ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Abu-Ghaida, Dina; Klasen, Stephan

Working Paper

The Costs of Missing the Millennium Development Goal on Gender Equity

IZA Discussion Papers, No. 1031

Provided in Cooperation with:
IZA Network @ LISER, Luxembourg Institute of Socio-Economic Research (LISER)

Suggested Citation: Abu-Ghaida, Dina; Klasen, Stephan (2004) : The Costs of Missing the Millennium Development Goal on Gender Equity, IZA Discussion Papers, No. 1031, Institute for the Study of Labor (IZA), Bonn

This Version is available at:
https://hdl.handle.net/10419/20266

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

DISCUSSION PAPER SERIES

IZA DP No. 1031

The Costs of Missing the Millennium Development Goal on Gender Equity

Dina Abu-Ghaida
Stephan Klasen

February 2004

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

The Costs of Missing the Millennium Development Goal on Gender Equity

Dina Abu-Ghaida
World Bank

Stephan Klasen
University of Göttingen and IZA Bonn

Discussion Paper No. 1031
February 2004

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
Email: iza@iza.org

Any opinions expressed here are those of the author(s) and not those of the institute. Research disseminated by IZA may include views on policy, but the institute itself takes no institutional policy positions.

The Institute for the Study of Labor (IZA) in Bonn is a local and virtual international research center and a place of communication between science, politics and business. IZA is an independent nonprofit company supported by Deutsche Post World Net. The center is associated with the University of Bonn and offers a stimulating research environment through its research networks, research support, and visitors and doctoral programs. IZA engages in (i) original and internationally competitive research in all fields of labor economics, (ii) development of policy concepts, and (iii) dissemination of research results and concepts to the interested public.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available on the IZA website (www.iza.org) or directly from the author.

IZA Discussion Paper No. 1031
February 2004

ABSTRACT

The Costs of Missing the Millennium Development Goal on Gender Equity*

At the Millennium Summit, the world community pledged to promote gender equality and chose as a specific target the achievement of gender equity in primary and secondary education by the year 2005 in every country of the world. Based on the findings from a growing empirical literature that suggests that gender equity in education promotes economic growth and reduce fertility, child mortality, and undernutrition, we estimate what the costs in terms of growth, and forgone fertility, mortality and undernutrition reduction, will be for the 45 countries that are, on current projections, unlikely to meet the target. Our estimates suggest that, by 2005, the countries that are off track are likely to suffer 0.1-0.3 percentage points lower per capita growth rates as a result and will have 0.1-0.4 more children per woman, and, by 2015, an average of 15 per 1000 higher rates of under five mortality and 2.5 percentage points higher prevalence of underweight children under five. Sensitivity analyses suggest that the results are quite robust to using different specifications and approaches to estimating these losses.

JEL Classification: I2, J7, J13, J16

Keywords: gender bias, education, millennium development goals, growth

Corresponding author:

Stephan Klasen
Department of Economics
University of Göttingen
Platz der Göttinger Sieben 3
37073 Göttingen
Germany
Tel.: +49 551 39 7303
Email: sklasen@uni-goettingen.de

* We want to thank Andrew Clark, Luis Crouch, Shantayanan Devarajan, Ruth Kagia, Elizabeth King, Stephen Knowles, Dorian Owen, Paul Schultz, Carolyn Winter, and participants at a seminar at the University of Munich for helpful comments on earlier versions of this paper. We also thank Jong-Wha Lee for providing us with enrolment figures that were used for the assessment of schooling attainments. Funding from the World Bank in support of this work is gratefully acknowledged. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent.

1. INTRODUCTION

Apart from its intrinsic value as a crucial development goal (Sen, 1999), education is also central to one's ability to respond to the opportunities that development presents. Currently, there are significant gender disparities in education that remain in several regions of the developing world (World Bank, 2001). Disparities persist in enrolment rates, which capture education flows, in average years of schooling, which represent the stock of education in the population, in quality and type of education, and in subject matters studied.

Nonetheless, female primary and secondary enrolment rates have generally risen over time and there has been a corresponding rise in attainments (see Table 1). Gender equality in school enrolments and average years of schooling has also improved since the 1970s as girls' schooling has generally increased faster than boys' (World Bank, 2001). However, there is variation in the gender disparity and the speed in closing gender gaps, with East Asia and the Pacific, Latin America, and Europe and Central Asia exhibiting the highest gender equality in education. As of 1999, primary enrolment rates had flattened out at high levels in these three regions, with gross enrolment rates for females reaching or surpassing 100 percent. Furthermore, average female secondary enrolment rates equal or exceed male rates in Europe and Central Asia and Latin America and women average about 90 percent as many years of schooling as men. Within these regions, there are, however, diverging trends. While in most of Latin America and Eastern Europe, girls' enrolment rates have remained high in absolute terms, and relative to boys', in some Central Asian countries, girls' enrolment rates are now trailing boys' and a widening gender gap has been observed in some countries (see Appendix Table 1).

Starting from higher initial levels of gender inequality, South Asia, Sub-Saharan Africa, and the Middle East and North Africa all registered noteworthy declines in gender disparities in primary and secondary enrolments between 1975 and 1999. South Asia's gender inequality in education is the largest, with women in South Asia averaging only about half as many years of education as men, and female enrolment rates at the secondary level only two-thirds of male rates. Also, in Sub-Saharan Africa, the increases in gender equality in enrolment rates at the primary level between 1980 and 1990 often tended to reflect absolute declines in boys' enrolment rates rather than improvements in girls'. Moreover Sub-Saharan Africa made no real progress in closing the gender gap in average years of schooling between 1970 and 1995, and absolute levels of female enrolment and schooling remain lower in Sub-Saharan Africa than in other developing regions.

(insert Table 1 here)

As a result of these persistent gaps, the world community pledged at the Millennium Summit to promote gender equality and empower women, with particular emphasis on gender equality in education. The chosen target was to eliminate gender disparities in primary and secondary education by 2005, and all levels of education no later than 2015 (United Nations, 2000).

The rationales for this goal include the high intrinsic value of education and thus the importance of gender equality in this critical aspect of well-being (Sen, 1999). In addition, gender equity is seen as a development goal in its own right as has been recognized in the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), signed and ratified by a majority of developing countries.

In addition, there was concern about instrumental effects of gender inequality in education. First, gender inequality in education may prevent the reduction of child mortality, fertility, and undernutrition, as well as reduce the education gains of the next generation. To the extent that these linkages exist, gender bias in education may thus generate instrumental problems for development policy-makers as it compromises progress in other important development goals, including other Millennium Development Goals, particularly the ones relating to child mortality, maternal mortality, poverty, and universal primary education.

Also, it may be the case that gender inequality in education reduces economic growth. This is an important issue to the extent that economic growth, on average, furthers improvement in well-being, although not all types of growth do so to the same extent (Drèze & Sen, 1989; UNDP, 1996; Bruno *et al*., 1996; Pritchett & Summers, 1996).

This paper is concerned with the instrumental impact of countries failing to meet the Millennium Development Goal (MDG) on gender equality. The prospect of countries failing to meet the MDG is not just a theoretical possibility but, given our assessment of current trends, a likely outcome for 45 countries for which data exist. The purpose of the paper is therefore to estimate to what extent these countries will suffer losses in terms of economic growth, as well as foregone reductions in fertility, child mortality, and undernutrition. Conversely, it will allow countries to assess the potential gains from adopting policies that bring them closer to meeting the goal.

As discussed in detail below, early literature suggested little differences in the effects of male and female schooling on growth, and some even suggested that female education had a smaller (or even negative) impact on economic growth (e.g. Barro, 1991; see Lorgelly, 2000 for a survey). More recent literature has comprehensively tackled a number of econometric and specification problems in these earlier studies. Most of these studies have now found a larger impact of female than male education on economic growth. The paper does not present new estimates on the impact

of gender inequality in education on economic growth but instead relies primarily on two such recent studies that not only present these effects but also address the issues and problems of earlier estimates (Klasen, 2002 and Knowles et al., 2002). We do present new estimates of the impact of gender inequality on fertility and child mortality, but also use other studies that have estimated these impacts (Gatti, 1999; Murthi and Drèze, 2001; Schultz, 1994; Summers, 1994) as well as those on undernutrition (Smith and Haddad, 2000).

The main new contribution of the paper is therefore to link the data about current trends in gender inequality in education with the results of studies that have estimated the impact of gender inequality on these various development outcomes. We will show and quantify that countries that fail to meet the MDG on gender inequality will have to face considerable costs in terms of foregone economic growth, as well as forgone reductions in fertility, child mortality, and undernutrition. These costs will already be apparent by 2005, but will mount thereafter. While we are able to present point estimates (with confidence intervals) of these costs, one should treat these point estimates with caution and instead consider the entire range of estimates that we provide.

2. GENDER INEQUALITY, GROWTH, FERTILITY, CHILD MORTALITY, AND UNDERNUTRITION: THEORETICAL CONSIDERATIONS

1. Economic growth

Placing gender gaps in education into the context of theoretical empirical growth research, one can postulate the following linkages between the gender gap in education and economic growth. These issues are discussed in detail in Klasen (1999, 2002) and will be only summarized here:

(i) Lowering the average level of human capital

Assuming that boys and girls have a similar distribution of innate abilities and that those at the upper end of the ability distribution of each sex are more likely to get educated, gender inequality in education must mean that less able boys than girls get the chance to be educated, and, more importantly, that the average innate ability of those who get educated is lower than would be the case if boys and girls received equal educational opportunities. This lowers the average level of human capital in the economy and thus reduces economic growth. It should also lower the impact male education has on economic growth and raise the impact of female education, as found by Dollar and Gatti (1999) or Knowles *et al.* (2002).

A similar effect of lowering the level of human capital would appear if one considers male and female human capital as imperfect substitutes and posits declining marginal returns to education as done by Knowles *et al.* (2002). Then the impact of diminishing returns of higher levels of male

education (rather than the selection of less able males) would lower the average level of human capital and thus economic growth.

Both effects are plausible and supported empirically. Micro studies show that the *marginal* private rate of return to educating girls is larger in many developing countries which is likely due to this selection effect as well as declining marginal returns to education (Hill and King, 1995; World Bank, 2001; Alderman *et al*., 1995; Alderman *et al*., 1996).[1] Similarly, there is considerable evidence for the imperfect substitutability of male and female labor in many settings and simulation studies have shown that a more equal allocation of male and female labor among industries would indeed boost economic growth (World Bank, 2001; Tzannatos, 1999).

(ii) The combined effect of gender inequality in education and wage discrimination

In most countries of the world, females experience some wage discrimination in formal sector employment which shows up as the unexplained portion of the female-male wage gap in earnings regressions (e.g. Horton, 1999; World Bank, 2001). Such wage discrimination can boost investment in industries that employ female labor, provided that females have enough education to effectively participate in the formal labor market. Reducing gender inequality in education may thus enable employers to benefit from employing relatively cheaper female labor and they may respond by higher investment in such female-intensive employment.

Here too, there is some empirical support for this type of effect. A significant portion of high growth in many developing countries, particularly in Asia, has been based on the use of female labor in export-oriented manufacturing industries. This was particularly the case in many Asian economies where female education was rapidly improving while there were also sizeable wage gaps between females and males favoring female employment and the development of female-intensive industries by domestic and foreign investors (Standing, 1999; Seguino, 2000).

(iii) The ‘direct’ externality factor of gender inequality in education

Lower gender inequality in education effectively means greater female education at each level of male education. If it is the case that female education has positive external effects on the quality of overall education (and male education does not, or not to the same extent), then reduced gender inequality should promote a higher quality of education and thus promote economic growth. As female education is believed to promote the quantity and quality of education of children (through the support and general environment educated mothers can provide their children, as well as their increased bargaining power), this positive externality is likely to exist (World Bank, 2001).[2]

(iv) The indirect externality operating via demographic effects

Three mechanisms are believed to be at the center of this demographic impact on economic growth. They all are related to the fact that fertility decline will reduce the share of children and consequently increase the share of workers in the total population. First, reduced fertility lowers the

dependency burden, thereby increasing the supply of savings in an economy which in turn promotes economic growth. Second, a large number of people entering the workforce as the result of previously high population growth will boost investment demand for capital equipment and social overhead investments (housing, etc.). If this higher demand is met by the increased domestic savings and/or capital inflows, these two factors will allow investments to expand which should boost growth (Bloom & Williamson, 1998). Third, a lowering of fertility rates will increase the share of the working age population in the total population. If all the growth in the labor force is absorbed in increased employment, then per capita economic growth will increase even if wages and productivity remain the same. This is due to the fact that more workers have to share their wages with fewer dependents, thereby boosting average per capita incomes. This temporary effect is believed to have contributed considerably to the high growth rates in East and Southeast Asia (Young, 1995; Bloom & Williamson, 1998; see below). To the extent that high female education was among the most important causal factors bringing about this fertility decline, it could account for a considerable share of the economic boon generated by this demographic gift.[3]

2. Fertility, child mortality, and undernutrition

Economic models of fertility find the opportunity cost of women's time as well as the bargaining power of women to be important determinants of the fertility rate (Becker, 1981; Schultz, 1994; Sen, 1999). Greater female education, and particularly lower gender inequality in education, is thus likely to lead to reduced fertility.

