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EDITORIAL

Ce premier numéro de l'année 2016 est toujours sous le sceau de la persévérance. La recherche en sciences économique poursuit son bonhomme de chemin. Par ce numéro le CEDRES réaffirme sa régularité et son positionnement comme revue de qualité aussi bien sur les questions traitées que sur le modèle de publication. Le numéro 61 paraît avec quatre articles. Il est varié dans ses spécialités avec des sujets portant sur la croissance, l'éducation et le genre, la gestion des déchets urbains .

Le premier article, de Allé Nar Diop (Université Cheick Anta Diop) traite des questions de répartition des fruits de la croissance au Sénégal. L'auteur montre que la croissance ne contribue pas à réduire la pauvreté mais relève que la croissance pro-pauvre est au rendez-vous sur la période 2005 à 2011. Diop souhaite une plus grande redistribution des fruits de la croissance en faveur du monde rural.

Le deuxième article revient sur l'éducation, le genre et l'équité. L'auteur Eugénie Maïga (Université de Koudougou), évoque la capacité de l'aide étrangère à favoriser l'égalité des sexes en matière d'éducation dans les pays en développement. L'auteur montre, d'une part, que l'aide globale affectée à l'éducation n'a aucun effet sur la parité au primaire mais a des effets négatifs sur la parité des sexes au secondaire et supérieur et d'autre part les aides spécifiques n'ont aucun impact spécifique quel que soit le niveau d'études.

Le troisième article est l'œuvre de Safiétou Sanfo (Université Ouaga2). Elle aborde la question environnementale de l'organisation de la pré-collecte des déchets en milieu urbain. Par ses travaux, l'auteur montre que c'est un secteur peu formel et inefficace dans l'atteinte des objectifs de salubrité mais aussi dans l'amélioration du pouvoir d'achat des employés.

Le dernier article de ce numéro traite de l'exploitation du cacao en côte d'ivoire selon les origines des exploitants et des mesures d'adaptation aux perturbations qu'a connu le secteur. Il met en lumière les problèmes sociaux entre populations d'origine burkinabè et autochtones et les effets des changements climatiques sur les performances du secteur.

Pr Idrissa OUEDRAOGO
Directeur de Publication

Foreign aid in education and gender equality in developing countries

Eugenie W. H. Maïga

Abstract

This paper examines the impact of foreign aid on gender equality in education outcomes in developing countries. Heterogeneity effects by type of aid received and by type of recipients are investigated using system GMM methods. The results indicate that aggregate aid disbursements to the education sector negatively affect gender parity in enrolment at the secondary and tertiary education levels and have no impact on gender parity in primary education. No impact of subsector specific aid was found. Heterogeneity in aid recipient type does not seem to matter. The same goes for heterogeneity in aid flows.

JEL: I20, F35, J16,

Keywords: Education, Foreign Aid, Gender

FOREIGN AID IN EDUCATION AND GENDER EQUALITY IN DEVELOPING COUNTRIES

Introduction

Gender gaps have received a great deal of attention in the development literature for many years and continue to be the focus of policy makers worldwide. One of the Millennium Development Goals is targeted at reducing gender inequality in education. One of the reasons for targeting gender inequality is that the literature has established the importance of education gender equality on economic growth. Indeed, gender equality has been shown to have direct as well as indirect impacts (through investment and population growth) on economic growth (Klasen, 2002). Data from World Development Indicators show that the range of the ratio of youth literate female to male increased from 41.7%-103.3% to 60.2%-110.6% between 2000 and 2010 across 100 developing countries. Could this be due to the increase in total aid disbursements to education worldwide, which reached 13.5 billion US dollars in 2010, up from 7.6 billion US dollars in 2002 (EFA[1], Global Monitoring Report 2012, Table 2.2) ?

The aid effectiveness debate is a long standing one and the jury is still out on that question (Sachs, 2005, Easterly, 2006, Collier, 2008, Moyo, 2009, Harford, 2011)). What is agreed upon is that large amounts of aid money were disbursed (two trillion US dollars in sixty years) to help developing countries, and a significant share (11% of total aid in 2010, EFA, Global Monitoring Report, 2012) went to education programs. The use of aggregate aid data to investigate the effectiveness of aid has been criticized, as it is thought to be the reason for inconclusive results (Asiedu and Nandwa, 2007; Dreher et. al 2008). Therefore it is important to look at the impact of aid on specific sectors such as the education sector that significantly benefited from it. Dreher et. al. (2008) and Michaelowa and Weber (2006) looked at the impact of aid flows to the education sector on education outcomes such as enrolment and completion rates. Both studies found that foreign aid significantly increases primary school enrolment and the second study also found a positive impact on completion rates. But these studies did not look at whether aid helped close gender gaps in education.

Only one study, by Breitwieser and Wick (2013), has systematically examined the impact of aid on the female to male ratio in primary and secondary school, among other outcomes. But this paper did not address heterogeneity in aid recipients and in type of aid flows. The current paper intends to fill this gap in the literature by measuring the impact of foreign aid on the changes in the education gender inequality in developing countries. This will be done by attempting to provide answers to the following questions. Does foreign aid to education affect the education gender parity in aid-receiving countries? Is the impact of foreign aid for education on the education gender parity different for low income and middle income countries? Does aid have different effects by level of education (e.g., primary, secondary or higher education)?

1 Education For All

The remainder of the paper is organized as follows. Past literature findings are reviewed in Section 2. Methodology and Data are described in Section 3. The results are presented in Section 4 and their sensitivity to various robustness checks in Section 5. A discussion of the main findings is provided in Section 6. Policy implications and recommendations for future research are discussed in Section 7 which concludes the paper.

1- **Literature Review**

Data from the Gender Statistics database of the World Bank show that net enrolment rates in primary school averaged 81.4% for males and 77.6% for females in 2011 while completion rates were 66.3% and 61% for the group of least developed countries (United Nations, UN classification). For secondary and higher education the net enrolment rates were 36.0% versus 29.7% and 10.2% versus 6.3% during the same year and for the same group of countries confirming the existence of gender gaps at all levels of education.

In the economics literature there has been very little empirical analysis that uses the education gender gap as the outcome of interest. One study from the education literature that addresses the education gender gap as the outcome of interest is Leach (1998), who looked at the causes for both the persistent gender gap in education in developing countries and the low impact of education on women's status in society. Leach identifies the 1970s as the point when gender imbalance in all education participation indicators (access, retention and achievement) was acknowledged but not made a priority by governments, who instead focused on rapid economic development through the predominantly male workforce. It was the donors who pushed for policy reforms to target girls in education, under the pressure of women's groups from their countries who wanted to put the limelight on the worldwide oppression of women. The consequences of gender inequality in education are low participation in the formal labour market and in community affairs, both of which are status-enhancing in the society. She argues that the type of education provided to girls, namely the gender biases hidden in the school curriculum in many countries, does not increase their status in society. Leach concludes that failure by governments to tackle the underlying causes of gender inequalities in education and failure by donors to push governments to do so hinder the narrowing of the education gender gap.

