and the appendix conclude the study.

I. LITERATURE REVIEW

Despite the lack of empirical studies that agree on the factors that reduces gender inequality in education, economic growth is a common factor in most of these studies. For instance, the paper by Dollar & Gatti (1999) finds the presence of a convex relation between economic growth and gender gap in education in secondary schools. The study finds limited impact of economic growth on gender inequality for countries moving from low-income to middle-income group, while there is positive impact for countries moving from middle-income to high-income group. The study also finds that religion, regional factors, and civil liberty are important in explaining the variability of gender inequality in education and health. The study concludes that gender inequality in education has a negative impact on economic growth.

Furthermore, the study of Forsythe, et al. (2003) examines the impact of economic growth on gender inequality for a group of developed and developing countries over the period 1974-1979. The study creates a gender inequality index that covers three dimensions of inequality namely education, health, and income. The results of the study indicate that the economic growth has significant positive impact on reducing gender inequality. In addition, the study finds that countries with higher gender inequality and lower per capita GDP at the beginning of the study period would experience the highest impact of growth on gender inequality. The study also concludes that government spending on education is the only factor that has a significant impact on reducing gender inequality especially in countries with relatively high public spending on education in year 1979. Finally, the study also finds that

the share of exports to GNP (as a proxy of globalization or integration with the world) has insignificant effect on the gender inequality.

Within the same lines, the study of Chen (2004) explains the mechanisms of impact of economic growth and ICT on the gender equality for a sample of 78 countries over the period 1960-2002. The study concludes that the impact of ICT is fundamental in achieving gender equality in education and employment. Moreover, the study emphasizes on the existence of a correlation between economic growth and gender equality, and thus the improvement of gender equality through ICT could lead to a series of counter improvements. On the other side, the study finds that government spending on education is insignificant in achieving gender equality in education.

The study of Gurumurthy (2004) shows that ICT contributes in social transformation and closing gender gap through the easiness of access, cheap, and efficient flow of information using digital technology. The study confirms the positive impact of ICT on gender equality in employment, health, and education. In the field of education, the study indicates that ICT allows the possibility of designing and delivering education in line with local preferences and priorities. In India, Azim Premji Foundation produces CD ROMs include attractive content for elementary school syllabus that took into consideration gender-sensitive and local dialects suitable for students in rural areas.

In addition, Shultz (2006) examines the relationship between trade liberalization and the gender inequality in education and health. The study indicates that trade restrictions in the form of tariffs, quotas, or foreign exchange distortions negatively affects women's education and health, but the liberalization and openness provide more job opportunities for women, which promotes greater educational enrollment and better health and thus helps in closing the gender inequality gap. Furthermore, the study of Qaisrani and Ahmed (2014) on a group of low middle-income countries over the period 2000-2010 concludes that ICT has a limited impact on gender equality in education due to the lack of available data, and inefficiency of the integration of ICTs in the community. Moreover, they conclude that economic growth has an insignificant impact on gender equality in primary education due the government's responsibility to provide free primary education through public spending on education and thus per capita income does not have an impact. The study shows that the average per capita income

has positive significant impact on gender equality in higher levels of education r to the fact that secondary and university levels education are relatively expensive. The study also concludes that public spending on education has significantly positive impact on gender equality in primary education, and the study attributes the results to the desire of governments to achieve the Millennium Development Goals (MDGs) to provide primary education for all and free of charge. The study finds that the average schooling of adult population is the most important factor on gender equality and that gender equality at low levels of education has a greater impact on economic growth as compared to high levels of education. Within the same lines, the study of Seguino (2006) conducted on 101 countries over the years 1980-1985 to examine the relation between economic growth and gender equality index introduced by Dijkstra (2002) which covers five dimensions of gender gap in education, life expectancy, senior positions, participation in the labor force, and parliamentary seats. The study concludes that economic growth is negatively correlated with gender equality in countries which are located in the first and second quartile, while positively correlated in countries located in the third and fourth quartile. At the sub-national level, Arora (2012) finds difference in the impact of economic growth and globalization on gender inequality among the Indian states due to inter-regional disparities. Although the study finds an inverse relationship between per capita GDP and gender inequality, some states were found to have high per capita GDP coincided with high level of gender inequality. For openness, the study finds that most states characterized by high globalization index have high gender inequality. Furthermore the study of Baliamoune-Lutz (2007) uses literacy as an indicator of gender equality for a group of 62 countries over the period 1990-1999. The study concludes that the economic growth and globalization have significant negative impact in Sub-Saharan African countries and an insignificant effect on non - Sub Saharan African. In line with this study, Seguino (2007) conducts a study on 21 Latin America and Caribbean countries over the period 1970 - 2000 to estimate the impact of economic growth on gender equality. The study uses ratio of female to male and the gross secondary school enrollment rate as criteria for gender equality. The study concludes that the economic growth has an insignificant effect on gender equality in education. The study also finds that globalization and openness, which is expressed by exports annual growth rate, and the ratio of total exports and imports to GDP, has a negative statically significant impact on gender equality in education, while the effect is insignificant for government spending annual

growth rate. Finally, in a study on the Middle East and North African (MENA) Countries over the period 1990-2007, Emara (2014) emphasizes that the countries under study do not have the ability to achieve the MDGs of gender gap in education by 2015 if they depend only on economic growth and not other factors. The study asserts the importance of stimulating international trade, infrastructure spending, and government spending on education as complementary factors to economic growth.