Similarly, models of health production at the household level emphasize the importance of the mother's education as well as her bargaining power. Greater education increases her health knowledge which improves her ability to promote the health of her children (World Bank, 1993), gives her greater ability to deal with adverse shocks (World Bank, 2001), and greater bargaining power increases her say over household resources which often leads to greater allocations to child health and nutrition. For example, Thomas (1990) found that the impact of unearned income on child survival was 20 times greater if the income was brought in by the mother than if it was brought in by the father (see World Bank 2001 for a survey). Both effects are likely to assist in lowering undernutrition and in reducing child mortality rates. Since reducing educational disparities is one of the most powerful ways of increasing the bargaining power of women (World Bank, 2001), promoting gender equity in education would thus be expected to promote the reduction of fertility, undernutrition, and child mortality directly and indirectly via the effect on bargaining power.

3. EMPIRICAL ESTIMATES OF THE EFFECTS OF GENDER BIAS IN EDUCATION ON GROWTH, FERTILITY, CHILD MORTALITY, AND UNDERNUTRITION

The above theoretical linkages have also been investigated empirically. Here we review the most important studies and then concentrate on the ones that we are going to use for the estimation of the costs of failing to achieve the gender equity MDG. They are summarized in Table 2. In many of these studies, the impact of female education rather than gender inequality in education per se is considered. But since most of these studies simultaneously include male education in the analysis, they implicitly consider the impact of gender inequality in education (see Knowles *et al.*, 2002). Also, since our policy exercise is to compare current projected paths of female enrolments with target paths that would allow countries to meet the goal, while not altering the projected levels of male enrolments, we are mainly concerned with the increase in female education that would happen as a result of meeting the goal.

1. Gender Inequality in Education and Economic Growth

There have been comparatively few studies that have explicitly considered the impact of gender inequality on economic growth.[4] Barro and Lee (1996) and Barro and Sala-i-Martin (1995) report the 'puzzling' finding that in regressions including male and female years of schooling the coefficient on female primary and secondary years of schooling is negative. They suggest that a large gap in male and female schooling may signify backwardness and may therefore be associated with lower economic growth.

There are reasons to question this result, however. Dollar and Gatti (1999) show that the result disappears once a dummy variable for Latin America is included suggesting that the 'puzzling' effect may be due to the combination of low growth and comparatively high female education in Latin America.[5]

The 'puzzling' finding may also be related to multicollinearity. In most countries, male and female schooling are closely correlated which makes it difficult to empirically identify the effects of each individually. The correlation coefficient between male and female total years of schooling and similar attainment measures (such as the share of the adult population that has achieved secondary education) is consistently above 0.9 for a large sample of countries considered by Barro. Large standard errors on male and female education and the sudden reversal of this finding in different specifications is further evidence of this problem (Lorgelly and Owen, 1999; Knowles *et al*. 2002).

Hill and King (1995) study the impact of gender differences in education on income. Instead of trying to account for growth of GDP, they relate *levels* of GDP to gender inequality in education. They find that a low female-male enrollment *ratio* is associated with a lower level of GDP per capita, over and above the impact of *levels* of female education on GDP per capita.

Knowles *et al.* (2002) also estimate the impact of gender inequality in education on *levels* of GDP per capita in an explicit Solow framework, treating adult male and female levels of education as separate factors of production. Their study is based on estimating the impact of male and female education on the long-run (or steady-state level) of GDP. They estimate these long run level relationships based on average GDP per capita (in log form) for 1960 to 1990 which they relate to average levels of male and female education (and other averaged covariates) for the same time period.[6] With that they can then derive a growth elasticity of male and female education which measures the percentage increase of per capita GDP as a result of a percentage increase in male or female education. They find that female education has a significant positive impact on average GDP levels while male education only has an insignificant impact. The estimated elasticity of the preferred specification is 0.37, i.e. a 1 percent increase in female education would increase the average level of GDP by 0.37 percent.[7] The male elasticity is found to be insignificant. In different parametrizations of the model, including one taken from Klasen (1999), they also show that gender inequality itself (modelled as a ratio) significantly reduces per capita income levels. Finally, they also investigate the matter in a growth regression framework to study the influence of female education on average growth between 1960 and 1990. There, they find a semi-elasticity of 0.21, suggesting that a 1 percent increase in female education would increase growth by over 0.2 percentage points.[8] Below, we will use both their level as well as their growth regressions, but focus on their level results as they are based on their preferred specification.

Dollar and Gatti (1999) also examine the relationship between gender inequality in education and growth. They try to explain five-year growth intervals (1975 to 1990) and attempt to control for the possible endogeneity between education and growth using instrumental variable estimation.[9] In contrast to Barro, they find that female secondary education achievement (measured as the share of the adult population that have achieved some secondary education) is positively associated with growth, while male secondary achievement is negatively associated with growth. In the full sample, both effects are insignificant, but it turns out that in countries with low female education, furthering female education does not significantly promote economic growth, while in countries with higher female education levels, promoting female education has a sizeable and significant positive impact on economic growth. But these results appear to be partly driven by the choice of time period (1975-1990), very short panels (5-year), and the use of an unusual and arguably problematic education variable (see Klasen, 2002).

Klasen (2002) investigates the impact of gender inequality on economic growth, using the total years of schooling of male adults and the female-male ratio of that schooling as the variables capturing the effect of gender inequality. These two variables are used both in initial levels (in 1960) as well as in changes. The latter variable is the female-male ratio of the (absolute) growth in

the years of schooling between 1960 and 1990. The analysis considers possible endogeneities using instrumental variables, panel data analysis, and other techniques. It also examines specifically different pathways by which gender inequality might influence economic growth. Apart from a direct impact, gender inequality might also indirectly affect economic growth through the effect it has on population growth, labor force growth, and the investment rate. In addition, the analysis generates reduced form estimates that measure the total impact of gender inequality on economic growth. Those regressions show that both the initial ratio of female to male education has a significant positive impact on subsequent growth as does the female to male ratio of the growth of education (even if one controls for endogeneity). The point estimate for the initial ratio is 1.64 (i.e. had the female-male ratio in a country been 0.6 instead of 0.5, growth would have been 0.16 percentage points higher) and for the ratio of the growth it is 0.75 (i.e. had the ratio of female to male expansion been 1.2 instead of 0.7, annual growth would have been nearly 0.4 percentage points higher). The findings are robust to various specifications and the use of different education variables.[10]

Klasen and Lamanna (2003) update the results from Klasen (2002) using updated data (up to year 2000) and find that the effects of gender inequality in education on growth remain in similar magnitudes when this larger time interval is considered in a cross-section and panel analysis. Further recent studies using advanced econometric techniques (GMM estimators), includng Forbes (2000) and Yamarik and Ghosh (2003) also support a negative impact of gender inequality in education on economic growth.[11]

Thus our reading of the existing studies is that the negative impact of gender inequality in education on growth has been substantiated in studies that use a growth regression framework addressing problems of multicollinearity, simultaneity, and specification issues (Klasen and Lamanna, 2003; Forbes, 2000; Yamarik and Ghosh, 2003, Klasen, 2002) and a Solow framework (Knowles et al., 2002; Hill and King 1995) while the studies finding different results have all been shown to be problematic in one respect or another. We will therefore primarily rely on Klasen (2002) for the estimate of the effects. We will also compare the results to the point estimates by Knowles *et al*. (2002). The two results are not likely to lead to quantitatively similar results due to the large differences in specification and estimation strategy. We will therefore mainly look for qualitative similarity between the two findings.

(Insert Table 2 here)

2. Fertility, Child Mortality, and Undernutrition

There are a large number of empirical studies that have demonstrated the effect of female education, or gender inequality in education, on fertility. Using macro level cross-country data, Subbarao and Raney (1995) find large negative effects of female enrollment rates in 1970 on

fertility in 1985 in models that control for a large number of other variables. Similarly, Schultz (1994) also uses cross-country panel data (with 2-3 observations per country) and finds that that the adult female years of schooling has a sizeable negative impact on fertility levels between 1972 and 1989. He uses the dependent variable in a log form (while the independent variables are not in logs) and a pooled panel as well as a fixed effects specification. His results suggests that a 1-year increase in the adult female years of schooling will reduce fertility by 8 percent in the pooled cross-section and by 13 percent in the fixed effects specification, which he prefers based on the relevant econometric tests. Schultz (1997) uses the same data but a number of different specifications (including fixed effects, reduced form estimates, instrumental variable estimation, with and without family planning scores) and finds that in most of the specifications one more year of female education reduces the total fertility rate by about 0.5 children per woman.

Gatti (1999) also uses cross-country panel data (which are more recent than Schultz's) and finds that 1 year of female schooling reduces the total fertility rate by 0.32. Klasen (1999) finds an effect of 0.23 in a cross-section regression for 1990. In Table 3, we show a new specification of that model (where we exclude child mortality as a determinant of fertility in order to measure the *total* effect of female education on fertility, including the one operating via reducing child mortality[12] and find that a 1-year increase in female years of schooling in 1990 reduces the total fertility rate by 0.36, which is very close to the results found by Gatti (1999). When we use the ratio of female to male educational attainment instead of female education (to avoid the multicollinearity problem), the fit of the regression becomes considerably better as shown by the higher adjusted R-squared. Increasing this ratio by 10 percentage points (e.g. from 60 percent to 70 percent) would reduce fertility by 0.26 children per woman.

Thus the cross-country evidence is remarkably consistent with suggesting that one more year of female schooling reduces fertility by 0.3-0.5 children per woman and thus we are quite comfortable with using the estimates presented in Table 3 which are within this range. Male education, on the other hand, tends to have an insignificant or positive effect on fertility so that reducing the gender inequality by boosting female education is indeed the most important factor influencing fertility (Schultz, 1997). We will rely on the estimates presented in Table 3 for our primary estimate but also compare the results to findings from Schultz (1994).[13]

Regarding child mortality (we use the under-five mortality rate as the indicator) there is also ample empirical evidence that higher female education reduces child mortality. Using cross-country data for 1990, Klasen (1999) finds that the ratio of female to male total years of schooling has a highly significant and negative impact on the child mortality rate. Using the same data, Table 3 shows that one more year of female education reduces the child mortality rate by 18.1 per 1000 in 1990 (also here we exclude the fertility rate to measure the total effect of female education on child

mortality, including the one operating via fertility). Using the ratio of female to male schooling once again demonstrates a better fit and suggests that increasing the ratio of female to male educational attainment by 10 percentage points would reduce under-five mortality by 14.2 per 1000, which will form the basis of our assessment.[14] Schultz (1994) also uses his same panel data set to look at child survival rates (which is one minus the under-five mortality rate, expressed in percent)[15] and finds that a 1-year increase in female educational attainment would increase child survival by about 1.5 percent. Below we will use his estimates as an alternative way to assess the costs.[16] Schultz (1997) again uses different specifications which yield quite similar estimates suggesting that an additional year of female education reduces child mortality by 12-14/1000.[17]

Regarding undernutrition, which is closely linked to child mortality, there is also considerable evidence that better female education reduces child undernutrition. Smith and Haddad (1999), for example, show that female secondary school enrolments is significantly correlated with lower rates of childhood underweight (the share of children that are moderately or severely underweight) using cross-country panel data. Using a specification with country fixed effects, 1 percentage point higher female secondary enrollment rate reduces the share of children who are underweight by 0.17 percentage points. Klasen (1999) generates similar findings for the impact of female literacy on child undernutrition using cross-country panel data.[18]

In sum, the theoretical and empirical literature discussed above suggests that there are plausible theoretical reasons and significant empirical support for the claim that reducing gender bias in education would enhance economic growth, and promote reductions in fertility, child mortality, and undernutrition. Conversely, countries that do not make progress on closing the existing gaps are likely to suffer costs and improvements in these dimensions will be slower than they would be if they succeeded in closing the gaps.

[Insert Table 3 here]

4. CURRENT STATUS OF COUNTRIES' PROGRESS TOWARDS THE MDG ON GENDER EQUALITY

While ideally one would measure achievement of the MDG based on educational outcome measures (such as test scores or functional capacities of males and females) or at least output measures (such as completion rates), the most consistent, recent, and widely available data refers to school attendance, an input measure.

The World Bank, as part of a larger exercise tracking progress towards all MDGs, uses the ratio of girls to boys in primary and secondary education (where available) and then linearly projects the growth of enrolment that was achieved in the nineties up until 2005. It then classifies developing countries according to whether they are on track (rank 1), slightly off track (rank 2), off track (rank 3), or seriously off track (rank 4) in terms of the achievement of gender parity in enrolments (see

Table 2).[19] Out of a total of 155 countries, 77 countries were found to be on track, 33 off track (ranging from slightly to seriously), and 45 lacked the necessary data. Thus, approximately half of developing countries are indeed on track towards meeting this goal or already have equity in enrolments. However, a significant portion of countries, approximately half the countries in each of the Middle East and North Africa, South Asia, and Sub-Saharan Africa, are on current trends unlikely to meet this goal and would have to, in some cases drastically, expand female enrolments to reach the goal by 2005.