Leach (2000) also examined the gender implications of education and training policies followed by development agencies. She argues that "Decentralisation of educational financing and control, the introduction of cost-sharing mechanisms and community involvement in the running of schools, the privatisation and deregulation of training, are all likely to undermine the most urgent task of increasing girls' participation in education". She concludes that it is improbable that donors would advocate the policies needed to achieve all-encompassing social and educational change.

Closest to the topic of this paper is the study by Breitwieser and Wick (2013) who looked at the impact of aggregate aid commitments on the female to male ratio in primary and secondary school among other outcomes. They found that when the observed sample is used the ratio is positively affected by aid but when the imputed sample is used the aid variable loses significance. The authors used aggregate aid commitment data because using sector aid disbursement would reduce the sample size since aid disbursement is only available from 1990 onwards. However, aid commitment and aid disbursement can differ significantly and it is actual disbursements that one would expect to be more relevant for impact analysis. The amount of aid donors commit to give to developing countries is not what they actually disburse. It is important to use aid disbursement data because that is the actual amount that is available for use by policy makers in developing countries to try to improve the targeted outcomes.

Other relevant studies from the economics literature are those that have looked at the impact of foreign aid on school enrolment and completion rates. Some studies used aid commitment data only (Wolf, 2007), while others used both aid commitment and disbursement data (Dreher et. al., 2008 and Michaelowa and Weber, 2006). Wolf (2007) looked at the impact of aid on public service delivery outcomes for health, education and water and sanitation. The results for education show a positive and significant impact of the share of official development assistance (ODA) devoted to education on primary school completion rates and youth literacy. However, these results are not robust across all specifications.

Michaelowa and Weber (2008) also used both aid commitment and aid disbursement data. They found a positive impact of aid on education outcomes in only one out of five specifications when commitment data are used. When disbursement data are used, the aid variable is significant in four specifications. Dreher et. al. (2008) argue that the studies by Wolf (2007) and Michaelowa and Weber (2006) results are inconclusive since they are not robust to the specification used. However, the results from both Dreher et. al. (2008) and Michaelowa and Weber (2006) studies may be misleading because they used disbursement data prior to 2002. According to the Organization for Economic Cooperation and Development (OECD), aid disbursement data prior to 2002 are not reliable because of significant underreporting, thus the database now provides disbursement data from 2002 onwards only. In addition, as Asiedu and Nandwa (2007) point out, aid commitment amounts can differ significantly from disbursements and time lags between commitment and disbursement can lead to biases in analyses that use four or five- year averages of the data.

Dreher et. al. (2008) examine the link between foreign aid to education and education outcomes in 96 developing countries using 1970-2004 aid data from the OECD and education data from the World Bank. They found that education aid per capita significantly and positively affect school enrolment and the findings are robust to a variety of estimation methods (fixed-effects, system GMM, and 2SLS) and to the set of explanatory variables used. They used both aid commitments and aid disbursements data (available starting in 1990) in their analysis. They found that the aid commitment variable is significant while the aid disbursement one is not which is counterintuitive since one would expect aid disbursements (actual amount countries received) to be

significant rather than aid commitments which are not always honoured by donors. Given that disbursements are what the countries actually receive and from which they spend to try to improve outcomes of interest, this paper will use aid disbursement data only in the regressions.

1- **Methodology, Data, and Descriptive Statistics**

2.1. Methodology

Gender parity in enrolment at all levels of education combined and at each level of education (primary, secondary and tertiary), are the dependent variables in this study. The explanatory variables are selected by closely following previous studies on aid and education outcomes (especially Michaelowa and Weber, 2006, and Dreher et. al., 2008). The supply side regressors are per pupil aid disbursements for education and public expenditure per pupil (per cent of GDP per capita) at the different levels of education. The demand-side variables are GDP per capita, the share of the population under 25, the urbanization rate, the mortality rate of children under five years of age and the adult literacy rate. The equation to be estimated is the following :

$$GPI_{i,t} = \beta_0 + \beta_1 GPI_{i,t-1} + \beta_2 aid\_pp_{i,t} + \beta_3 edu\_\exp\_pp_{i,t} + \gamma \boldsymbol{X} + \delta_i + \varepsilon_{i,t} \quad (1)$$

where $GPI_{i,t}$ is the gender parity index for country i in year t, $GPI_{i,t-1}$ is the lagged value of GPI, $aid\_pp_{i,t}$ is education aid disbursements per pupil, $edu\_exp\_pp_{i,t}$ is per pupil government expenditure on education, X is a matrix of demand side variables δ_i represents country fixed effects and $\varepsilon_{i,t}$ is an error term. The lagged dependent variable is included to test for persistence in outcome (Dreher et. al, 2008). The variable definitions and data sources are given in Table A.1 in the Appendix.

The data for this study are panel data for 142 aid-receiving countries for the period 2002 to 2011, the period for which aid disbursement data are reliable. Potential problems that may arise when estimating the model in Equation (1) include unobserved country-specific factors bias, endogeneity of aid flows, heteroskedasticity and autocorrelation within countries.

To overcome these issues, it is recommended to use dynamic panel Generalized Methods of Moments (GMM) estimators. Two estimators are available: the difference GMM estimator proposed by Arellano and Bond (1991) and the system GMM estimator proposed by Arellano and Bover (1995) and Bundell and Bond (1998). The first estimator uses lagged levels of first differences of the variables as instruments but Arellano and Bover (1995) showed that lagged levels can be poor instruments for first differences. Thus, they proposed the system GMM estimator which is an augmented version of the difference GMM estimator in that it combines both level and first difference equations and this estimator also reduce finite sample bias by making use of additional moment conditions (Asiedu and Nandwa, 2007). Both estimators come with an autocorrelation test suitable for linear GMM regressions on panel data (Roodman, 2006).

One issue with estimating annual panel GMM estimation is the issue of year-to-year fluctuations in the data which can bias the results. A way of getting around this issue is to use three or five-year averages of the data but the 10 year panel is too short to compute such averages. Therefore, all results from this paper would have to be interpreted with this caveat in mind. In addition, not being able to use five-year averages of the data given the short time dimension leads to significant loss of observations when some variables with large number of missing values are included in the model (e.g. adult literacy).

One would expect that the more money a government spends on education (for example, to eliminate school fees), the better chance girls would have to attend school, therefore the lower the gender gap would be. More spending on education would increase boys' chances of going to school as well. However boys are closer to the "upper bound" of 100% enrollment, so there is more room for improvement for girls than for boys. In addition, it has been shown in previous studies that foreign aid in education has a positive impact on education outcomes and on economic growth (Dreher et. al. 2008, Asiedu and Nandwa, 2007). Thus, a positive relationship between foreign aid in education and gender equality is expected.

