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The impact of gender inequality in education on income in Africa and the Middle East☆

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ABSTRACT

We use data for a group of sub-Saharan African, North African and Middle Eastern countries to explore the impact of gender inequality in education on levels of income per capita. Two gender inequality indicators are used: the gap in female to male primary education enrolment ratios and the gap in female to male secondary education enrolment ratios. Estimation results indicate that gender inequality in primary and secondary education has a statistically significant negative effect on income, especially in North African and Middle Eastern countries. In relatively open economies, gender inequality in education seems to have an additional effect, but this effect is consistently positive, suggesting that while trade contributes to higher income it may be accompanied by greater inequality. Overall, the results in this paper provide further evidence that the international development community's focus on reducing gender inequality and achieving universal primary education is well founded.

1. Introduction

Eliminating gender disparity is a key and long held goal of the international development community. The United Nations Millennium Development Goals include the elimination of gender disparity in primary and secondary enrolments by 2005, and at all levels of education by 2015 (United Nations, 2000). This is one of the targets of Millennium Development Goal Three (MDG3), which has among its objectives the promotion of gender equality. Such an objective has strong intrinsic value. Social justice requires that all people have the same opportunities in life. Disparity in education is inconsistent with this principle. But the promotion of gender equality also has strong instrumental value in many respects. Gender inequality is bad for achievements in income per capita and its many associated development or quality of life benefits. It would appear to be no coincidence that gender inequalities in education tend to be greatest in income poor countries and among the income poor within countries (World Bank, 2001).

There is a growing literature on the impact of gender inequality on income per capita, its growth and related variables. Among the many studies are Hill and King (1995), Klasen (1999, 2002), Knowles et al. (2002) and Abu-Ghaida and Klasen (2004), Duflo (2012) and Bandiera and Natraj (2013). Klasen (2002), for example, shows that gender inequality in education has direct and indirect effects on income growth. Lower female education lowers the average level of human capital, and thus, has a negative direct impact on income growth. Gender inequality also has an effect on population growth and investment, and thus, produces an indirect impact on income growth. There are also effects from increasing female education that impact other development outcomes, not just income levels. Knowles et al. (2002:119) observe that "there is evidence that female education, especially in developing countries, also produces social gains by reducing fertility and infant mortality, improving family and child health, increasing life expectancy, and increasing the quantity and quality of children's educational attainment." Abu-Ghaida and Klasen (2004:1096), in the context of progress towards MDG3 targets, find that "countries that are currently seriously off track might lose 0.1–0.3 percentage points in annual economic growth during 1995–2005, and an average of 0.4 percentage points during 2005–15."

While gender inequality might be associated with lower income growth than would otherwise be the case, it need not be the case that higher income growth is associated with lower gender inequality. Standing (1999) and Seguino (2000), among others, have reported a positive association between growth and gender inequality in wages. Seguino notes that women tend to be crowded into lower paying jobs. Given that gender inequality in education tends to be associated with higher wage inequality, one might also expect a positive association between income growth and disparities between women and men in access to schooling.

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This paper is also concerned with the relationship between gender inequality and income per capita in developing countries. As such, it is concerned with the instrumental effects of gender equality in education.[2] The paper uses data for a sample 41 sub-Saharan African (SSA), North African and Middle Eastern countries[3] and ordinary least squares (OLS), within-group, Arellano and Bond (1991) generalized method of moments (GMM-DIF), and Arellano and Bover (1995)/ Blundell and Bond (1998) system GMM (GMM-SYS) estimators to explore the effects of higher gender inequality on per capita income levels. Two indicators of gender inequality are used, these being the gap in female to male primary education enrolment and the gap of female to male secondary education enrolment ratios (see detailed definition in Appendix A). We focus on these indicators primarily because of their a priori relevance to income per capita but also due to MDG3 relevance. The indicators overlap with another variable to track progress towards MDG3, the ratio of girls to boys in primary, secondary and tertiary education.[4] We focus specifically on SSA and Middle Eastern and North African (MENA) due to the widespread concerns within the international community over progress towards MDG3 within them, especially the slow progress in female shares of the labor force (Klasen and Lamanna, 2003). These countries are of additional interest owing to them having made comparatively little progress in gender equality in education since 1990 and the lower levels of this equality than most if not all developing country groups in recent years (see Table 1).

The methods used in this paper differ from those often employed by existing studies in one important aspect. Whereas most other existing work on the effects of gender inequality in education employ either cross-sectional or pooled cross-sectional data, we use time series and cross section data and control for the endogeniety of some of the explanatory variables (using GMM-DIFF and GMM-SYS) and compare the results with those we obtain from pooled cross-sections and fixed-effects panel data estimations. It is often argued in the empirical literature that the endogeneity of some regressors in income growth equations seriously weakens the validity of empirical results. Dollar and Gatti (1999), Klasen (1999), and Knowles et al. (2002) each provide two-stage least squares (2SLS) estimations to account for the endogeneity of some regressors. Yet finding appropriate instruments to circumvent the problem of endogeneity in dynamic panel data is, at best, extremely complicated. As is well-known, the Arellano–Bond GMM estimation approach sidesteps this issue by differencing the endogenous and predetermined variables and using lags of their own levels as instruments. While clearly no panacea, this is an appropriate technique for modeling the type of relationships examined in this paper.[5] Since the data appear to be persistent, the lagged levels are, however, likely to be weak instruments for the lagged differences. We also present, therefore, results from OLS (pooled-cross sectional data) and within-group estimates. Based on the results of this estimation, we conclude that the more appropriate estimator is GMM-SYS.