The appendix Table 1 also reports the latest available (mostly 1999) and projected 2005 gross enrolment rates at the primary and secondary levels for boys and girls, as well as the female to male ratios in enrolment. Enrolments in 2005 are projected using the growth rate in enrolments between 1990 and 1999 (or the earliest and latest available UNESCO data in this range) with annual compounding. We amend the World Bank's assessment in two ways. First, we do not use the ratio of girls to boys in school but the ratio of gross enrolment rates. While the two methods are quite related (after all, our method divides by the number of boys and girls of school-going age and the differences in the number of boys and girls of school-going age in most countries are quite small), they differ in that the World Bank method also implicitly includes the problems of gender disparities at birth and in childhood in its assessment. If a country like China has a large excess of males at birth (partly due to sex-specific abortions, see Klasen and Wink, 2002) and also some excess female mortality in childhood, there will be up to 15 percent more boys of school-going age than girls. Requiring parity of the absolute number of girls and boys in school, as implicitly done in the World Bank method, would require higher enrolment *rates* for girls as there are fewer girls to start with which is more than what is called for in the MDG. While sex-selective abortions and gender bias in mortality is a very serious problem that needs to be addressed in its own right (see Klasen and Wink, 2002), it appears problematic to conflate this with the MDG on gender equity in education. Thus, we stick to the ratio of enrolment rates as our measure for the goal.[20]

Secondly, we extend the analysis to countries that were not rated by the World Bank but for which the data on enrolments exist and we simply apply the World Bank's method of rating but use the ratio of gross enrolment rates. This way, we are able to rate another 25 countries and find another 8 countries to be slightly off track and another 4 off-track. Thus, we have a total of 22 countries that are slightly off-track, 14 that are off-track, and 9 countries that are seriously off-track, while the majority of developing countries (90) are actually projected to meet the goal.

The finding that the majority of developing countries are projected to reach the goal is somewhat surprising but quite heartening. Not only virtually all transition countries (with the exception of Tajikistan and Lithuania), but also almost all countries in Latin America and the Caribbean, in East Asia and the Pacific, the majority of countries in the Middle East and North

Africa, half the countries in South Asia, and one-third of countries in Sub-Saharan Africa are projected to reach the goal.[21] Within South Asia, Bangladesh and Sri Lanka are projected to reach the goal, as is China in East Asia and Egypt and Saudi Arabia in the Middle East.[22]

Several caveats are in order. First, we are using gross enrolment rates, defined as the number of pupils in a school form (e.g. primary or secondary school) divided by the number of children in the relevant age group (e.g. 6-12 for primary, 13-18 for secondary school). It is easily possible, and in fact occurs frequently, for gross enrolment rates to exceed 100 percent, either due to poor progress within school, or late (early) entry of overage (underage) children into school. Thus, gender equity in gross enrolment rates could in theory be achieved by boys entering school on time and progressing quickly while girls enter later and progress poorly but nevertheless show a high gross enrolment rate. Using net enrolment rates would address this matter but these are unfortunately not available in many countries.[23]

Second, high enrolment rates (even net enrolment rates) do not have a one-to-one correspondence with subsequent high attainment rates. Attainment rates are based on years passed and thus are an output measure of the educational process while the enrolment rates are merely an input measure. High enrolment in the face of high failure rates will not boost attainment as much as high enrolment rates with low failure rates.

Third, none of this says much about educational quality. High enrolment rates can be accompanied by high or low educational quality. In fact, one can easily imagine that countries boosting enrolment rates (e.g. through the dropping of user fees as recently done in Lesotho or in Malawi in the early 1990s) may successfully raise enrolment rates but may face as a consequence declining quality as class sizes increase, resources per pupil fall, and the learning environment deteri orates. Some of this might show up in attainment rates, but even those will not fully control for differences in educational quality. We will not be able to say much about this issue in this paper but it is an important caveat to bear in mind. In particular, it should caution against mechanically trying to reach the gross enrolment goals without ensuring that quality stays the same (or preferably improves), which will typically involve additional spending and institutional changes to accompany the increased enrolment rates.

Fourth, many countries ranked as 1 (expected to meet the goal) have, in the past few years, expanded female enrolments considerably, often far more than male enrolments. In this assessment, we are assuming that this differential expansion will continue for the coming years at the same pace as it has in the past 10 years. This is not guaranteed and will therefore require constant monitoring and continuing effort to stay on this path towards meeting the goal. To take an extreme example, female secondary enrolments in Bangladesh grew at 16.5 percent per year between 1990 and 1999 while male secondary enrolments grew at 8.0 percent. Bangladesh is meeting the goal if it

continues this massive and female-biased expansion, but that will be far from given and one will have to monitor the countries ranked as 1 just as closely as those ranked 2, 3, and 4 since many might easily deviate from their projected path. Thus one may argue that our projection of a linear trend is quite optimistic and that progress in female education might be much slower after recent boosts in their enrolment.[24]

Lastly, we focus here exclusively on the ability to reach gender equity in education, not on the development of overall education. Some countries are reaching gender equity in education through *declines* in enrolments that are faster for males than females. This is allowing them to meet the goal of gender equity, but takes them further from reaching the goal of education for all. As such, they will suffer serious economic consequences of these reduced *overall* education levels.[25] Thus, it is important to also investigate whether countries are experiencing rising or falling enrolment rates for both sexes. We will comment on this below.

With these caveats in mind, we will focus on those countries that are currently projected to fail to meet the MDG on gender equity for which we have complete data available (see below). The vast majority of those come from Sub-Saharan Africa (17), with 4 countries from South Asia, and 1 from each of East Asia, Europe and Central Asia, and Latin America and the Caribbean, and Middle East and North Africa. When assessing the costs of failing to meet the MDG on gender equality, it is clear that enrolment gaps per se do not impose significant costs to society.[26] It is the resulting gaps in educational attainment of the adult population that are the cause of the most significant costs, as all studies have found that the gap in educational *attainment* of adults is the factor that reduces economic growth, or compromises progress on reducing fertility, undernutrition, and child mortality.

Thus it is critical to estimate the impact of gaps in enrolments on subsequent gaps in achievement. Given that gaps in enrolment will only over time lead to gaps in achievement, the failure to meet the MDG on gender equity in enrolments is imposing costs that will materialize with a delay. Only when these uneducated girls turn into uneducated women do these costs begin to mount. Thus, one would not expect very large costs to occur by 2005, the date when the goal is supposed to be met, but in the periods thereafter when uneducated female cohorts enter the adult age groups.

Bearing the above in mind, our exercise must rely on the most widely available and current data, i.e. gross enrolment ratios, to derive education attainment data that can then be used in estimating the effects of the gender disparity in education on economic growth, fertility, and child mortality. In order to establish the relationship between gross enrolment rates and education attainment, we use Barro and Lee's latest (2000) education attainment and gross enrolment data, while restricting our analysis to the 78 developing countries in the dataset (as defined by the World Bank). Barro

and Lee's enrolment figures are based on UNESCO data and are available at five-yearly intervals for 1960-95.[27] Their attainment data, available at five-yearly intervals for 1960-2000, cover the female and male average years of primary and secondary schooling of the population aged 15 and over.[28] Similar the stock adjustment calculations made by Barro and Lee (2000), we suggest that, for females and males separately, current educational attainment of the adult population is a function of lagged education attainment, lagged enrolment rates, and the difference in current and lagged enrolment rates. Therefore, we regress available attainment data on the above variables, allowing additionally for variation across countries and over time. Unfortunately, we do not have attainment data for all the countries for which we have enrolment data so that this assessment and our subsequent analysis of the costs can only be done for those countries with complete attainment data.

Table 4 reports the results of these regressions, showing that for primary education, five-year lagged attainment, ten-year lagged enrolments, and the difference between current and ten-year lagged enrolments are excellent predictors (adjusted R-squared of 0.96-0.98) of current attainment. Even without any country or year fixed effects, we already are able to explain virtually all variation in attainment rates, although adding country and year fixed effects improves our fit. The coefficients are also highly significant and plausible in magnitude.[29] For secondary education, five-year lags for enrolments are intuitively more appropriate (as it takes fewer years until they join the population of 15 and above) and fit the data considerably better. We will report results for the country effects only, as the year effects were not always significant; those with country and year effects are quite similar and available on request. Table 4 therefore provide us with the required link, by means of the coefficients on regressors, between education enrolment and attainment that we can now use to project attainment.

(insert Table 4 here)

In order to assess the impact of failing to achieve the gender equality MDG, it is necessary to project two scenarios for female education: the first relies on existing trends in enrolment and simply projects enrolment as described above and attainment using the regressions in Table 4. The second scenario assumes the achievement of the MDG, stipulating that the average growth rate in female primary and secondary enrolment between 1995 and 2005 is such that female enrolment is equal to male enrolment by 2005 and remains so thereafter. As mentioned above, gross enrolment data are available until 1999 at best, so that our first exercise is to project enrolment in 2000, 2005, 2010, and 2015, adhering, where relevant, to the upper and lower bounds (see endnote 20). Based on these projected enrolments and the regression results in Table 4, Table 5 provide total projected primary and secondary years of schooling for males and females as well as target female years of schooling.

(insert Table 5 here)

Focusing first on males (left panel of Table 5) which reports actual total years of schooling in 2000 as well as projections for 2005 and 2015, there is a worryingly large number of countries that are projected to have declining educational attainment for males.[30] Of the 25 countries that are projected to be off-track and where data are complete, 6 countries exhibit declining total male years of schooling: Cameroon, Democratic Republic of Congo, Republic of Congo, Zambia, and Central African Republic in Sub-Saharan Africa; and Iraq in the Middle East. Male total years of schooling is projected to increase in the remaining 18 countries, roughly doubling between 2000 and 2015 in the case of Afghanistan, and tripling in the case of Mali and Guinea-Bissau.

Turning to females, the same countries exhibiting declining male total years of schooling (with the exception of Iraq) are also projected to experience declining female attainment. For all of these countries, target female total years of schooling are higher than those projected in 2005 as well as in 2015. For 2005, target years of schooling are higher than projected years for most the remaining countries as well, i.e. those with projected increases in female schooling. In the case of the Gambia, Nepal, Sierra Leone, and Liberia, however, the target female attainment in 2005 is actually slightly smaller than the projected attainment.[31] This is due to the fact that these countries show massive enrolment growth rates in the late 1990s. Both this huge growth rate (mostly due to recent 1999 figures) is suspect, as is the assumption that it would continue unchanged until 2005, so that it is likely that these countries will continue to exhibit gender gaps in education. However, the magnitude of these gaps is difficult to assess without resorting to essentially arbitrary alternative assumptions about the true enrolment figures for 1999 and their growth thereafter. We therefore retain these countries as countries likely to fail to meet the MDG and suffer costs, but cannot assess the magnitude of these costs. Additionally, for 2015, Ghana and Pakistan exhibit target schooling years that are lower than projected years, i.e. they will overshoot the goal of gender parity in education between 2005 and 2015; whether this will actually happen is also open to question. Therefore, for the countries that are overshooting the target by 2005 (i.e., the Gambia, Nepal, Sierra Leone, and Liberia) or 2015 (Ghana and Pakistan additionally), it will not be necessary to calculate the costs of failing to meet the goal for these years.

5. COSTS OF FAILING TO MEET THE MDG ON GENDER EQUITY

1. Economic Growth

It may be important to preface the presentation of the results with some caveats regarding the interpretation of the expected effects. First, these estimates are based on *average* effects found in cross-country regressions. While they would thus be a plausible projection of effects for any individual country, it may well be that the actual effect may be larger or smaller for any individual

country. Deviations from these average expected effects are also not likely to be random but related to the policy, educational, and institutional environment of a country. In countries where the overall policy and institutional environment is not conducive to economic growth, more female education is unlikely to deliver much higher growth either.[32] Similarly, in countries where female employment and economic activities are highly circumscribed, the positive effects of female education might not materialize to the same extent. Conversely, in environments more favorable to economic growth, removing the bottleneck of poor female human capital might well have a much larger effect than estimated here.[33]

Secondly, as these effects are based on historical assessment of the impact of female and male education on economic growth, they implicitly take into account differences in type or quality of education, including particularly also gender-streaming into fields of study within educational systems in many countries. If the female expansion in education implied by the target scenario would be entirely constrained to typical female occupations, one might expect that the growth effects will materialize to a lesser extent; conversely, if this expansion allows women to enter all fields of education and occupations, the effects may well be significantly larger.