2.2. Data

Description.

The data are drawn from two main sources, the International Development Statistics (IDS) compiled by the Development Assistance Committee (DAC) secretariat of the OECD for the education aid data, and the World Bank databases (Education Statistics-All Indicators and the World Development Indicators (WDI)) for the education gender parity and other variables. Sources for the sensitivity analysis variables include the Freedom House for the democracy index, the International Crisis Group (ICRG) for government stability, and Gwartney et.al (2012) for the economic freedom index.

Issues.

As explained above, disbursement data prior to 2002 is not reliable. Thus, the empirical analysis for disbursement data only covers 10 years, 2002 to 2011. There are 142 developing countries that received education aid during that period and this number constitutes the maximum included in the regressions. Missing values exist for both dependent and explanatory variables resulting in serious attrition when certain variables are included in the regression or when the data is split into low income and middle income sub-samples. Therefore, instead of splitting the sample into low and middle income groups an interaction term between the education aid variable and the GDP per capita variable is used to assess whether heterogeneity in aid recipients matters. A positive coefficient on the interaction variable would suggest that countries with higher income per capita have better education gender parity outcomes.

Descriptive statistics.

Table 1 present the descriptive statistics of all variables included in the model. The dependent variables are gender parity in gross enrolment rates at all levels of education combined, and at the primary, secondary and tertiary education levels. The explanatory variables are income per capita measured by GDP per capita PPP (US $ 2005), per pupil foreign aid in education, share of population between under 25 years of age, urbanization rate, adult literacy rate, mortality rate of children under five years of age, and public expenditure per pupil at the different levels of education (per cent of GDP) are used as explanatory variables. The average of gender parity in gross enrolment at all levels of education combined is 66.7%. Gender parity in primary education enrolment averaged 94.4% and gender parity in secondary education is slightly higher at 94.8%. For tertiary education gender parity seems to favour girls with a high average of 102.9 % and indexes as high as 338.5 % (St. Lucia[1], 2004). For the countries that are below parity, the average gender parity in enrolment in tertiary education is 62.1%. Total education aid per pupil averaged $1.15 across all countries in the sample. Sector-specific aid per pupil averaged $2.23 for primary education, $4.22 for secondary education and $40.8 for tertiary education suggesting that for the period 2002-2011 donors are shifting toward supporting higher levels of education.

1 One value of gender parity in tertiary education enrolment was as high as 530.6 % (St. Lucia, 2006) and was set to missing because the index jumped from 271.9 the previous year to 530.6 in 2006 and decreased to 233.3 in 2007 suggesting that the 2006 value is an outlier

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Observations
Dependent variables					
GPI all levels	67.66	15.50	0.53	96.68	683
GPI primary	94.44	8.38	43.95	126.05	1,100
GPI secondary	94.76	18.37	20.96	139.79	948
GPI tertiary	102.89	46.69	6.40	338.47	742
GPI tertiary[a]	62.1	22.6	6.40	99.9	335
GPI youth literacy	94.45	11.50	44.23	115.58	239
Regressors					
Aid per pupil, all levels	1.15	3.26	0.0001	29.34	703
Aid per pupil, primary	2.23	8.35	0.0006	183.29	1,147
Aid per pupil, secondary	4.22	12.38	0.0004	96.35	979
Aid per pupil, tertiary	40.81	188.56	0.0004	3904.11	825
GDP per capita	5,297	5,001	249	31,969	1,302
Expenditure per pupil, all levels	4.59	2.15	0.60	16.06	690
Expenditure per pupil, primary	0.14	0.08	0.02	0.62	450
Expenditure per pupil, secondary	0.20	0.12	0.03	0.85	384
Expenditure per pupil, tertiary	0.09	0.18	0.00	1.82	405
Adult literacy	79.04	19.71	21.82	100.00	242
Urban population,	47.13	20.45	8.70	93.50	1,410
Population under 25	55.35	10.36	26.99	73.11	1,324
Pupil-teacher ratio, primary	31.36	14.84	7.84	100.24	970
Pupil-teacher ratio, secondary	21.32	8.82	6.67	80.05	705
Under 5 mortality rate	60.30	50.50	5.1	230	1,410
Economic freedom index	6.38	0.84	2.88	8.05	639
Government stability index	8.66	1.48	4.5	11	790
Democracy index	0.22	1.52	-3	3	790

a: Average gender parity index for values less than or equal to perfect parity (100).

1- Results

All regressions are estimated using system GMM methods to address the finite sample bias which is likely in our short panel (T=10). Using a threshold of 0.6, correlation coefficients between adult literacy rate and under 5 mortality (rho=0.81) and adult literacy and population under 25 (0.69) are high. Moreover, adult literacy with a sample size of only 242 out of a possible total of 1,420 causes serious attrition in the sample. Consequently, adult literacy is excluded from the regressions.

Lagged aid and lagged expenditure per pupil are used as instruments for aid and expenditure per pupil in all regressions. The two-step estimator with Windmeijer-corrected cluster-robust errors and orthogonal deviations are used to estimate all regressions. Windmeijer correction is needed to prevent the downward bias of standard errors in finite samples (Windmeijer, 2005).

Orthogonal deviations transformation of the data is used rather first difference since the latter exacerbates sample size loss in in panels with gaps (Roodman 2006). In all tables of this section, the results of focus are those in Columns 1 and 3.

3.1. Impact of aid on gender parity in enrollment at all levels of education combined

Table 2 presents the results of the system GMM regression of gender parity in enrolment at all levels of education combined on aggregate aid to education and on expenditure per pupil at all levels of education combined. The only statistically significant variable in Column 1 is the lagged dependent variable whose coefficient and significance level (1%) suggest persistence in outcome for the GPI at all levels of education combined. The coefficient of the education aid variable is positive but not statistically significant. The coefficient of the expenditure variable per pupil is negative but insignificant.

To assess whether aid to education affects countries with different income status differently, an interaction term between total aid to education and GDP per capita was added to the model. The results in Column 2 show no change compared to Column 1, meaning the only statistically significant variable is the lagged dependent variable. The interaction variable has a positive coefficient but it is not statistically significant. Both regressions pass the Hansen J test of overidentifying restrictions with p-values of 0.751 (Column 1) and 0.718 (Column 2). The Arellano-Bond tests of second order autocorrelation of residuals yield p-values of 0.522 and 0.535. These results imply the absence of second order autocorrelation in the two regressions. In addition, the instrument set passes the test of exogeneity (Difference-in Hansen test) in both regressions with p-values of 0.956 and 0.956, confirming the validity of the instruments.