The empirical results obtained from our econometric analysis indicate that inequality in primary and secondary education has a statistically significant negative effect on income that is quite robust to changes in specification. Moreover, in MENA countries, gender inequality has an even greater effect on income, and higher openness increases the marginal (positive) effect of gender inequality.

The remainder of this paper is as follows. Section 2 discusses the links between female education and income, income growth and other development variables. Variable selection, data and econometric procedure are discussed in Section 3. Section 4 presents the estimation results. Concluding comments are provided in Section 5.

2. Female education and income

In mainstream economic theory, education often represents a major dimension of human capital and shows a positive influence on production, suggesting that lower levels of female or male education reduce human capital. This means that, in theory, female education has a direct income growth. Empirical data have, in general, supported the existence of additional positive effects of female education on growth beyond this direct influence. Among such effects we can list, for example, the impact the children's health and education, and the mother's health, including reproductive health. In fact, greater education for women may result in shifting the focus from quantity to quality in reproductive outcomes (Baliamoune-Lutz and McGillivray, 2009). Existing evidence indicates that greater female education makes women better-informed mothers and thus would contribute to reducing child malnutrition and mortality rates (Caldwell and McDonald, 1982; Fielding and Torres, 2009; Klasen, 2003; Knowles et al., 2002).[6]

There is ample empirical evidence in support of a negative relationship between female education and fertility. Female education may result in higher economic independence for women by allowing them to have control over resources and their lives and could exert a greater impact on fertility than does income (Basu, 2002; Handa, 2000). Moreover, in some cases, as has been shown in Filmer (1999), the effect on children's school enrolments from female adult education can be higher than that of the male in the same household.

While, in general, there is a consensus that education has a significant positive association with growth (Schultz, 1994), there are fewer agreements on whether both male and female education have similar, positive contributions to growth. Using a GMM estimator for growth equations, Caselli et al. (1996) find a statistically significant positive coefficient on female schooling and a negative coefficient on male schooling. Knowles et al. (2002), using cross-sectional data and a neo-classical growth model, find that female education had a positive effect on labor productivity, while the impact of male education was ambiguous. On the other hand, Barro and Lee (1994) and Barro and Sala-i-Martin (1995) report that female education has a negative effect on growth, but this result was disputed by other researchers due to econometric issues in those studies (see, for example,the criticisms in Knowles et al., 2002; Dollar and Gatti, 1999, and Lorgelly and Dorian Owen, 1999).

A number of recent studies have examined empirically the contribution of gender inequality in education to income growth (Baliamoune-Lutz, 2007; Baliamoune-Lutz and McGillivray, 2009; Esteve-Volart, 2000; Klasen, 1999, 2002; Klasen and Lamanna, 2003; Knowles et al., 2002). These studies have, for the most part, found evidence in support of a negative influence from gender inequality in education to income or growth. For example, using the Barro and Lee (1994) data set for about 87 countries, Esteve-Volart (2000) studies the relationship between growth in per capita GDP and gender inequality in primary schooling in the base year and finds that an increase in female to male primary schooling ratio results in higher economic growth. On the other hand, using OLS and 2SLS estimations on data from developed

[2] The distinction between intrinsic and instrumental aspects of gender equity is important and is often made in the literature on the effects of gender inequality in education. See for example, World Bank (2001), Subrahmanian (2002), Klasen (2002), and Abu-Ghaida and Klasen (2004). In particular, see Jackson (1996) for an interesting discussion of the instrumentalist approach to the relationship between gender and development. A central message in the World Bank's World Development Report 2012 (*Gender Equality and Development*, World Bank, 2011) is that in addition to the fact that gender equality has an intrinsic value, it is also smart economics, as "greater gender equality can enhance productivity, improve development outcomes for the next generation, and make institutions more representative."

[3] We note that the number of countries drops to 36 when we focus on the gap in secondary education.

[4] The other two indicators used to track this progress are the share of women in wage employment in the non-agricultural sector and the proportion of seats held by women in national parliament. In addition, it is worth noting that MDG2 focuses on achieving *universal* primary education.

[5] That GMM estimation is no panacea is now very well known in the literature. Bazzi and Clemens (2007) and Deaton (2010) provide commentaries that are relevant to our present purposes.

[6] For interesting discussions of relevant theory, see Galor and Weil (1996), and Lagerlöf (2003).