Based on Klasen (2002) and Knowles *et al*. (2002) Tables 6a and 6b outline the impact on economic growth of achieving gender parity in education. Due to missing data on attainments, we are only able to project the effects for 25 countries. For the estimates based on Klasen (2002) we use the coefficient from the reduced form regression of the ratio of female to male expansion of education (0.75) to see whether a faster growth of female attainment, that would be consistent with meeting the target, would lead to higher growth in the period 1995-2005.[34] To estimate the impact of meeting the target between 2005 and 2015, we calculate the effect that would obtain from already having a higher ratio of female to male attainment in 2005, and of possibly having a higher female to male ratio in the growth of education between 2005 and 2015. For the effects based on Knowles *et al.* (2002), we use the impact higher female education would have on long-term per capita GDP.[35] We list the countries according to their rank. We are expecting the largest effects in the countries ranked as a 4, and progressively smaller effects for countries ranked 3 or 2.

(insert Tables 6a and 6b here)

Beginning with the third column in Table 6a, we find that the growth effects of meeting the goal are considerable in the countries that are currently off-track. Most countries in categories 3 and 4 would have grown faster by 0.1-0.3 percentage points between 1995 and 2005 if they had embarked on a path to meet the goal in 1995. In the period 2005-2015, the effects become significantly larger, averaging around 0.4 percentage points per year for countries in categories 3 and 4.[36]

In short, we are observing sizable losses for countries that are failing to meet the goal of gender equity in education by 2005. If these figures of 0.1-0.3 percent in annual growth appear small, one

has to remember the power of compounding. A country with a PPP-GDP per capita of $1500 in 1995 and a projected per capita growth rate of 1 percent per year (both typical values for many countries in Sub-Saharan Africa) between 1995 and 2015 would have 10 percent higher income in 2015 if the effect of failing to meet the goal was 0.4 percentage points in both 10-year periods. Also, one should bear in mind that many countries in Sub-Saharan Africa have experienced no or negative growth in the past. In that context, even such a seemingly small effect would ensure that many countries could return to positive growth or significantly increase their existing growth potential.

Turning to the calculations based on Knowles *et al.* (2002), they confirm the sizable impact of failing to reach the goal on gender inequality. In fact, if anything, most measured effects appear to be larger than the ones based on Klasen (2002). Were countries to meet the goal of gender equity in enrolments, their average 1975-2005 GDP per capita levels would be up to 15 percent larger. For 1985-2015, the effect would also reach up to 14 percent. As with the estimates based on Klasen (2002), the effect would be largest for countries categorized as groups 3 or 4, and comparatively small for those in group 2.[37] The growth estimates based on Knowles yield even larger effects, but they should be treated with some caution as they are not their preferred estimates (see above).[38]

In sum, these results suggest that countries failing to meet the goal of gender equity in education will suffer losses in terms of economic growth. The point estimates differ according to specification but converge on suggesting that the countries that are seriously off track will suffer the most.

2. Fertility, Child Mortality, and Undernutrition

Apart from investigating the effects on economic growth, we also examine what the costs of failing to meet the goal are in terms of foregone reductions in fertility, child mortality, and malnutrition. Here again, we use the average effects found in the studies discussed above and apply them to countries. The effects may differ from country to country, although the size of the effect of female education on fertility, child mortality, and undernutrition appears to be much more similar across regions of the world and less dependent on the overall policy and institutional environment.[39] Thus we have more confidence in applying these average effects to individual countries.

The fertility and child mortality estimates are based, in the first instance, on the regressions presented in Table 3, particularly the equations using the female/male ratio of the total years of schooling (equations 2 and 4). In addition, we consider the specification and results by Schultz (1994) to compare these effects. For the reductions in malnutrition, we rely on our female secondary enrolments predictions and the results from Smith and Haddad (1999).

As Table 7a shows, the number of births per woman would be reduced by 0.1-0.4 children per woman by 2005 if countries met the goal of gender equity. Once again, the effects are largest in the

category 4 countries, while they are smaller in the other countries. By 2015, the effects would rise to up to 0.6 fewer children per woman.

In terms of child mortality, the effects are also sizable. Meeting the goal would reduce child mortality by up to 24 children per 1000 in Afghanistan (a seriously off-track country) in 2005. By 2015 the effects would mount to 20-32 children per 1000 in a number of countries. Thus, meeting the goal would greatly assist countries in meeting the MDG on child mortality, which, for some countries, might be very difficult to reach without the help of having first eliminated the gender gap in schooling. For example, in Afghanistan and Mali, where the effect of gender equity in education leads to a reduction of child mortality in 2005 by 24 and 14 children per 1000 respectively, the achievement of the goal would save the lives of approximately 110,000 children in Afghanistan and 35,000 children in Mali (based on current UN projections for the population aged 0-4 years, and assuming constant fertility rates[40]). In India, the number of children whose death could be averted reaches 435,000 per year in 2005, based on a reduction of child mortality by 3 deaths per 1000. The numbers of deaths averted are considerably larger in 2015 when the impact is projected to be much higher.

[Insert Tables 7a and 7b]

In Table 7b, we use the Schultz (1994) specification to examine the impact of meeting the goal on fertility and child mortality. The results of the fertility regression are larger when the fixed effect specification is used. Overall they are remarkably similar to the findings in Table 7a and also suggest considerable costs in terms of fertility for failing to meet the goal. The results for child mortality show somewhat smaller effects but still on the order of magnitude suggested by the earlier results. In terms of annually averted child deaths in 2005, given current demographic conditions, the number for Afghanistan is 31,000, for Mali 5,000, and for India 240,000.

The effects of closing the gender gap on malnutrition rates (i.e. the share of children under five years of age who are moderately or severely underweight) are particularly large, as shown in Table 8. If countries would meet the MDG on gender equity by 2005, malnutrition rates would be lower by several percentage points already in 2005 in half the countries, and the effect would be even larger thereafter. Also here, those most seriously off-track would benefit the most from boosting female education. Closing the gender gap in education would therefore play a significant role in helping to meet the MDG on poverty, which includes halving the proportion of people who suffer from hunger as its second target, and specifically the prevalence of underweight children.[41]

Clearly, failing to meet the goal of gender equity in education will not only hurt the girls who lose an opportunity for an education, but also impose societal costs in terms of lower growth, higher fertility, child mortality, and malnutrition. There are likely to be other losses in areas not investigated here, such as curtailing educational investments of the next generation and reducing

girls' vulnerability to HIV/AIDS, given that girls and young women are highly vulnerable to HIV/AIDS, and a lack of education makes them more so.[42]

(insert Table 9 here)

6. Conclusion

In this paper, we took the insights of recent findings about the effects of gender gaps in education on economic growth and on fertility, child mortality, and undernutrition to estimate the losses that countries are likely to suffer if they do not meet the MDG of equity in primary and secondary education by 2005. Using different specifications and different ways to translate the failure to reach the enrolment goal into attainment gaps, we find that the countries failing to meet the goal will indeed suffer significant losses in terms of foregone economic growth as well as smaller progress in reducing levels of fertility, child mortality, and undernutrition. Point estimates suggest that the countries that are currently seriously off track might lose 0.1-0.3 percentage points in annual economic growth between 1995 and 2005, and an average of 0.4 percentage points between 2005 and 2015. In addition, failing to meet the goal would lead to 0.1-0.6 more children per woman by 2015 and to higher child mortality of up to 32 per 1000 depending on how far the countries are from meeting the goal. Sensitivity analyses using results from different studies show that these results are quite robust to different specifications of the effects as well as to different approaches of turning enrolments into educational attainments. Thus, promoting female education to close these gaps is not only intrinsically valuable for the girls who would benefit and would further an important aspect of gender equity in developing countries, but it would assist in the overall development of these countries as well. From this point of view, there are high returns to investing heavily to meet this goal and ensure that it is not only met in its quantitative dimensions but also will be accompanied by improvements in completion rates and the quality of education made available.

While focusing on gender equity in education as a high priority, one should not lose sight of overall educational achievements. As shown above, many countries are currently experiencing stagnating or even declining educational enrolments. Reaching gender equity in the face of these declining overall enrolments is valuable, but clearly the goal must be to push for gender equity at high *overall* levels of enrolments. Thus for those countries, the decline in enrolments must be halted and reversed and educational opportunities must be expanded for all, but the expansion should be faster for females than for males to close the remaining gaps.

REFERENCES

Ahuja, V. & Filmer, D. (1995). Educational Attainment in Developing Countries: New Estimates and Projections Disaggregated by Gender. *Policy Research Working Paper No. 1489, Background paper for World Development Report 1995*, Washington, DC: the World Bank.

Alderman, H., Behrman, J., Khan, S., Ross, D., & Sabot, R. (1995). Public Schooling in Rural Pakistan: Efficiently Targeting Girls in a Lagging Region. In D. Van de Walle & K. Nead (Editors), *Public Spending and the Poor*. Baltimore, MD: Johns Hopkins Press.

Alderman, H., Behrman, J., Ross, D. & Sabot, R. (1996). Decomposing the Gender Gap in Cognitive Skills in a Poor Rural Economy. *Journal of Human Resources, 31*, 229-54.

Appiah, E. N. & McMahon, W. (2002). The Social Outcomes of Education and Feedbacks on Growth in Africa. *Journal of Development Studies, 38*, 27-68.

Barro, R.(1991). Economic Growth in a Cross-Section of Countries. *Quarterly Journal of Economics, 106*, 407-443.

Barro, R. & Lee, J. (1996). International Measures of Educational Achievement. *American Economic Review, 86*, 218-223.

Barro, R. & Lee, J. (2000). International Data on Educational Attainment: Updates and Implications. *National Bureau of Economic Research Working Paper No. 7911*, Cambridge, MA.

Barro, R. & Sala-i-Martin, X. (1995). *Economic Growth*. New York, NY: McGraw-Hill.

Becker, G. (1991). *A Treatise on the Family*. Cambridge, MA: Harvard University Press.

Bloom, D. & Williamson, J. (1998). Demographic Transition and Economic Miracles in Emerging Asia. *World Bank Economic Review, 12*, 419-455.

Bruno, M., Squire, L., & Ravallion, M. (1996). Equity and Growth in Developing Countries. *Policy Research Working Paper No. 1563*. Washington, DC: The World Bank.

Devarajan, S., Easterly, W. & Pack, H. (2001). Is Investment in Africa too High or too Low? Macro- and Micro- Evidence. *Journal of African Economies, 10*, 81-108.

Dollar, D. & Gatti, R. (1999). Gender Inequality, Income, and Growth: Are Good Times Good for Women? Mimeographed. Washington, DC: The World Bank.

Drèze, J. & Sen, A. (1989). *Hunger and Public Action*. New York, NY: Clarendon Press.

Filmer, D., King, E. M., & Pritchett, L. (1998). Gender Disparity in South Asia: Comparisons between and within Countries. *Policy Research Working Paper 1867*. Washington, D.C: The World Bank.

Forbes, K. (2000). A Reassessment of the Relationship between Inequality and Growth. *American Economic Review, 90*, 869-887.

Galor, O. & Weil, D. N. (1996). The Gender Gap, Fertility, and Growth.. *American Economic Review, 86*, 374-387.

Gatti, R. (1999). A Cross-Country Analysis of Fertility Determinants. Mimeographed. Washington, DC: The World Bank.

Hill, M. A. & King, E. M . (1995). *Women's Education in Developing Countries: Barriers, Benefits, and Policies.* Baltimore, MD: Johns Hopkins University Press.

Horton, S. (1999). Marginalization Revisited: Women's Market Work and Pay, and Economic Development. *World Development, 27,* 571-582.

Klasen, S. (1999). Does Gender Inequality Reduce Growth and Development? Evidence from Cross-Country Regressions. *World Bank Policy Research Report Working Paper No. 7*. Washington, DC: The World Bank.

Klasen, S. (2002). Low Schooling for Girls, Slower Growth for All? Cross-Country Evidence on the Effect of Gender Inequality in Education on Economic Development. *World Bank Economic Review, 16(3),* 345-373.

Klasen, S. & Wink, C. (2002). A Turning Point in Gender Bias in Mortality? An Update on the Number of Missing Women. *Population and Development Review, 28(2),* 285-312.

Klasen, S. & Lamanna, F. (2003). The Impact of Gender Inequality in Education and Employment on Economic Growth in the Middle East and North Africa. Mimeographed, University of Munich.

Knodel, J. and Jones. 1996. "Post-Cairo Population Policy: Does promoting girls' schooling miss the mark? *Population and Development Review* 22: 683-702.

Knowles, S., Lorgelly, P. K., & Owen, P.D. (2002). Are Educational Gender Gaps a Brake on Economic Development? Some Cross-Country Empirical Evidence. *Oxford Economic Papers, 54,* 118-149.

Lagerlöf, N. (1999). Gender Inequality, Fertility, and Growth. Mimeographed. Department of Economics, University of Sydney.

Lorgelly, P. (2000). Are there Gender-Separate Huamn Capital Effects on Growth? A Review of the Recent Empirical Evidence. CREIT Research Paper 00/13, Nottingham: University of Nottingham.