II. DATA & METHODOLOGY

The data set consist of 54 developing economies and constructed as a panel of country observations collected from the World Development Indicators of the World Bank's database over the period 1990-2014. The list of countries included in the sample is reported in Table 1 of the appendix. The three indices of the GPI in primary, secondary, and tertiary educational enrollment are defined by the United Nations as the "*Ratio of girls to boys (gender parity index) in primary, secondary and tertiary education is the ratio of the number of female students enrolled at primary, secondary and tertiary levels of education to the number of male students in each level*."

The data set includes the total government spending on education (as a percent of GDP), growth rate of GDP (constant 2010 US dollars), openness variable measured as the sum of exports and imports as a percent of GDP, ICT variable measured using the principal component analysis of three ICT variables including fixed telephone subscriptions (per 100 people), internet users (per 100 people), and mobile cellular subscriptions (per 100 people). The data set also includes female population (as a percent of total population) and a regional dummy that takes 1 for Europe, Middle East, and North African (EMEA) countries, 2 for Latin American countries, and 3 for Asian countries.

Using Panel Least Squares with regional dummy the gender parity index is estimated for the sample of 54 developing countries. Following the same methodology of Panda and Kumar (2007) and applied in Emara (2014), we analyze the extent to which government spending in education is sufficient for achieving the gender parity in our sample of developing countries by the conclusion of SDGs in the year 2030. The base model is represented by Equation (1) to estimate the determinants of the gender parity index.

$$GPI_{i,t} = \beta_0 + \beta_1 CV_{i,t} + d_i + \varepsilon_{i,t} \qquad (1)$$

The variable $GPI_{i,t}$ is the gender parity index defined as primary (GPIP), secondary (GPIS), and tertiary (GPIT) school enrollment. The variable $CV_{i,t}$ is the set of control variables including government spending on education (as a percent of GDP), GDP growth rate, the openness measure, the ICT variable, and female population. The variable d_i represents regional dummy. The subscripts i and t represent the country and the time period, respectively. Next, in order to project the gender parity index for the year 2030, the following computation is used,

$$GPI_{2030} = GPI_l(1 + b\beta)^{2030-k} \qquad (2)$$

where GPI_{2030} is the gender parity index in the year 2030, GPI_l is the latest value of the index (or year 2014 for the majority of countries in the sample), β is the coefficient of government spending on education estimated from our results of Table 1 below, and k is the years left until 2030, which is sixteen years based on our latest available data for the majority of countries in the sample. The coefficient b is the government spending on education growth rate over the period 1990-2014 computed using the following semi-log trend function,

$$GSE_t = a + bt \qquad (3)$$

Where GSE_t is the government spending on education (as a percent of GDP), a is the constant of the equation, and t is the years from 1990 to 2014. Finally, to close the gender gap in education, the required yearly growth in government spending (as a percent of GDP) is computed as follows,

$$b_{req} = \left[\left(\frac{GPI_{2030}}{GPI_l} \right)^{1/(2030-k)} - 1 \right] \div \beta \qquad (4)$$

where the definition of the coefficient is the same as previously defined in Equation 2.

III. ESTIMATION RESULTS

The model in Equation (1) is estimated for each GPI in a turn. As the results of Table (1) shows, economic growth has a positive statistical significant impact on bridging the gender gap for the three levels of education. More specifically, a one percent increase in economic growth leads to an increase of 0.00068, 0.00768, and 0.0687 percent in the GPIP, GPIS, and GPIT, respectively. Furthermore, the results shows that the increase in government spending on education has a statistical significant positive impact on the gender parity index for the three levels of education. For instance the government spending on education coefficients are 0.00542, 0.00789, and 0.0971 percent for the GPIP, GPIS, and GPIT, respectively. In addition, the openness index shows a statistically insignificant impact on the gender gap for the three levels of education under study. On the other hand, the ICT index shows a positive significant impact on closing the gender gap for the three levels of education. For instance, a one-unit increase in the ICT variable leads to an increase by 0.0272, 0.0353, and 0.515 for the GPIP, GPIS, and GPIT, respectively. Next, the coefficient of female population shows that the increase in female population (as percent of total population) increases school enrollment for the three levels of education. More specifically, a one percent increase in female population increases the gender parity indices by 0.0179, 0.0185, and 0.00742 for GPIP, GPIS, and GPIT, respectively. Finally, the results show that there is a significant regional effect for the primary and the tertiary levels but not on the secondary level between the set of developing countries in the sample. Finally, the R-square shows that all regressors have high explanation to the variability of the three gender parity indices.