Table 2 : Results of System GMM regressions of gender parity at all levels of education on total aid to education

VARIABLES	(1) Log GPI at all levels	(2) Log GPI at all levels
Lagged dependent	0.9645***	0.9666***
	(0.091)	(0.086)
Expenditure per pupil	-0.0088	-0.0090
	(0.006)	(0.006)
Total education aid per pupil	0.0022	0.0010
	(0.002)	(0.003)
GDP per capita	0.0153	0.0171
	(0.141)	(0.131)
Urbanization rate	0.0166	0.0192
	(0.035)	(0.038)
Population under 25	-0.0371	-0.0319
	(0.045)	(0.045)
Under 5 mortality	0.0216	0.0221
	(0.025)	(0.024)
Aid*GDP per capita		0.0108
		(0.034)
Observations	270	270
Number of countries	72	72
Number of instruments	29	30
Hansen J test p-value	0.751	0.718
Difference-in-Hansen test p-value	0.956	0.952
AR1 test p-value	0.001	0.001
AR2 test p=value	0.522	0.535

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.2. Impact of aid on gender parity in primary education

Total aid to education is used as the aid variable in the regressions presented in Columns 1 and 2 of Table 3 while primary education aid is the aid variable in Columns 3 and 4. Across all four regressions, the coefficient of the lagged dependent variable is positive and highly significant, suggesting persistence in outcome for gender parity in primary school enrolment. In Column 1, the coefficient of expenditure per pupil at all levels of education combined is strongly significant with a positive effect on gender parity while total education aid is negative and insignificant. Heterogeneity in aid recipients is assessed in Column 2 by including an interaction term between GDP per capita and total aid to education. The coefficient of the interaction term is positive as expected but not significant, suggesting no heterogeneity effects by aid recipient type. The coefficient of the expenditure per pupil variable has a similar magnitude as in Column 1 but becomes less significant. This result suggests in the developing countries that make up our sample, public expenditures on education are more effective than total foreign aid to the education sector in increasing gender parity in primary school.

In the Columns 3 and 4 regressions, primary education aid has positive but insignificant coefficients. The lack of significance of the aid variables maybe explained by the fact that many countries have reached or are near perfect parity in enrolment at the primary education level. The coefficient of expenditure per pupil at the primary education level is insignificant in both regressions suggesting no impact of public expenditures on education at the primary level on gender parity. No heterogeneity in aid recipient was found as the lack of significance of the coefficient of the interaction term between GDP per capita and primary education aid indicates. All four regressions pass the Hansen J test of overidentification, the Arellano-Bond autocorrelation test and the exogeneity of instruments test.

Table 3 : Results of System GMM regressions of gender parity in primary education on total education aid and primary education aid

VARIABLES	(1) Log GPI primary	(2) Log GPI primary	(3) Log GPI primary	(4) Log GPI primary
Lagged dependent	0.5872***	0.6424***	0.6869***	0.7056***
	(0.171)	(0.154)	(0.234)	(0.214)
Expenditure per pupil	0.0068**	0.0065*		
	(0.003)	(0.004)		
Total education aid, per pupil	-0.0002	-0.0038		
	(0.001)	(0.004)		
GDP per capita	-0.0578	-0.0503	-0.0660	-0.0581
	(0.073)	(0.070)	(0.123)	(0.114)
Urbanization rate	-0.0092	-0.0185	-0.0021	-0.0076
	(0.019)	(0.013)	(0.018)	(0.014)
Population under 25	-0.0011	0.0231	0.0213	0.0032
	(0.038)	(0.041)	(0.059)	(0.054)
Under 5 mortality	-0.0489*	-0.0489**	-0.0328	-0.0301
	(0.026)	(0.023)	(0.035)	(0.034)
Aid*GDP per capita		0.0318		
		(0.039)		
Expenditure per pupil, primary			0.0240	-0.0071
			(0.163)	(0.111)
Aid per pupil, primary			0.0003	0.0011
			(0.002)	(0.004)
Aid*GDP per capita, primary				-0.0451
				(0.082)
Observations	328	328	328	328
Number of countries	85	85	85	85
Number of instruments	29	30	29	30
Hansen J test p-value	0.495	0.583	0.291	0.274
Difference-in-Hansen test p-value	0.722	0.935	0.583	0.517
AR1 test p-value	0.036	0.020	0.128	0.116
AR2 test p=value	0.162	0.174	0.447	0.448

Standard errors in parentheses

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

3.3 Impact of aid on gender parity in secondary education

The secondary education results are shown in Table 4. Columns 1 and 2 present the regressions that use total aid to education as the aid variable and Columns 3 and 4 the regressions that use secondary education aid as the aid variable. The results indicate no persistence in outcome for secondary school enrolment GPI as the lagged dependent variable is insignificant across all four regressions. Total aid to education has a negative and strongly significant effect on secondary school GPI (Column 1) suggesting that the more aggregate education aid a country receives the lower its secondary school GPI. This result may seem counterintuitive but even if a country receives large amounts of aid to education it may be that they allocate it to other levels of education or to other sectors, not to secondary education, the so-called problem of fungibility of aid (Leiderer, 2012). Empirical evidence of aid fungibility at the sector level is documented in Feyzioglu et al. (1998), Devarajan et al. (1999), Van de Sijpe (2010), Lu et al. (2010), and Chatterjee et. al. (2012), among others. In Column 2, the coefficient of the interaction term between GDP per capita and total aid to education is positive but not significant, suggesting that there is no heterogeneity in aid recipient for secondary education GPI. The coefficient of total aid to education becomes insignificant in Column 2, suggesting no impact of aggregate aid to education on secondary education GPI.

In Column 3, the results show that secondary education aid and expenditure per pupil at the secondary education level are insignificant. The results in Column 4 are similar to those of Column 3, namely no significance of the secondary education aid and expenditure per pupil at the secondary education level variables. The coefficient of the interaction term is negative but not significant, suggesting no heterogeneity effects by aid recipient type.

The regression in Column 1 does not pass the exogeneity of instruments test. Each instrument was tested separately but none was found to be endogenous. Therefore, the variable population under 25 which is highly correlated with the other instrument was removed and the regression then passed the exogeneity of instruments test.