Lorgelly, P.K. & Owen, P.D. (1999). The Effect of Female and Male Schooling on Economic Growth in the Barro-Lee Model. *Empirical Economics, 24,* 537-557.

Mankiw, N.G., Roemer, D., & Weil, D. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics, 107,* 407-437.

Murthi, M., Guio, A.-C., & Drèze, J. (1995). Mortality, Fertility, and Gender Bias in India: A District-Level Analysis. *Population and Development Review, 21,* 745-782.

Murthi, M. & Drèze, J. (2001). Fertility, Education, and Development: Evidence from India. *Population and Development Review, 27,* 33-63.

Pritchett, L. (2001). Where Has All the Education Gone? *World Bank Economic Review, 15,* 367-391.

Pritchett, L. & Summers, L. (1996). Wealthier is Healthier. *Journal of Human Resources, 31,* 841-868.

Sachs, J. & Warner, M. (1995). Natural Resource Abundance and Economic Growth. *National Bureau of Economic Research Working Paper, No. 5398,* Cambridge, MA.

Sachs, J. & Warner, M. (1997). Source of Slow Growth in African Economies. *Journal of African Economies, 6,* 335-76.

Schultz, T. P. (1994). Human Capital, Family Planning, and their Effects on Population Growth. *American Economic Review, 84(2),* 255-260.

Schultz, T. P. (1997). Demand for Children in Low Income Countries. In M. Rosenzweig & O.

Stark (Editors), *Handbook of Population and Family Economics*. Amsterdam: Elsevier.

Seguino, S. (2000). Gender Inequality and Economic Growth: A Cross-Country Analysis. *World Development, 28,* 1211-1230.

Sen, A. (1999). *Development as Freedom*. New York, NY: Knopf.

Smith, L. & Haddad, L. (1999). Explaining Child Malnutrition in Developing Countries. *International Food Policy Research Institute Research Report, No. 111,* Washington, DC: International Food Policy Research Institute.

Smith, L., Ramakrishnan, U., Haddad, L., Martorell, R., & Ndiaye, A. (2001). The Importance of Women's Status for Child Nutrition in Developing Countries. Draft Policy Report. Washington, DC: International Food Policy Research Institute.

Standing, G. (1999). Global Feminization Through Flexible Labor: A Theme Revisited. *World Development, 27,* 583-602.

Subbarao, K. & Raney, L. (1995). Social Gains from Female Education: A Cross-national study. *Economic Development and Cultural Change, 44(1),* 105-28.

Summers, L. (1994). Investing in All the People. Washington, DC: The World Bank.

Taylor, A. (1998). On the Costs of Inward-looking Development. *Journal of Economic History, 58,* 1-28.

Thomas, D. (1990). Intrahousehold Resource Allocation: An Inferential Approach. *Journal of Human Resources, 25,* 634-64.

Thomas, D. (1997). Income, Expenditures, and Health Outcomes: Evidence on Intrahousehold Resource Allocation. In L. Haddad, J. Hoddinott, and H. Alderman (Editors) *Intrahousehold Resource Allocation in Developing Countries: Models, Methods, and Policy.* Baltimore, MD: Johns Hopkins University Press.

Tzannatos, Z. (1999). Women and Labor Market Changes in the Global Economy: Growth Helps, Inequalities Hurt, and Public Policy Matters. *World Development, 27(3),* 551-569.

United Nations. (2000). Millennium Declaration. New York, NY: United Nations.

United Nations Development Programme. (1995). *Human Development Report*. New York, NY: Oxford University Press.

United Nations Development Programme. (1996). *Human Development Report*. New York, NY: Oxford University Press.

World Bank. (1993). *World Development Report*. New York, NY: Oxford University Press.

World Bank. (2001). *Engendering Development*. Washington, DC: The World Bank.

World Bank. (2002). *Education and HIV/AIDS:A Window of Hope.* Washington, DC: The World Bank.

Yamarak, S. and S. Ghosh (2003). Is Female Education Productive? A Reassessment. Mimeographed, Medford, MA: Tufts University.

Young, A. (1995). The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience. *Quarterly Journal of Economics, 110(3),* 641-680.

Table 1: Gross Enrolment Rates and Education Attainment, by Region

	Primary Gross Enrolment Rate				Secondary Gross Enrolment Rate				Average Years of Attainment [b]			
	1975		1999		1975		1999		1970		1995	
Region	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males
East Asia & Pacific	108	121	106	105	35	49	60	65	3.06	4.54	5.85	6.84
Europe & Central Asia	..	..	93	95	..	..	80	81	8.09	8.93	9.67	9.20
Latin America & Caribbean	97	100	130	133	34	35	87	80	3.52	4.14	5.58	5.91
Middle East & North Africa	64	99	91	99	24	44	67	72	1.39	2.75	4.21	5.74
South Asia	58	91	91	110	15	33	41	57	1.08	2.95	2.94	5.31
Sub-Saharan Africa [a]	45	66	73	85	6	13	23	28	1.56	2.60	2.82	3.98

[a] Latest available data on primary GERs are from 1998 and on secondary GERs from 1996.

[b] Attainment data include schooling beyond secondary. Since data are from Barro and Lee (2000), the regional classification includes some countries with per capita incomes too high to be included in the World Bank's database (the one used for the GERs).

Source: World Development Indicators central database and Barro and Lee (2000).

Table 2: Empirical Results Used in Analysis

	Growth Regressions		Fertility, Child Mortality, Undernutrition		
Source	Klasen (2002)	Knowles et al. (2002)	Authors' estimates	Schultz (1994)	Smith and Haddad (1999)
Regression Framework	Cross-Country and Panel Growth Regression	Cross-Country Level and Growth Regression	Cross-Country Fertility and Child Mortality Regression	Panel Fertility and Child Mortality Regressions	Panel Undernutrition Regressions with fixed effects
Education Variable	Initial Female Male Ratio Gap in Total Years of Schooling and FMR of growth of schooling	Log of female and male years of schooling	Two specifications: (1) Male and female years of schooling (2) male and female-male ratio of years of schooling	Male and female years of schooling	Female secondary school enrolment rate
Control Variables	Average education, growth of average education, openness, regional dummies, initial income	Investment rates, population growth, country-specific technology levels	Per capita income, regional dummy variables	Family planning score, trade surplus in fuels, urbanization, agricultural share of labor force, calories per capita	Access to safe water, female-male life expectancy ratio, calories per capita
Preferred Point Estimate (standard error)	Initial Gap: 1.64 (0.73) Gap of Ed. Growth: 0.75 (0.26)	Level Regression: 0.37 (0.103) Growth Regression: 0.21 (0.07)	(1) Fertility: -0.358 (0.130) Child mortality: -18.102 (6.259) (2) Fertility: -2.619 (0.496) Child mortality: -142.377 (29.264)	TFR (pooled): -0.0824 (0.013) TFR (fixed effects): -0.131 (0.025) Child Survival: 0.145 (0.0033)	-0.167 (0.0633)
Endogeneity Controls	Yes	Yes	No	No	Yes
Estimation Procedure	OLS and TSLS	OLS and TSLS	OLS	OLS with fixed effects	OLS and TSLS

Table 3: Fertility and Child Mortality Regressions

Dependent variables: total fertility rate and under-5 child mortality rate in 1990

	Fertility		Child Mortality	
	Equation 1	**Equation 2**	**Equation 3**	**Equation 4**
Constant	4.444 *	6.316 *	145.116 *	244.727 *
	(0.558)	(0.592)	(24.682)	(28.754)
Per capita GDP (1990)	0.000 **	0.000 **	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Male total years of schooling (1990)	0.136	-0.118 **	2.131	-10.388 *
	(0.136)	(0.059)	(6.455)	(2.653)
Female total years of schooling (1990)	-0.358 *		-18.102 *	
	(0.130)		(6.259)	
Female/male ratio of total years of schooling (1990)		-2.619 *		-142.377 *
		(0.496)		(29.264)
Sub-Saharan Africa	2.240 *	2.051 *	57.951 *	49.771 *
	(0.497)	(0.480)	(20.266)	(18.785)
Latin America & Caribbean	0.512	0.650 ***	-4.874	4.360
	(0.355)	(0.332)	(14.095)	(13.087)
South Asia	0.672	0.461	7.287	-4.088
	(0.572)	(0.535)	(19.124)	(18.548)
OECD	0.301	0.219	10.927	6.137
	(0.385)	(0.345)	(15.189)	(12.595)
Middle East & North Africa	1.581 *	1.406 *	-8.985	-18.826
	(0.472)	(0.466)	(16.724)	(16.499)
Europe & Central Asia	-0.337	-0.496	22.963	14.316
	(0.405)	(0.380)	(14.576)	(12.700)
No. of observations	105	105	109	109
Adjusted R-squared	0.810	0.834	0.707	0.762

* significant at 1%, ** significant at 5%, *** significant at 10%, standard errors in parentheses

Omitted region is East Asia and the Pacific.

Table 4: Regressions Matching Enrolment to Attainments

	Primary Level [a]						Secondary Level [b]					
	Females			Males			Females			Males		
	Simple Regression	Country Effects	Country & Year Effects	Simple Regression	Country Effects	Country & Year Effects	Simple Regression	Country Effects	Country & Year Effects	Simple Regression	Country Effects	Country & Year Effects
Constant	0.026	0.163 ***	0.806 *	0.082	0.414 *	1.598 *	0.013	0.010	0.044	0.025	0.004	0.175 **
	(0.039)	(0.089)	(0.178)	(0.065)	(0.146)	(0.240)	(0.010)	(0.015)	(0.041)	(0.017)	(0.028)	(0.070)
Lagged attainment [c]	0.952 *	0.767 *	0.635 *	0.941 *	0.693 *	0.476 *	0.926 *	0.744 *	0.754 *	0.931 *	0.715 *	0.689 *
	(0.012)	(0.035)	(0.047)	(0.013)	(0.038)	(0.050)	(0.023)	(0.033)	(0.035)	(0.022)	(0.036)	(0.039)
Lagged enrolment [d]	0.379 *	0.771 *	0.503 *	0.336 *	0.779 *	0.404 **	0.466 *	0.872 *	0.759 *	0.425 *	1.001 *	0.726 *
	(0.066)	(0.141)	(0.149)	(0.081)	(0.181)	(0.184)	(0.055)	(0.080)	(0.096)	(0.058)	(0.113)	(0.137)
Difference between current	0.402 *	0.417 *	0.234 ***	0.413 *	0.589 *	0.358 **	0.505 *	0.510 *	0.436 *	0.537 *	0.666 *	0.537 *
and lagged enrolment	(0.088)	(0.119)	(0.122)	(0.099)	(0.147)	(0.145)	(0.098)	(0.103)	(0.108)	(0.108)	(0.118)	(0.124)
Year 1965									-0.049			-0.149 *
									(0.035)			(0.051)
Year 1970			-0.271 *			-0.443 *			-0.010			-0.082 ***
			(0.073)			(0.081)			(0.033)			(0.047)
Year 1975			-0.247 *			-0.366 *			-0.016			-0.090 **
			(0.063)			(0.069)			(0.030)			(0.043)
Year 1980			-0.095 ***			-0.186 *			0.026			-0.020
			(0.055)			(0.062)			(0.027)			(0.039)
Year 1985			-0.126 *			-0.142 *			-0.030			-0.081 **
			(0.047)			(0.054)			(0.026)			(0.037)
Year 1990			0.002			-0.024 *			0.026			0.022
			(0.044)			(0.052)			(0.025)			(0.036)
No. of observations	409	409	409	404	404	404	467	467	467	464	464	464
Adjusted R-squared	0.977	0.979	0.980	0.956	0.960	0.964	0.941	0.952	0.953	0.912	0.924	0.927
F test,		1.445 **	1.757 *		1.534 *	2.159 *		2.360 *	2.330 *		1.996 *	2.059 *
country effects jointly zero												

[a] Dependent variable: average years of primary schooling in population aged 15 or above

[b] Dependent variable: average years of secondary schooling in population aged 15 or above

[c] Five-year lag for both primary and secondary level.

[d] Ten-year lag for primary, five-year lag for secondary level.

* significant at 1%, ** significant at 5%, *** significant at 10%, standard errors in parentheses

Omitted years are 1995 and 2000.