Next, using the results of Table 1 and following the approach of Panda and Kumar's (2007), a gap analysis is performed to explore the extent to which the increase in government spending on education (as a percent of GDP) can close the gender gap in education by the year 2030. In general, the results of the gap analysis suggest that most of the countries in the sample will be able to close the gap by the year 2030, however many countries will lag behind especially on the primary level of education. More specifically, the results of Table 3 of the appendix shows the gap analysis for the off-track countries for the GPIP, where thirty countries out of the fifty-four countries in the sample will not be able to close the gap on the primary level of education by 2030 if they depend only on government spending on education and not other factor.

Table 1: Gender Parity Models

VARIABLES	(1) GPIP	(2) GPIS	(3) GPIT
Econ. Growth	0.00648***	0.00768***	0.0687***
	(0.00168)	(0.00270)	(0.0169)
Government Sending on Education	0.00542*** (0.00145)	0.00789*** (0.00303)	0.0971*** (0.0181)
Openness	0.00663	-0.009.76	-0.0396
	(0.00968)	(0.00776)	(0.00550)
ICT	0.0272***	0.0353**	0.515***
	(0.00008)	(0.000141)	(0.00139)
Female Population	0.0179*** (0.000325)	0.0185*** (0.000547)	0.00742* (0.00350)
Regional Dummy	0.00786**	0.00593	-0.0692**
	(0.00343)	(0.00736)	(0.0316)
Observations	489	472	412
R-squared	0.996	0.987	0.757

Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in round parentheses (.) are the robust standard errors.

Countries such as Yemen, Djibouti, Panama, Kuwait, Hungary, will perform even worse on in terms of primary enrollment of girls by the year 2030 then their latest available levels. Some other group of countries such as Iraq, Lebanon, South Africa, and Libya are projected to have no change at all in their GPIP from their latest. Few countries on this table show a slight improvement in the GPIP by the year 2030 such as Dominican Republic, Algeria, Qatar, Morocco, and few others. Table 4 shows the required growth in government spending for this group of countries[2] in order to close the gender gap in education by 2030. For example, the results suggest that Yemen would require an increase of about 2.5% per year of government spending on education (as a percent of GDP) in order to close the gender gap by the year 2030. This number is about 1.82% for Djibouti, 0.39% for Panama, 0.27% for Kuwait, and 0.17% for Hungary. Similarly Table 5 shows that based on the projection of GPIS, only 14 countries in our sample will be off-track by the conclusion of the SDGs in the year 2030. For instance, the GPIS is projected to be only 0.63 for Yemen, 0.75 for Iraq, 0.77 for Saudi Arabia, 0.79 for Djibouti, and 0.86 for Morocco, with again Yemen and Djibouti performing even worse than their latest available GPIS values. For Yemen, closing the education gap for the secondary level by the year 2030 would require an increase of about 3.4% per year in government spending on education (as a percent of GDP) as shown in Table 6. This number is about 2.11%, 1.91%, and 1.07% for Saudi Arabia, Djibouti, and Morocco,

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[2] Data on government spending on education (as a percent of GDP) is not available for Iraq, Libya, and West Bank & Gaza

respectively. Finally, Table 7 shows that only 10 countries will be off-track for the GPIT by the conclusion of the SDGs, where again Yemen, Djibouti, and Iraq are on the top of the list. For example, by the year 2030 the GPIT is projected to be 0.13, 0.44, 0.60, and 0.69 for Yemen, Djibouti, Iraq, and Kuwait, respectively. As shown on Table 8, the increase in government spending on education (as a percent of GDP) is projected at about 1.10%, 0.45%, 0.22% and 0.12% per year for Yemen, Djibouti, Kuwait, and Korea, respectively.

IV. CONCLUSION

Using the government spending on education coefficient to project the performance of developing countries over the next 14 years, the study finds that the majority of countries will not be able to close the gender gap in education on the primary level if they depend solely on government spending on education. The results are more pormising for the secondary and tertiary levels of education where the majority of countries will be able to close the gap by the conclusion of the SDGs. More specifically, using the growth in governemnt spending to project the levels of GPIP, GPIS, and GPIT and to estimate the required increase in government spending needed to close the gender gap in education by the conclusion of the SDGs in the year 2030, the results shows that thirty countries will be off-track for the GPIP, fourteen countries will be off-track for the GPIS, and only ten countries will be off-track for the GPIT if the countries depend only on government spending on education and not other factors. Furthermore, the results of the gap analysis suggest that bridging educational gap requires increasing government expenditure on education over the coming fourteen years. For instance, for the most off-track country in the sample, Yemen, the required yearly increase in government spending on education (as a percent of GDP) is about 2.54%, 3.47%, and 1.10% for the primary, secondary, and tertiary levels of education respectively. Similarly, a country such as Djibouti would require an increase of about 1.82%, 1.91%, and only 0.45% yearly for the primary, secondary, and tertiary levels of education respectively. As a policy implication of the study, for the off-track developing countries, bridging the educational gap by 2030 would require a whole set of policies that combines not only the increase in government spending on education but also the provision of ICT infrastructure especially in rural and remote areas for closing the gender gap in education

which works hand in hand with other policies for stimulating economic growth. Achieving high rate of growth is essential to raise the standard of living, provide greater employment opportunities and increase government resources that encourage the community to invest in women.

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