Table 4 : Results of System regressions of gender parity in secondary education on total education aid and secondary education aid

VARIABLES	(1) Log GPI secondary	(2) Log GPI secondary	(3) Log GPI secondary	(4) Log GPI secondary
Lagged dependent	-0.0515	-0.0226	0.3022	0.2434
	(0.107)	(0.066)	(0.264)	(0.222)
Expenditure per pupil, all levels	0.0071	0.0080		
	(0.009)	(0.009)		
Total education aid, per pupil	-0.0033**	-0.0070		
	(0.002)	(0.007)		
GDP per capita	-0.1196	-0.1096	-0.0791	0.0136
	(0.382)	(0.425)	(0.408)	(0.418)
Urbanization rate	-0.0055	-0.0159	0.0100	-0.0093
	(0.099)	(0.107)	(0.067)	(0.067)
Population under 25	0.1435	0.1227	-0.0799	-0.1614
	(0.227)	(0.237)	(0.214)	(0.216)
Under 5 mortality	-0.3832***	-0.3650***	-0.1828*	-0.1804*
	(0.078)	(0.073)	(0.104)	(0.106)
Aid*GDP per capita		0.0574		
		(0.075)		
Expenditure per pupil, secondary			-0.0929	-0.1329
			(0.131)	(0.150)
Aid per pupil, secondary			0.0031	0.0045
			(0.003)	(0.005)
Aid*GDP per capita, secondary				-0.0464
				(0.058)
Observations	309	309	261	261
Number of countries	81	81	74	74
Number of instruments	29	30	29	30
Hansen J test p-value	0.219	0.341	0.299	0.326
Difference-in-Hansen test p-value	0.042	0.138	0.391	0.457
AR1 test p-value	0.945	0.509	0.214	0.224
AR2 test p=value	0.990	0.996	0.260	0.250

Standard errors in parentheses

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

3.4 Impact of aid on gender parity in tertiary education

Table 5 presents the results of the regressions of tertiary education GPI on total aid to education (Columns 1 and 2) and on aid to tertiary education (Columns 3 and 4). In Columns 1 and 2, the lagged dependent variable is significant suggesting persistence in outcome. However, this result is infirmed in Columns 3 and 4 were the coefficients of the lagged dependent variable failed to reach significance. In Column 1, total aid to education has a negative and highly significant impact on tertiary education GPI suggesting that receiving more aggregate aid to education would not have a positive impact on tertiary education GPI. This result may be due to the fact that members of the Development Assistance Committee (DAC) of the OECD devote a large share (33% in 2010) of gender equality focused aid to education to scholarships and student cost in donor countries (OECD, 2013). Total aid to education is positive and insignificant in Column 2, suggesting no impact of aggregate aid to education on tertiary GPI when heterogeneity effect of aid by recipient type is controlled for. No evidence of heterogeneity in aid recipient type was found.

In Columns 3 and 4, tertiary education aid is negative and insignificant while expenditure per pupil at the tertiary education level is positive and highly significant. The coefficient of the interaction term is positive but not significant, suggesting no heterogeneity effects by aid recipient type. All four regressions pass the Hansen J test of overidentification, the Arellano-Bond autocorrelation test and the exogeneity of instruments test.

Table 5: Results of System regressions of gender parity in tertiary education on total aid to education and aid to tertiary education

	(1)	(2)	(3)	(4)
VARIABLES	Log GPI tertiary	Log GPI tertiary	Log GPI tertiary	Log GPI tertiary
Lagged dependent	0.3219*	0.5057*	0.3401	0.3086
	(0.163)	(0.278)	(0.237)	(0.254)
Expenditure per pupil, all levels	0.0084	0.0226		
	(0.028)	(0.024)		
Total education aid, per pupil	-0.0154***	0.0431		

	(0.005)	(0.055)		
GDP per capita	-0.4455	-0.2623	-0.7963	-0.8220
	(0.615)	(0.739)	(0.662)	(0.647)
Urbanization rate	-0.0838	-0.0200	0.1663	0.1876
	(0.237)	(0.201)	(0.259)	(0.298)
Population under 25	-0.2347	-0.3444	-0.4958	-0.4869
	(0.347)	(0.347)	(0.321)	(0.330)
Under 5 mortality	-0.5841***	-0.3642	-0.5449**	-0.5539**
	(0.198)	(0.234)	(0.215)	(0.243)
Aid*GDP per capita		-0.5015		
		(0.552)		
Expenditure per pupil, tertiary			0.7126**	0.6778**
			(0.296)	(0.309)
Aid per pupil, tertiary			-0.0001	-0.0007
			(0.001)	(0.002)
Aid*GDP per capita, tertiary				0.0243
				(0.052)
Observations	310	310	274	274
Number of countries	74	74	65	65
Number of instruments	29	30	29	30
Hansen J test p-value	0.159	0.219	0.515	0.469
Difference-in-Sargan test p-value	0.909	0.684	0.469	0.362
AR1 test p-value	0.031	0.048	0.224	0.260
AR2 test p=value	0.929	0.346	0.618	0.709

Standard errors in parentheses

*** p↓0.01, ** p↓0.05, * p↓0.1

In sum, the results indicate no significant impact of total aid to education on gender parity in enrolment at all levels of education combined and in enrolment at the primary education level. Negative and strongly significant impacts of total aid to education on gender parity in enrolment at the secondary and tertiary education levels were found. For subsector specific aid, the coefficients are positive and insignificant for primary and secondary education enrolment GPI and negative and insignificant for tertiary education GPI. The robustness of these results is tested below.

1- **Sensitivity analysis**

The sensitivity analysis for the regressions using aggregate education aid is conducted using economic and political governance indicators. The indicators used are the index of economic freedom, the democracy index, the government stability index, and interaction terms between aid and each of the aforementioned variables. For the regressions using subsector-specific aid to education, the pupil-teacher ratios for primary and secondary education are added to relevant regressions. There is no data on student-teacher ratios at the tertiary level of education. Gender parity in youth literacy rate was considered as part of the robustness check for left-hand-side variable but was dropped from the paper because the GMM regressions suffer from the problem of too many instruments due to the small sample size available (239 observations out of 1,410).

The economic freedom index takes on values between zero and 10, 10 being the freest. The democracy index is computed by combining the sub-indices on political rights and civil liberties (see Table A1 Appendix). The government stability indicator assesses government's ability to carry out its declared programs and its ability to remain in office. It takes on values between zero and 12, 12 being the maximum. This section is organized into two subsections, one using panel data and the other using cross section data to conduct the sensitivity analysis.

4.1 Panel data

Table 6 presents the sensitivity analysis results for the regressions using total aid to education and expenditure per pupil at all levels of education as the aid and expenditure variables. Column 1 shows that no change occurs for the GPI in enrolment at all levels of education combined when compared to the results in Column 1 of Table 2. The only significant variable is the lagged dependent variable and none of the additional regressors are significant. Comparing the results in Column 2 (GPI in primary school enrolment) to those of Column 1 in Table 3, expenditure per pupil at levels of education and mortality of children under five years of age lose significance while the lagged dependent variable retains significance. None of the additional regressors are significant. In Column 3, the results for GPI in secondary school enrolment show total education aid loses significance and its sign becomes positive while mortality of children under five years of age retains both its significance and sign. The changes in the results for tertiary education GPI (Column 4) include the loss of significance for

total aid to education and mortality of children under five years of age and the gain of significance for the lagged dependent variable from weakly to highly significant and for expenditure per pupil variable from not significant to highly significant.