Table 5: Total Primary and Secondary Years of Schooling for Off-Track Countries, Country Effects

		Males			Females				
	Revised	2000	2005	2015	2000	2005		2015	
Country	Ranking	Actual	Projected	Projected	Actual	Projected	Target	Projected	Target
Cameroon	2	4.03	3.81	3.38	2.94	2.89	2.97	2.71	2.92
Congo, Dem. Rep.	2	4.08	3.35	2.17	1.95	1.79	1.85	1.36	1.45
Congo, Rep.	2	5.55	5.09	4.13	4.54	4.41	4.58	3.83	4.19
Gambia, The	2	2.98	3.13	3.43	1.63	2.08	2.06	3.29	2.86
Ghana	2	5.63	6.01	6.46	2.14	2.67	2.69	3.53	3.49
Guatemala	2	3.66	4.13	5.01	3.03	3.50	3.55	4.50	4.64
Nepal	2	3.26	3.66	4.49	1.45	2.33	2.32	4.31	4.04
Papua New Guinea	2	3.23	3.45	4.19	2.42	2.70	2.72	3.66	3.65
Sierra Leone	2	3.08	3.36	3.89	1.70	2.13	2.07	3.37	2.90
Turkey	2	5.90	6.01	6.36	4.17	4.43	4.61	4.95	5.44
Uganda	2	4.28	4.55	4.97	2.72	3.12	3.15	3.96	3.97
Zambia	2	5.91	5.61	5.04	4.94	4.94	4.96	4.84	4.85
Benin	3	3.25	3.66	4.68	1.38	1.82	2.01	2.96	3.61
Central African Republic	3	3.34	2.99	2.43	1.70	1.66	1.77	1.53	1.85
Guinea-Bissau	3	0.94	1.56	3.00	0.74	1.13	1.31	2.45	2.97
India	3	6.14	6.14	6.21	3.66	3.99	4.13	4.66	4.97
Liberia	3	3.23	3.44	4.13	1.51	1.94	1.92	3.59	3.10
Mali	3	1.17	1.90	3.60	0.56	1.05	1.23	2.46	3.11
Mozambique	3	1.37	1.72	2.49	0.84	0.99	1.14	1.73	2.07
Niger	3	1.36	1.41	1.49	0.66	0.76	0.80	1.01	1.09
Pakistan	3	5.02	5.58	6.80	2.48	3.23	3.27	5.19	5.12
Senegal	3	3.05	3.31	3.83	1.93	2.28	2.33	3.16	3.18
Togo	3	4.52	4.77	5.38	2.08	2.58	2.76	3.69	4.22
Afghanistan	4	2.49	3.76	5.76	0.79	1.28	1.91	2.96	4.27
Iraq	4	4.30	4.09	3.72	3.18	3.23	3.43	3.22	3.81

Source: Barro-Lee data (2000) and authors' calculations.

Table 6a: Effect on Economic Growth of Gender Parity in Education, Country Effects, Using Klasen (2002)

Country	Revised Ranking	10-Year Impact on Growth						30-Year Impact on Growth					
		1995-2005			2005-2015			1975-2005			1985-2015		
			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval	
Cameroon[a]	2	0.7	0.2	1.1	0.2	0.1	0.3	0.1	0.0	0.1	2.8	0.9	4.7
Congo, Dem. Rep.[a]	2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Congo, Rep.[a]	2	0.3	0.1	0.5	0.1	0.0	0.1	na	na	na	0.1	0.0	0.2
Gambia, The[b]	2	..	..	..	..	..	..	..	..	..	..	..	..
Ghana[b]	2	..	..	..	..	..	..	..	..	..	..	..	..
Guatemala	2	0.1	0.0	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1
Nepal[b]	2	..	..	..	..	..	..	..	..	..	..	..	..
Papua New Guinea[b]	2	..	..	..	..	..	..	..	..	..	..	..	..
Sierra Leone[b]	2	..	..	..	..	..	..	..	..	..	..	..	..
Turkey	2	0.7	0.2	1.2	0.7	0.2	1.2	0.1	0.0	0.1	0.2	0.1	0.3
Uganda	2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zambia[a]	2	0.1	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1
Benin	3	0.2	0.1	0.4	0.4	0.1	0.7	0.1	0.0	0.1	0.2	0.1	0.3
Central African Republic[a]	3	0.3	0.1	0.5	0.2	0.1	0.3	0.1	0.0	0.1	1.1	0.4	1.9
Guinea-Bissau	3	0.2	0.1	0.4	0.4	0.1	0.7	na	na	na	0.2	0.1	0.3
India[c]	3	0.2	0.1	0.4	..	..	..	0.0	0.0	0.1	0.2	0.1	0.3
Liberia[b]	3	..	..	..	..	..	..	..	..	..	..	..	..
Mali	3	0.2	0.1	0.3	0.4	0.1	0.6	0.1	0.0	0.2	0.2	0.1	0.3
Mozambique	3	0.3	0.1	0.4	0.3	0.1	0.6	0.2	0.1	0.3	0.2	0.1	0.3
Niger	3	0.2	0.1	0.4	0.5	0.1	0.8	0.1	0.0	0.1	0.1	0.0	0.2
Pakistan[b]	3	0.1	0.0	0.1	..	..	..	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	3	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Togo	3	0.3	0.1	0.5	0.5	0.1	0.8	0.0	0.0	0.1	0.3	0.1	0.4
Afghanistan	4	0.3	0.1	0.5	0.5	0.1	0.9	0.3	0.1	0.4	0.3	0.1	0.4
Iraq[a,c]	4	..	..	..	0.7	0.2	1.2	0.1	0.0	0.2	0.5	0.2	0.9

"na" not available

[a] In these countries, male and female educational attainment are projected to fall. If countries meet the target, the female fall would be smaller, but then the female-male ratio of the growth in attainment would also (implausibly) be smaller (as a smaller negative number is divided by the same negative number yielding a smaller positive number). To correct for this, the sign of the growth effect was reversed.

[b] In these countries, the target attainment for females is indistinguishable or even smaller than the projected attainment. This is due to huge jumps in enrolments in the late 1990s and consequent high imputed growth rates in enrolments. Once these are extrapolated to 2005 (or 2015), they suggest no gender gaps and associated costs. Thus, we do not estimate costs for these countries. But since we question the accuracy of the latest enrolment figures as well as the extrapolation of high enrolment growth, we believe that the costs will be similar to other countries' in the same rank.

[c] In these countries, the growth effect of meeting the goal was estimated to be implausibly high due to the very small denominator of the male educational contraction and thus the huge impact of changing the target expansion of female education. Similarly, the effects for Turkey and Cameroon suffer from this problem to a lesser extent and the results should be treated with some caution.

Table 6b: Effect on Economic Growth of Gender Parity in Education, Country Effects, Using Knowles *et al.* (2002)

Country	Revised Ranking	1975-2005						1985-2015					
		GDP Change (%)			Growth Effect			GDP Change (%)			Growth Effect		
			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval	
Cameroon	2	0.7	0.3	1.0	0.4	0.2	0.6	1.7	0.8	2.6	1.0	0.6	1.4
Congo, Dem. Rep.	2	0.8	0.4	1.3	0.5	0.3	0.7	1.2	0.5	1.9	0.7	0.4	1.0
Congo, Rep.	2	na	na	na	na	na	na	1.7	0.8	2.6	1.0	0.6	1.5
Gambia, The[a]	2	..	..	..	..	..	..	..	..	..	..	..	..
Ghana[a]	2	0.2	0.1	0.3	0.1	0.1	0.2	..	..	..	..	..	..
Guatemala	2	0.3	0.2	0.5	0.2	0.1	0.3	0.7	0.3	1.1	0.4	0.2	0.6
Nepal[a]	2	..	..	..	..	..	..	..	..	..	..	..	..
Papua New Guinea[a]	2	0.2	0.1	0.4	0.1	0.1	0.2	..	..	..	..	..	..
Sierra Leone[a]	2	..	..	..	..	..	..	..	..	..	..	..	..
Turkey	2	1.0	0.5	1.6	0.6	0.3	0.9	2.4	1.1	3.8	1.4	0.8	2.1
Uganda	2	0.3	0.1	0.5	0.2	0.1	0.3	0.1	0.0	0.1	0.1	0.0	0.1
Zambia	2	0.1	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Benin	3	3.2	1.5	4.9	1.9	1.1	2.7	6.3	2.8	9.7	3.7	2.1	5.3
Central African Republic	3	2.0	0.9	3.0	1.2	0.7	1.7	4.9	2.2	7.5	2.9	1.6	4.1
Guinea-Bissau	3	na	na	na	na	na	na	6.9	3.1	10.6	4.1	2.3	5.8
India	3	1.0	0.4	1.5	0.6	0.3	0.8	1.6	0.7	2.5	1.0	0.5	1.4
Liberia[a]	3	..	..	..	..	..	..	..	..	..	..	..	..
Mali	3	5.4	2.4	8.3	3.2	1.8	4.6	8.5	3.9	13.2	5.0	2.8	7.3
Mozambique	3	4.6	2.1	7.2	2.7	1.5	4.0	5.6	2.5	8.6	3.3	1.9	4.7
Niger	3	1.9	0.8	2.9	1.1	0.6	1.6	2.4	1.1	3.7	1.4	0.8	2.0
Pakistan[a]	3	0.4	0.2	0.7	0.2	0.1	0.4	..	..	..	..	..	..
Senegal	3	0.5	0.2	0.7	0.3	0.2	0.4	0.1	0.0	0.2	0.1	0.0	0.1
Togo	3	2.1	0.9	3.2	1.2	0.7	1.8	3.7	1.7	5.7	2.2	1.2	3.1
Afghanistan	4	14.8	6.7	22.9	8.8	4.9	12.6	14.4	6.5	22.2	8.5	4.8	12.2
Iraq	4	1.7	0.8	2.7	1.0	0.6	1.5	4.2	1.9	6.5	2.5	1.4	3.6

"na" not available

[a] In these countries, the target attainment for females is indistinguishable or even smaller than the projected attainment. This is due to huge jumps in enrolments in the late 1990s and consequent high imputed growth rates in enrolments. Once these are extrapolated to 2005 (or 2015), they suggest no gender gaps and associated costs. Thus, we do not estimate costs for these countries. But since we question the accuracy of the latest enrolment figures as well as the extrapolation of high enrolment growth, we believe that the costs will be similar to other countries' in the same rank.

Table 7a: Impact on Fertility and Child Mortality Rates of Gender Parity in Education, Country Effects

Using Female/Male Ratio of Total Years of Schooling

Country	Revised Ranking	Fertility Impact						Child Mortality Impact					
		2005			2015			2005			2015		
			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval	
Cameroon	2	-0.1	-0.1	0.0	-0.2	-0.2	-0.1	-2.9	-4.0	-1.7	-9.1	-12.7	-5.4
Congo, Dem. Rep.	2	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-2.6	-3.6	-1.5	-6.1	-8.5	-3.6
Congo, Rep.	2	-0.1	-0.1	-0.1	-0.2	-0.3	-0.1	-4.7	-6.7	-2.8	-12.3	-17.2	-7.3
Gambia, The[a]	2	..	..	..	..	..	..	..	..	..	..	..	
Ghana	2	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.9	-0.4	0.7	1.0	0.4
Guatemala	2	0.0	0.0	0.0	-0.1	-0.1	0.0	-1.6	-2.3	-1.0	-4.0	-5.6	-2.4
Nepal[a]	2	..	..	..	..	..	..	..	..	..	..	..	
Papua New Guinea	2	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	-1.4	-0.6	0.2	0.3	0.1
Sierra Leone[a]	2	..	..	..	..	..	..	..	..	..	..	..	
Turkey	2	-0.1	-0.1	0.0	-0.2	-0.3	-0.1	-4.1	-5.8	-2.5	-11.1	-15.6	-6.6
Uganda	2	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	-1.5	-0.6	-0.4	-0.5	-0.2
Zambia	2	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.9	-0.4	-0.1	-0.1	-0.1
Benin	3	-0.1	-0.2	-0.1	-0.4	-0.5	-0.2	-7.5	-10.5	-4.5	-19.6	-27.5	-11.7
Central African Republic	3	-0.1	-0.1	-0.1	-0.3	-0.5	-0.2	-5.4	-7.6	-3.2	-18.9	-26.5	-11.3
Guinea-Bissau	3	-0.3	-0.4	-0.2	-0.5	-0.6	-0.3	-16.5	-23.1	-9.8	-24.8	-34.8	-14.8
India	3	-0.1	-0.1	0.0	-0.1	-0.2	-0.1	-3.4	-4.7	-2.0	-7.1	-9.9	-4.2
Liberia[a]	3	..	..	..	..	..	..	..	..	..	..	..	
Mali	3	-0.3	-0.4	-0.2	-0.5	-0.6	-0.3	-13.9	-19.5	-8.3	-25.7	-36.1	-15.4
Mozambique	3	-0.2	-0.3	-0.1	-0.3	-0.5	-0.2	-12.3	-17.2	-7.3	-19.0	-26.6	-11.3
Niger	3	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-4.6	-6.5	-2.8	-8.4	-11.7	-5.0
Pakistan	3	0.0	0.0	0.0	0.0	0.0	0.0	-1.1	-1.6	-0.7	1.6	2.2	1.0
Senegal	3	0.0	-0.1	0.0	0.0	0.0	0.0	-2.1	-2.9	-1.3	-0.5	-0.7	-0.3
Togo	3	-0.1	-0.1	-0.1	-0.3	-0.3	-0.2	-5.2	-7.3	-3.1	-13.8	-19.4	-8.3
Afghanistan	4	-0.4	-0.6	-0.3	-0.6	-0.8	-0.4	-23.9	-33.5	-14.3	-32.3	-45.2	-19.3
Iraq	4	-0.1	-0.2	-0.1	-0.4	-0.6	-0.3	-7.0	-9.8	-4.2	-22.6	-31.7	-13.5

[a] In these countries, the target attainment for females is indistinguishable or even smaller than the projected attainment. This is due to huge jumps in enrolments in the late 1990s and consequent high imputed growth rates in enrolments. Once these are extrapolated to 2005 (or 2015), they suggest no gender gaps and associated costs. Thus, we do not estimate costs for these countries. But since we question the accuracy of the latest enrolment figures as well as the extrapolation of high enrolment growth, we believe that the costs will be similar to other countries' in the same rank.