Across all four regressions none of the additional regressors are significant. All regressions pass the overidentification, autocorrelation and exogeneity of instruments tests at conventional levels of significance.

Table 6 : Robustness checks for System GMM regressions of gender parity in enrolment at all levels of education combined and the different levels of education on total aid to education

VARIABLES	(1) Log GPI all levels	(2) Log GPI primary	(3) Log GPI secondary	(4) Log GPI tertiary
Lagged dependent	0.9445***	0.7106***	0.1580	0.9095***
	(0.111)	(0.186)	(0.283)	(0.057)
Expenditure per pupil	-0.0002	0.0038	-0.0121	0.0458***
	(0.006)	(0.003)	(0.012)	(0.015)
Total education aid, per pupil	0.4149	0.0002	0.9198	-0.0955
	(0.585)	(0.038)	(1.314)	(0.391)
GDP per capita	0.0491	-0.0574	0.0292	-0.4828
	(0.154)	(0.087)	(0.484)	(0.419)
Urbanization rate	0.0306	-0.0292	-0.0611	0.0725
	(0.070)	(0.023)	(0.101)	(0.122)
Population under 25	-0.0274	0.0371	0.2104	0.0271
	(0.049)	(0.039)	(0.314)	(0.178)
Under 5 mortality	0.0122	-0.0342	-0.2976***	-0.0517
	(0.029)	(0.031)	(0.109)	(0.061)
Economic freedom index	0.0093	0.0008	0.0216	0.0020
	(0.014)	(0.006)	(0.030)	(0.019)

Government stability	0.0038	0.0006	0.0063	-0.0002
	(0.002)	(0.002)	(0.007)	(0.007)
Democracy index	0.0019	0.0046	0.0013	0.0002
	(0.004)	(0.004)	(0.016)	(0.011)
Aid*Democracy	0.0156	-0.0002	0.0743	-0.0311
	(0.037)	(0.004)	(0.119)	(0.030)
Aid*Government stability	-0.0103	-0.0012	-0.0090	-0.0190
	(0.013)	(0.002)	(0.015)	(0.015)
Aid*Economic freedom	-0.0528	0.0012	-0.1398	0.0462
	(0.080)	(0.003)	(0.203)	(0.058)
Observations	142	172	163	167
Number of countries	39	45	43	39
Number of instruments	35	35	35	35
Hansen test p-value	0.227	0.489	0.702	0.619
Difference-in-Sargan test p-value	0.169	0.123	0.420	0.723
AR1 test p-value	0.031	0.040	0.204	0.075
AR2 test p=value	0.297	0.106	0.521	0.744

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 presents the results of the sensitivity analysis for regressions using subsector specific aid to education and subsector specific expenditure per pupil as aid and education variables. Compared to the main results (Column 3 of Table 3), the results in Column 1 show that primary education aid per pupil becomes negative and strongly significant and mortality of children under five years of age becomes strongly significant with the same negative sign. Both government stability and economic freedom interact positively with primary education aid to improve GPI in enrolment at the primary education level though their main effects are not significant. Therefore, economic freedom and government stability seem to be important for gender parity in

enrolment at the primary level of education. The regression passes all three specification tests.

In Column 2, the results for secondary school enrolment GPI show that expenditure per pupil at the secondary education level becomes strongly significant and its sign stays negative while mortality under five loses its significance when compared to the results of Column 3 of Table 4. These results suggest a negative impact of public expenditure on education on GPI in enrolment at the secondary education. It may be the case that the more government spends on secondary education the more it favors boys which can be explained by preference of enrolling boys in school in many developing countries and by sex selection in some countries which reduces the pool of female candidates for school enrolment. The coefficient of the secondary education aid variable becomes negative but stays insignificant. None of the additional regressors are significant and the regressions pass all three specification tests.

Turning to tertiary education enrolment GPI, the results in Column 3 of Table 7 are compared to those of Column 3 of Table 5. Expenditure per pupil at tertiary education level becomes insignificant while GDP per capita becomes weakly significant. Tertiary education aid remains insignificant. Economic freedom interacts positively with tertiary education aid to improve GPI in tertiary education enrolment. The democracy index and the government stability index and their interaction with aid are insignificant. The regression passes all specification tests.

Table 7: Robustness checks for System GMM regressions of gender parity at the different levels of education on subsector-specific aid to education

VARIABLES	(1) Log GPI primary	(2) Log GPI secondary	(3) Log GPI tertiary
Lagged dependent	0.4875**	0.8545**	0.2994
	(0.209)	(0.334)	(0.288)
Expenditure per pupil	0.0505	-0.3427***	0.1838
	(0.156)	(0.114)	(0.354)
Education aid, per pupil	-0.1637**	-0.5334	-0.0206
	(0.079)	(0.503)	(0.013)
GDP per capita	-0.0246	0.5270	-1.5565*
	(0.195)	(0.434)	(0.877)

Pupil-teacher ratio	0.0818	0.0929	
	(0.061)	(0.180)	
Urbanization rate	-0.0192	-0.0541	0.2420
	(0.033)	(0.079)	(0.286)
Population under 25	0.0744	0.0796	-0.3623
	(0.075)	(0.212)	(0.391)
Under 5 mortality	-0.0749**	0.0258	-0.4557***
	(0.033)	(0.114)	(0.146)
Economic freedom index	-0.0044	-0.0477	0.0596
	(0.010)	(0.035)	(0.051)
Government stability	-0.0000	-0.0015	0.0082
	(0.002)	(0.006)	(0.012)
Democracy index	0.0009	0.0079	-0.0292
	(0.003)	(0.016)	(0.023)
Aid*Democracy	0.0040	-0.0039	0.0013
	(0.005)	(0.042)	(0.001)
Aid*Government stability	0.0049*	0.0109	-0.0015
	(0.003)	(0.014)	(0.001)
Aid*Economic freedom	0.0180**	0.0671	0.0053*
	(0.008)	(0.067)	(0.003)
Observations	188	138	158
Number of countries	46	40	35
Number of instruments	36	36	35
Hansen test p-value	0.276	0.309	0.459
Difference-in-Sargan test p-value	0.706	0.284	0.588
AR1 test p-value	0.105	0.235	0.433
AR2 test p=value	0.414	0.407	0.889

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2 Cross section data

Perhaps the lack of significance and the negative effects of aid on gender parity stem from the year-to-year fluctuations that plague annual panel data estimation. To check whether this is the case, cross section regression that averages the data over the ten-year period are run. Ordinary Least Squares (OLS) method with robust standard

errors is used to estimate the models. Instrumental variables (IV) method would be the best method to address the potential endogeneity of aid flows but for lack of suitable instruments[1] for aid flows only OLS results are presented and interpreted.

Table 8 presents the results for the regressions that use total education aid and expenditure per pupil at all levels of education as aid and expenditure variable. Total aid to education is positive and significant across all regressions except the one for GPI in enrolment at all levels of education. The results suggest a 1.3% increase in primary education enrolment GPI, a 3.8% increase in secondary education enrolment GPI, and a 21.8% % increase in tertiary education enrolment GPI for each dollar increase in total education aid. The increase in tertiary education enrolment GPI is huge but the OLS results are to be taken with caution given that aid flows are potentially endogenous. Therefore, these estimates only indicate a positive correlation between education aid and gender parity in enrolment at the different levels of education. The coefficient of expenditure per pupil at all levels of education is insignificant across all regressions.

Having a large share of the population under 25 years of age is detrimental to gender parity in tertiary education enrolment (Column 4). In Column 3, the larger the share of urban population the higher will gender parity in secondary education enrolment is. A counterintuitive result in Column 3 is the sign of GDP per capita which is negative and strongly significant suggesting that countries with higher income have lower gender parity in secondary school. Mortality of children under five years of age is negative and highly significant in Columns 2, 3 and 4 suggesting that the higher the mortality rate of young children the lower gender parity in primary, secondary, and tertiary is.

The OLS results are different from the GMM in that they have expected positive and significant coefficients for the aid variable. But given the caveat of the OLS method, one cannot conclude that OLS results are superior. What this means, is that the main results are not robust to the method of estimation.

1 Bahar (2009) used natural disaster events in neighboring countries to construct instrumental variables for foreign aid flows. Future drafts may include IV regressions using this information if our request for the data is granted.

Table 8 : Cross section regressions (OLS) of gender parity in enrolment at all levels of education combined and at the different levels of education on total education aid, main model

VARIABLES	(1) Log GPI all levels	(2) Log GPI primary	(3) Log GPI secondary	(4) Log GPI tertiary
Expenditure per pupil, all levels	0.0593	0.0043	-0.0010	-0.0054
	(0.062)	(0.004)	(0.009)	(0.022)
Total education aid, per pupil	0.0674	0.0125*	0.0381***	0.2182***
	(0.068)	(0.007)	(0.013)	(0.038)
GDP per capita	0.5352	-0.1352	-0.6505**	0.3151
	(0.955)	(0.126)	(0.302)	(0.877)
Urbanization rate	0.8451	0.0157	0.1664**	0.1202
	(0.582)	(0.048)	(0.078)	(0.316)
Population under 25	-0.3344	0.0309	-0.0415	-0.9423**
	(0.480)	(0.087)	(0.200)	(0.439)
Under 5 mortality	0.0647	-0.1055***	-0.3008***	-0.5884***
	(0.260)	(0.019)	(0.048)	(0.159)
Constant	3.5522***	4.5704***	4.6640***	5.1944***
	(0.744)	(0.041)	(0.098)	(0.315)
Observations	62	63	63	63
R-squared	0.160	0.450	0.653	0.705

Robust standard errors in parentheses

*** p↓0.01, ** p↓0.05, * p↓0.1

Table 9 presents the results for the regressions that use subsector specific education aid and subsector specific expenditure per pupil as aid and expenditure variable. Aid is positive and strongly significant in the regressions for primary education enrolment GPI and secondary enrolment GPI but negative and insignificant for tertiary education enrolment GPI. These results suggest that targeted aid has a positive impact on gender parity at the primary (1.5% increase per extra dollar) and secondary (3.3%

increase per extra dollar) education levels with the magnitude of the coefficient being similar to those of aggregate aid to education. However, causation cannot be claimed, only correlation between education aid and gender parity in enrolment at the primary and secondary education levels. Expenditure per pupil is insignificant across all three regressions while mortality of children under five years of age is negative and highly significant. Similar to the aggregate aid case, the subsector aid variables have the expected sign and significance (except for tertiary education) in the OLS regressions indicating the lack of robustness of the GMM results.

Table 9 : Cross section regressions (OLS) of gender parity in enrolment at the different levels of education on subsector specific education aid, main model

VARIABLES	(1) Log GPI primary	(2) Log GPI secondary	(3) Log GPI tertiary
Expenditure per pupil[a]	-0.1939	0.0470	-0.0421
	(0.134)	(0.141)	(0.250)
Education aid, per pupil[a]	0.0146***	0.0328**	-0.0032
	(0.005)	(0.013)	(0.005)
GDP per capita	0.0107	-0.3455	0.2255
	(0.144)	(0.356)	(1.210)
Pupil-teacher ratio[a]	0.1100	0.3470	
	(0.125)	(0.267)	
Urbanization rate	0.0044	0.1543	-0.0645
	(0.040)	(0.106)	(0.341)
Population under 25	-0.0366	-0.3585	-0.7583
	(0.139)	(0.225)	(0.463)
Under 5 mortality	-0.0977***	-0.3117***	-0.6069***
	(0.030)	(0.040)	(0.197)
Constant	4.6123***	4.7362***	5.3073***
	(0.058)	(0.109)	(0.300)
Observations	61	56	55
R-squared	0.469	0.697	0.625

a: The variable is specific to each column, e.g. for column 1 aid is primary education aid, etc.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Discussion of findings

Education aid was found to have an insignificant impact on gender parity at all levels of education combined and on gender parity in primary education. Its impact on secondary and tertiary education is negative and significant. For subsector specific aid, the coefficients are positive and insignificant for primary and secondary education enrolment GPI and negative and insignificant for tertiary education GPI. These results are not robust to the specification used or to the method of estimation.

One explanation for the apparent ineffectiveness of aid to the education sector is fungibility of aid. As stated above, past research (Chatterjee et. al., 2012, Van de Sijpe, 2010, Lu et al., 2010, etc.) has shown that aid can be fungible, that is, aid can be used in ways donors did not intend. For instance, the negative and significant impact of aggregated aid to education on secondary education may be due to aid intended for the secondary education being allocated to primary education in the hope to meet Millennium Development Goals (MDGs) for universal primary education by 2015. Several suggestions to curb the aid fungibility problem were made in the literature. Three ways of delivering aid are compared by Leiderer (2012), namely project aid, budgetary support and results-based aid. He recommends a mix of budgetary support and results-based aid as the best option to reduce fiduciary risks but for this to work donors must have the capacity and will to synchronize their support.

The lack of impact of education aid (both aggregate and subsector-specific) on gender parity in primary education may be due to the high proportion of the countries with perfect or near perfect GPI in primary education. Indeed, about 80% of the countries in the sample have primary education GPI of 90% or higher suggesting that there is not much room for improvement in primary education GPI for the majority of the countries in the sample.

Turning to tertiary education, in 2009-10, of the US$ 4.7 billion committed to gender equality in education by DAC countries, 33% took the form of scholarship and student costs in donor countries (OECD, 2013). Consequently, this type of aid never reaches the receiving countries which may explain the negative and significant impact of aggregate aid to education on gender parity in tertiary education. This reinforces the importance of using aid disbursement data rather than aid commitment data as aid commitment funds may not end up reaching the receiving countries.