Table 7b: Impact on Fertility and Child Mortality Rates of Gender Parity in Education, Country Effects, Sensitivity Analysis (Schultz, 1994)

Country	Revised Ranking	Fertility Impact												Child Mortality Impact					
		Pooled Regression						Fixed Effects Regression											
		2005			2015			2005			2015			2005			2015		
			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval			95% Confidence Interval	
Cameroon	2	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.1	-0.9	-0.5	-1.4	-2.6	-1.5	-3.8
Congo, Dem. Rep.	2	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.7	-0.4	-1.1	-1.1	-0.6	-1.6
Congo, Rep.	2	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2	-0.1	-0.3	-0.4	-0.2	na	na	na	na	na	na
Gambia, The[a]	2	..	..	..	..	..	..	..	..	..	..	..		na	na	na	na	na	na
Ghana	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.5	0.4	0.2	0.6
Guatemala	2	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.6	-0.4	-0.9	-1.9	-1.1	-2.8
Nepal[a]	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Papua New Guinea	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.5	0.1	0.0	0.1
Sierra Leone[a]	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Turkey	2	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.2	-0.2	-0.1	-2.4	-1.3	-3.5	-6.9	-3.8	-9.9
Uganda	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.6	-0.2	-0.1	-0.2
Zambia	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.4	0.0	0.0	-0.1
Benin	3	-0.1	-0.1	-0.1	-0.3	-0.4	-0.2	-0.2	-0.2	-0.1	-0.5	-0.7	-0.3	-2.4	-1.3	-3.4	-8.0	-4.4	-11.5
Central African Republic	3	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	-0.2	-0.3	-0.1	-1.4	-0.8	-2.0	-4.0	-2.2	-5.7
Guinea-Bissau	3	-0.1	-0.1	-0.1	-0.3	-0.3	-0.2	-0.1	-0.2	-0.1	-0.4	-0.6	-0.3	-2.0	-1.1	-2.9	-5.9	-3.3	-8.6
India	3	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.1	-1.9	-1.1	-2.8	-4.0	-2.2	-5.8
Liberia[a]	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Mali	3	-0.1	-0.1	-0.1	-0.4	-0.5	-0.2	-0.2	-0.2	-0.1	-0.6	-0.8	-0.4	-2.1	-1.1	-3.0	-7.2	-4.0	-10.4
Mozambique	3	-0.1	-0.1	0.0	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-1.7	-1.0	-2.5	-3.9	-2.1	-5.6
Niger	3	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.1	-0.5	-0.3	-0.7	-0.9	-0.5	-1.4
Pakistan	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	-0.6	-0.3	-0.8	1.0	0.5	1.4
Senegal	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.3	-0.9	-0.2	-0.1	-0.2
Togo	3	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-0.1	-0.2	-0.1	-0.4	-0.5	-0.2	-2.2	-1.2	-3.1	-6.5	-3.6	-9.4
Afghanistan	4	-0.4	-0.5	-0.2	-0.7	-1.0	-0.5	-0.6	-0.8	-0.4	-1.2	-1.6	-0.7	-6.6	-3.7	-9.5	-13.6	-7.5	-19.7
Iraq	4	-0.1	-0.1	-0.1	-0.2	-0.3	-0.2	-0.1	-0.2	-0.1	-0.4	-0.5	-0.2	-2.6	-1.4	-3.7	-7.5	-4.2	-10.9

[a] In these countries, the target attainment for females is indistinguishable or even smaller than the projected attainment. This is due to huge jumps in enrolments in the late 1990s and consequent high imputed growth rates in enrolments. Once these are extrapolated to 2005 (or 2015), they suggest no gender gaps and associated costs. Thus, we do not estimate costs for these countries. But since we question the accuracy of the latest enrolment figures as well as the extrapolation of high enrolment growth, we believe that the costs will be similar to other countries' in the same rank.

Table 8: Impact of Gender Parity in Education on Child Malnutrition (Smith & Haddad, 1999)

Country	Revised Ranking	Percentage Point Change in Prevalence of Underweight					
		2005			2015		
			95% Confidence Interval			95% Confidence Interval	
Angola[a]	2	-0.5	-0.8	-0.1	..	..	..
Burundi[a]	2	-0.1	-0.2	0.0	..	..	..
Cambodia	2	-0.8	-1.4	-0.2	-0.2	-0.3	0.0
Cameroon	2	-0.4	-0.7	-0.1	-0.1	-0.1	0.0
Comoros[a]	2	-0.2	-0.3	0.0	..	..	..
Congo, Dem. Rep.	2	-1.5	-2.6	-0.4	-1.0	-1.7	-0.3
Congo, Rep.	2	-2.4	-4.2	-0.6	-2.0	-3.4	-0.5
Djibouti[a]	2	..	..	..	..	..	..
Gambia, The[a]	2	-0.2	-0.3	0.0	..	..	..
Ghana[a]	2	-0.4	-0.7	-0.1	..	..	..
Guatemala	2	-0.9	-1.6	-0.2	-1.3	-2.2	-0.3
Lao PDR	2	-2.0	-3.5	-0.5	-1.4	-2.4	-0.3
Mauritania[a]	2	-0.2	-0.3	0.0	..	..	..
Morocco	2	-1.1	-1.9	-0.3	-0.4	-0.8	-0.1
Nepal[a]	2	..	..	..	..	..	..
Nigeria[a]	2	-0.4	-0.7	-0.1	..	..	..
Papua New Guinea[a]	2	-0.6	-1.1	-0.2	..	..	..
Sierra Leone[a]	2	..	..	..	..	..	..
Solomon Islands	2	-1.6	-2.7	-0.4	-1.9	-3.4	-0.5
Turkey	2	-3.0	-5.1	-0.8	-2.1	-3.6	-0.5
Uganda	2	-0.9	-1.5	-0.2	-0.6	-1.1	-0.2
Zambia[a]	2	-0.2	-0.4	-0.1	1.3	2.2	0.3
Benin	3	-3.8	-6.7	-1.0	-6.4	-11.2	-1.6
Burkina Faso	3	-0.7	-1.2	-0.2	-0.4	-0.6	-0.1
Central African Republic	3	-0.9	-1.6	-0.2	-0.6	-1.0	-0.2
Cote d'Ivoire	3	-1.9	-3.3	-0.5	-1.4	-2.5	-0.4
Guinea-Bissau	3	-2.8	-4.9	-0.7	-4.3	-7.5	-1.1
India	3	-2.6	-4.6	-0.7	-1.5	-2.6	-0.4
Liberia[a]	3	..	..	..	..	..	..
Mali	3	-2.9	-5.1	-0.8	-7.0	-12.2	-1.8
Mozambique	3	-0.9	-1.6	-0.2	-0.5	-0.9	-0.1
Niger[a]	3	-0.1	-0.2	0.0	..	..	..
Pakistan[a]	3	-1.3	-2.3	-0.3	..	..	..
Senegal	3	-1.0	-1.8	-0.3	-0.2	-0.3	0.0
Togo	3	-5.0	-8.7	-1.3	-4.5	-7.9	-1.2
Yemen, Rep.[a]	3	-3.3	-5.7	-0.8	..	..	..
Afghanistan	4	-14.1	-24.5	-3.6	-3.9	-6.9	-1.0
Chad	4	-2.4	-4.1	-0.6	-2.5	-4.3	-0.6
Eritrea	4	-4.0	-7.0	-1.0	-7.3	-12.7	-1.9
Ethiopia	4	-0.2	-0.4	-0.1	-0.1	-0.2	0.0
Guinea	4	-2.6	-4.6	-0.7	-3.5	-6.2	-0.9
Iraq	4	-2.7	-4.8	-0.7	-2.3	-4.1	-0.6
Lithuania	4	-9.3	-16.2	-2.4	-11.8	-20.6	-3.0
Somalia	4	-0.5	-0.8	-0.1	-0.4	-0.7	-0.1
Tajikistan	4	-2.7	-4.7	-0.7	-3.2	-5.7	-0.8

[a] These countries are projected to have higher female than male secondary enrolments either already by 2005 or by 2015, so it is not appropriate to report the costs of failing to achieve the gender equity goal.

Appendix

Table 1: Latest Available and Projected 2005 Primary and Secondary Gross Enrolment Rates for Boys and Girls

			1999 or latest available						2005 projections					
Country	Meeting goal?[a]	Revised Ranking[b]	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio
Afghanistan	4	4	34	69	12	32	0.50	0.36	83	115	31	115	0.72	0.27
Albania	1	1	109	110	77	75	0.99	1.03	115	115	80	69	1.00	1.17
Algeria	1	1	110	119	69	65	0.92	1.07	115	115	82	63	1.00	1.30
Angola	..	2	60	69	13	18	0.87	0.77	46	56	17	19	0.83	0.85
Argentina	1	1	119	119	97	91	1.00	1.07	115	115	115	107	1.00	1.07
Armenia	..	1	90	85	79	100	1.06	0.79	73	62	56	115	1.17	0.49
Azerbaijan	1	1	99	97	80	80	1.02	1.00	91	88	75	74	1.04	1.01
Bahrain	1	1	103	102	105	99	1.00	1.06	100	100	108	100	1.00	1.08
Bangladesh	1	1	105	108	56	52	0.97	1.08	115	115	115	84	1.00	1.37
Belarus	1	1	109	112	93	96	0.98	0.97	115	115	91	99	1.00	0.92
Belize	1	1	125	130	72	72	0.96	1.00	115	115	99	108	1.00	0.92
Benin	..	3	69	103	14	30	0.67	0.45	102	115	21	44	0.89	0.48
Bhutan	..	..	19	22	8	10	0.85	0.80	..	..	..	..	..	..
Bolivia	..	1	115	117	76	81	0.98	0.93	115	115	115	115	1.00	1.00
Bosnia and Herzegovina	..	1	74	74	69	69	1.00	1.00	80	79	75	75	1.01	1.00
Botswana	1	1	109	109	85	78	1.00	1.09	102	109	115	115	0.94	1.00
Brazil	1	1	162	170	109	98	0.95	1.11	115	115	115	115	1.00	1.00
Bulgaria	1	1	102	105	91	93	0.97	0.98	106	109	102	109	0.97	0.94
Burkina Faso	3	3	35	51	8	12	0.70	0.64	43	58	11	15	0.75	0.72
Burundi	2	2	56	69	6	8	0.80	0.75	49	63	9	9	0.78	0.94
Cambodia	..	2	95	109	12	22	0.87	0.55	87	100	9	14	0.87	0.64
Cameroon	2	2	84	98	17	22	0.85	0.78	78	92	13	16	0.85	0.85
Cape Verde	..	1	143	145	51	52	0.98	0.97	115	115	115	115	1.00	1.00
Central African Republic	..	3	45	68	6	14	0.66	0.41	41	59	4	10	0.69	0.45
Chad	4	4	53	87	5	18	0.61	0.28	72	96	8	22	0.75	0.36
Chile	1	1	105	109	88	87	0.96	1.02	108	115	97	99	0.94	0.98
China	2	1	108	105	60	66	1.02	0.90	100	100	75	74	1.00	1.02
Colombia	1	1	112	113	75	67	1.00	1.11	114	115	94	86	1.00	1.10
Comoros	..	2	76	91	18	23	0.84	0.82	87	94	22	24	0.93	0.95
Congo, Dem. Rep.	2	2	44	49	13	24	0.90	0.52	34	32	11	20	1.07	0.56
Congo, Rep.	2	2	79	88	43	60	0.90	0.72	59	65	43	57	0.91	0.75
Costa Rica	1	1	106	109	54	48	0.97	1.12	110	114	63	54	0.96	1.17
Cote d'Ivoire	..	3	66	88	15	28	0.74	0.53	73	95	16	27	0.77	0.58
Croatia	1	1	89	91	86	83	0.99	1.04	93	94	90	90	0.98	1.00
Cuba	1	1	102	106	84	80	0.96	1.04	106	111	77	78	0.95	0.98
Czech Republic	1	1	104	104	89	87	0.99	1.02	109	110	88	84	0.99	1.05
Djibouti	4	2	31	43	17	13	0.73	1.29	31	41	24	12	0.75	2.02
Dominican Republic	1	1	123	126	73	60	0.97	1.22	115	115	100	87	1.00	1.15

Table 2: Latest Available and Projected 2005 Primary and Secondary Gross Enrolment Rates for Boys and Girls (continued)