Policy Implications

This paper addressed the effectiveness of aid in reducing gender inequality developing countries using aid disbursement data for the period 2002 to 2011. Heterogeneity in aid recipients and in aid flows (primary, secondary or tertiary education) was investigated. System GMM methods were employed with Windmeijer-corrected cluster-robust errors to deal with heteroskedasticity, potential endogeneity of aid flows and account for country-specific effects.

The system GMM results found in this study suggest that total aid disbursements to the education sector negatively affect the gender parity in enrolment at the secondary and tertiary education levels. Subsector specific aid disbursements were found to have no impact on gender parity at the different levels of education. For the regressions using the total aid to education as aid variable, only the results for gender parity in enrolment at all levels of education combined are robust to the set of explanatory variables used. The subsector specific aid regressions are not robust to the set of explanatory variables used. Both types of heterogeneity (in aid recipients and in aid flows) do not seem to matter in the sample used in this study.

Further analysis was conducted using cross section data that averaged the data over the ten year period to address year-to-year fluctuations in the data. The OLS results using aggregate aid to education show a positive and significant impact on GPI at primary, secondary and higher education levels but no impact on the combined GPI variable. Aid to primary education and aid to secondary education were found to have positive and significant impact on gender parity at these two levels of education. Aid to tertiary education has a negative but insignificant coefficient. The potential endogeneity of aid flows imply that causality between education aid and gender parity in school enrolment cannot be claimed from OLS results. The implication of the OLS results is that the results are not robust to the method of estimation.

Given that the lack of robustness of the system GMM results, one would recommend that aid to education be at least maintained in its current levels and aid-receiving countries statistical system be supported to keep better records so as to improve data quality and availability. Improvement in data quality and availability would help in producing research with conclusive results.

One reason why primary aid to education does not have an impact on gender parity is that many countries have reached or are near perfect parity. However, girls accounted for 53% of the 61 million out-of-school children in 2010 (EFA, 2012). In addition, the EFA Global Monitoring Report (2012) states that "Analysis for this Report of household survey data in nine countries shows that girls face larger obstacles

to entering primary school than boys, but once in school they tend to have an equal chance of completing it". Hence, women are seen as resilient in pursuing studies. The issue is how to get them into the education system in the first place. Following this initiating circumstance, the primary education should continue to receive support to get more girls started in school, which would increase their chances of securing jobs and/or accessing higher education.

Several interventions are available to donors in supporting girls' enrolment in school. The interventions should target the obstacles to girls' enrolment which include poverty, distance to school, opportunity cost of sending girls to school (household chores), and cultural beliefs. The latter one is the hardest to influence. Conditional cash transfer programs have been successful such as Mexico's PROGRESA in getting parents to send their children to school (Schultz, 2004). The BRIGHT school construction program in rural Burkina Faso (girl-friendly schools) was successful in increasing girls' enrolment rate by 5 percentage points more than boys (Kazianga et. al, 2012). These schools provide (among other services) take-home rations, textbooks, school lunch, separate latrines for boys and girls, literacy training and capacity building to local communities. Other successful interventions include provision of free uniforms (Evans et. al, 2013), scholarships (Kremer et. al., 2009) and sensitization programs consisting of providing estimates of returns to education to parents and students (Nguyen, 2008, Jensen, 2010) to help them make informed decision to enrol and/or remain in school. The Abdul Latif Jameel Poverty Action Lab (J-PAL) and Innovations for Poverty Action (IPA) compared interventions targeted at getting children to go to school (IPA/J-PAL, 2012). They show that the most cost effective intervention is the provision of information on returns to schooling (20.7 additional years of education per US $100 spent) followed by deworming (13.9 years/ US$ 100), free uniforms (0.71 years/US $100), and merit scholarships (0.27 years/US$ 100).

For tertiary education, the average parity is high in the sample of countries used in this study (102.9%) which may be one of the reasons why tertiary aid to education does not impact gender parity in tertiary education enrolment. However, the gap between the lagging and high performing countries in terms of tertiary education enrolment gender parity is quite large (ranges from 6.4% to 338.5% versus 44.0% to 126.1% for primary education). Therefore much more needs to be done for to close the gap between countries as far as gender parity in tertiary education enrolment is concerned. The same argument goes for secondary education for which the gap in gender parity is also very large (21.0% to 139.8%). This situation calls for supporting the lagging countries by studying how the best performing countries have achieved parity and see what lessons can be learned, adopted and adapted by the lagging counties.

Finally, the short panel used in this study maybe the reason for inconclusive results. Indeed, there were only ten year of reliable aid disbursement data available to this study; having longer panel data on aid disbursements would help shed more light into the aid effectiveness debate but this data would only be available with time.

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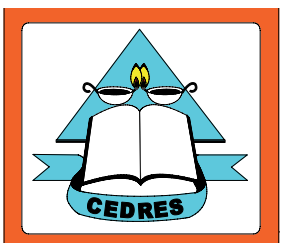
Appendix

Table A_1 : Variable Definitions and Sources

Variable	Description	Source
Gender parity index	Ratio of female to male enrolment at a given level of education	Education Statistics-All Indicators, World Bank (2012)
Education aid per pupil (disbursements)	Aid disbursements by all donors for a given level of education divided by number of pupils for each level of education	OECD (2013)
Expenditure per pupil	Public expenditure per student is the public current spending on education divided by the total number of students, as a percentage of GDP per capita. Public expenditure (current and capital) includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/ households and other private entities).	Education Statistics-All Indicators, World Bank (2012)
GDP per capita	Per capita GDP in purchasing power parity, 2005 international dollar	World Development Indicators, World Bank (2012)
Adult literacy rate	Percentage of people 15 and older who can with understanding, read and write and a short statement about their everyday life	World Development Indicators, World Bank (2012)
Population under 25	Share of total population under 25	World Development Indicators, World Bank (2012)

Urban population	Share of total population living in areas defined as urban in each country	World Development Indicators, World Bank (2012)
Pupil teacher ratio	Number of pupils enrolled in primary school divided by number of primary school teachers (regardless of their teaching assignment)	Education Statistics-All Indicators, World Bank (2012)
Under 5 mortality rate	Probability that newborn baby will die before reaching age five if subject to current age-specific mortality rates. Variable expressed as rate per 1,000	World Development Indicators, World Bank (2012)
Index of economic freedom	This is a composite index of economic freedom, taking on values between 0–10. Higher values reflect greater freedom	Gwartney et. al. (2012)
Government stability	Assesses government's ability to carry out its declared programs and its ability to remain in office. Values are between 0 and 12	International Country Risk Guide (ICRG)
Democracy index	[8 - (political rights index + civil liberties index)] /2	Freedom House (2013)



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