			1999 or latest available						2005 projections					
Country	Meeting goal?[a]	Revised Ranking[b]	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio
Ecuador	1	1	114	114	57	56	0.99	1.02	112	112	58	57	1.00	1.01
Egypt, Arab Rep.	2	1	96	104	81	86	0.93	0.94	103	105	90	88	0.98	1.03
El Salvador	1	1	109	113	50	50	0.97	0.99	115	115	84	90	1.00	0.94
Equatorial Guinea	4	..	112	137	19	43	0.82	0.44	..	..	..	..	..	..
Eritrea	4	4	55	67	23	33	0.82	0.70	71	85	35	59	0.83	0.59
Estonia	1	1	101	105	108	105	0.96	1.03	100	100	110	111	1.00	0.99
Ethiopia	4	4	57	85	4	6	0.67	0.68	95	115	2	3	0.82	0.62
Fiji	..	1	110	111	70	70	0.99	1.01	100	100	96	99	1.00	0.97
Gabon	1	1	151	152	51	58	0.99	0.87	..	..	..	..	..	..
Gambia, The	2	2	71	79	23	31	0.90	0.74	88	81	35	36	1.09	0.97
Georgia	1	1	98	99	78	77	1.00	1.02	99	99	70	67	1.00	1.05
Ghana	..	2	74	82	33	42	0.89	0.78	79	83	37	40	0.95	0.94
Guatemala	2	2	94	105	30	35	0.89	0.87	112	115	38	44	0.97	0.87
Guinea	4	4	51	75	7	20	0.68	0.36	84	97	10	26	0.87	0.39
Guinea-Bissau	..	3	66	99	14	26	0.67	0.54	94	115	26	43	0.82	0.61
Guyana	1	1	115	117	82	80	0.98	1.02	115	115	78	80	1.00	0.97
Haiti	..	1	155	153	28	30	1.01	0.92	115	115	46	52	1.00	0.88
Honduras	..	1	110	107	35	29	1.03	1.23	108	108	33	27	1.00	1.20
Hungary	1	1	103	104	99	98	0.98	1.01	108	111	115	114	0.97	1.01
India	3	3	92	109	40	59	0.85	0.68	99	108	46	62	0.91	0.75
Indonesia	1	1	106	110	54	56	0.97	0.95	101	105	65	62	0.96	1.05
Iran, Islamic Rep.	2	1	86	89	77	83	0.96	0.92	75	74	107	99	1.00	1.08
Iraq	3	4	91	111	29	47	0.82	0.62	85	106	25	41	0.80	0.60
Jamaica	1	1	102	96	82	85	1.07	0.96	103	92	94	103	1.12	0.91
Jordan	1	1	101	101	89	86	1.00	1.03	115	115	115	115	1.00	1.00
Kazakhstan	1	1	96	96	87	87	1.01	1.01	103	102	80	81	1.01	0.99
Kenya	1	1	90	91	28	31	0.98	0.90	87	87	37	35	1.00	1.05
Korea, Rep.	1	1	99	98	97	98	1.01	1.00	95	94	104	102	1.02	1.01
Kyrgyz Republic	1	1	100	103	84	82	0.97	1.03	100	100	71	70	1.00	1.03
Lao PDR	3	2	106	124	29	42	0.85	0.70	115	115	39	51	1.00	0.77
Latvia	1	1	100	102	90	88	0.98	1.03	105	107	88	85	0.98	1.04
Lebanon	1	1	98	102	82	75	0.96	1.09	87	100	86	78	0.87	1.10
Lesotho	1	1	108	99	32	24	1.09	1.37	100	98	34	26	1.02	1.29
Liberia	..	3	99	137	18	27	0.73	0.69	115	115	32	33	1.00	1.00
Libya	1	1	116	118	84	75	0.99	1.11	115	115	80	68	1.00	1.19
Lithuania	1	4	100	101	71	115	0.99	0.61	109	107	59	115	1.02	0.52
Macedonia, FYR	1	1	102	104	80	82	0.98	0.97	105	109	115	115	0.97	1.00
Madagascar	1	1	100	104	14	15	0.96	0.96	98	105	11	12	0.93	0.95
Malawi	..	1	158	158	40	50	1.00	0.80	115	115	115	115	1.00	1.00

Table 2: Latest Available and Projected 2005 Primary and Secondary Gross Enrolment Rates for Boys and Girls (continued)

			1999 or latest available						2005 projections					
Country	Meeting goal?[a]	Revised Ranking[b]	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio
Malaysia	1	1	116	118	84	75	0.99	1.11	115	115	80	68	1.00	1.19
Maldives	1	4	100	101	71	115	0.99	0.61	109	107	59	115	1.02	0.52
Mali	3	3	45	65	10	20	0.70	0.52	95	115	21	38	0.83	0.54
Mauritania	1	2	82	87	15	21	0.94	0.72	115	115	23	23	1.00	0.96
Mauritius	1	1	109	108	106	108	1.00	0.98	108	108	115	115	1.00	1.00
Mexico	1	1	113	114	75	72	0.99	1.04	113	113	94	88	1.00	1.06
Moldova	1	1	97	98	82	79	0.99	1.03	103	106	80	83	0.97	0.96
Mongolia	1	1	100	97	71	58	1.04	1.23	102	97	62	48	1.05	1.29
Morocco	2	2	83	98	35	44	0.84	0.80	109	113	39	46	0.96	0.85
Mozambique	4	3	73	98	11	17	0.75	0.68	86	115	18	24	0.74	0.76
Myanmar	1	1	91	91	35	35	0.99	1.00	82	82	51	51	1.01	1.01
Namibia	1	1	114	112	63	56	1.02	1.12	102	106	75	72	0.96	1.04
Nepal	2	2	112	140	45	62	0.80	0.72	115	115	78	76	1.00	1.02
Nicaragua	..	1	105	104	65	55	1.01	1.19	111	114	82	76	0.97	1.08
Niger	3	3	26	39	5	8	0.67	0.65	30	40	6	7	0.75	0.89
Nigeria	..	2	74	89	27	33	0.83	0.82	68	72	40	42	0.95	0.94
Oman	1	1	71	75	67	68	0.95	0.98	65	66	95	83	0.98	1.15
Pakistan	..	3	74	117	32	46	0.63	0.70	113	115	53	61	0.98	0.87
Panama	..	1	108	111	71	67	0.97	1.07	111	113	76	71	0.98	1.06
Papua New Guinea	3	2	80	88	18	24	0.91	0.78	94	97	32	35	0.97	0.89
Paraguay	1	1	111	115	58	56	0.97	1.04	115	115	87	84	1.00	1.04
Peru	1	1	127	128	78	83	0.99	0.94	115	115	94	96	1.00	0.98
Philippines	..	1	113	113	79	73	1.00	1.09	115	113	86	72	1.01	1.19
Poland	1	1	99	102	98	99	0.97	0.99	101	105	109	114	0.96	0.96
Puerto Rico	..	1	129	129	68	63	1.00	1.08	115	115	76	70	1.00	1.08
Romania	1	1	101	103	81	80	0.98	1.01	108	112	74	72	0.97	1.03
Russian Federation	..	1	84	85	85	79	0.99	1.07	71	72	78	72	0.99	1.08
Rwanda	1	1	121	124	12	12	0.98	0.95	115	115	17	15	1.00	1.11
Samoa	1	1	101	104	80	73	0.97	1.09	100	100	115	115	1.00	1.00
Saudi Arabia	2	1	67	70	65	72	0.96	0.90	66	65	91	94	1.03	0.97
Senegal	3	3	68	78	15	24	0.87	0.64	83	86	20	26	0.97	0.76
Sierra Leone	..	2	63	68	22	26	0.92	0.82	83	74	31	30	1.12	1.04
Slovak Republic	1	1	102	103	87	86	0.99	1.02	103	109	88	85	0.94	1.03
Solomon Islands	..	2	92	102	14	22	0.91	0.65	115	115	21	30	1.00	0.69
Somalia	..	4	7	13	4	7	0.52	0.53	6	11	3	6	0.53	0.53
South Africa	1	1	117	121	95	86	0.96	1.10	114	120	106	99	0.95	1.07
Sri Lanka	1	1	104	107	74	70	0.97	1.07	104	108	72	69	0.97	1.05
St. Lucia	1	1	111	117	104	85	..	..	..	..	..	..	..	..
Sudan	2	1	51	59	36	22	0.85	1.67	55	59	52	19	0.93	2.76

Table 2: Latest Available and Projected 2005 Primary and Secondary Gross Enrolment Rates for Boys and Girls (continued)

			1999 or latest available						2005 projections					
Country	Meeting goal?[a]	Revised Ranking[b]	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio	Female primary enrolment	Male primary enrolment	Female secondary enrolment	Male secondary enrolment	Female/male primary ratio	Female/male secondary ratio
Swaziland	1	1	121	128	60	60	0.95	1.01	115	115	80	77	1.00	1.04
Syrian Arab Republic	2	1	99	108	39	44	0.91	0.89	96	103	36	34	0.93	1.05
Tajikistan	..	4	101	109	70	82	0.93	0.86	108	115	54	71	0.94	0.77
Tanzania	1	1	63	63	5	6	1.00	0.86	60	58	5	6	1.02	0.98
Thailand	1	1	91	96	80	78	0.95	1.02	87	93	115	115	0.94	1.00
Togo	3	3	109	139	22	50	0.78	0.44	115	115	34	64	1.00	0.53
Trinidad and Tobago	1	1	103	105	82	75	0.99	1.09	108	110	82	73	0.98	1.12
Tunisia	1	1	115	121	76	73	0.95	1.04	115	115	115	94	1.00	1.22
Turkey	3	2	96	106	48	67	0.91	0.71	96	108	57	75	0.89	0.76
Turkmenistan	..	1	109	109	112	112	1.00	0.99	115	115	115	115	1.00	1.00
Uganda	..	2	136	146	10	16	0.93	0.59	115	115	9	15	1.00	0.65
Ukraine	1	1	81	82	99	87	0.99	1.15	74	76	103	83	0.98	1.24
Uruguay	1	1	111	113	99	84	0.99	1.17	114	115	105	94	0.99	1.11
Uzbekistan	..	1	79	81	89	100	0.97	0.89	77	81	80	94	0.96	0.85
Vanuatu	1	1	122	113	26	31	1.08	0.83	115	115	38	43	1.00	0.88
Venezuela, RB	1	1	101	103	65	54	0.98	1.19	104	109	89	82	0.95	1.08
Vietnam	..	1	104	111	61	68	0.94	0.91	107	115	97	109	0.94	0.89
Yemen, Rep.	4	3	56	98	25	69	0.56	0.37	88	115	32	52	0.77	0.62
Yugoslavia, Fed. Rep.	1	1	67	65	62	59	1.02	1.05	63	62	60	57	1.02	1.06
Zambia	..	2	76	81	22	29	0.94	0.77	66	70	26	28	0.94	0.95
Zimbabwe	1	1	95	98	43	48	0.97	0.88	84	87	40	45	0.96	0.90

[a] As assessed by the World Bank, based on the ratio of girls to boys in primary and secondary education, where "1" denotes on track, "2" slightly off track, "3" off track, and "4" seriously off track.
The World Bank's methodology uses, with some modification, the ratio of years it takes to reach the goal divided by the years available (i.e. between latest data and 2005).
If this ratio is >0 and <1, the ranking is "1", if >1 and <2, the ranking is "2", if >2, the ranking is "3", and if the ratio of girls to boys in school is declining, the ranking is "4".

[b] Based on the ratio for girls to boys of gross enrollment rates in primary and secondary education, and otherwise following the World Bank's methodology. Since we apply this approach to the ratio of enrollment rates rather than the ratio of students in school, any discrepancies in ranking are the result of the slight difference in the number of boys and girls of school-going age in most countries. Since the ratio is an average for primary and secondary enrollment, in the following cases it masks large discrepancies between the primary and secondary levels: Armenia, Cambodia, Democratic Republic of Congo, Eritrea, Guinea, Iraq, Lithuania, Tajikistan, Uganda. However, only in the case of Armenia does it lead to an "on track" ranking where not both the primary and secondary level are on track separately.

Source: World Development Indicators central database and authors' calculations.

NOTES

[1] These studies only consider the *private* marginal returns to education. It is important to point out that higher female marginal returns even when the private returns to the same level of education are larger for boys (as is often the case as men have higher labor force participation rates and tend to earn more than women). This is due to the fact that, due to gender gaps in education, an extra (i.e. marginal) year of schooling for an average girl refers to a lower level of education where returns are generally much higher, while an additional year of schooling for boys will be at a higher level where returns are much lower. For a discussion, see World Bank (2001) and Alderman *et al*. (1995). If one included positive externalities of female education (e.g. the effects on fertility, undernutrition, and child mortality) and thus considered marginal *social* returns, the difference between marginal female and male returns would be even larger.

[2] Moreover, to the extent that *similarity* in education levels in the household generates positive external effects on the quality of education, reduced gender inequality may be one way to promote such external effects. For example, it is likely that equally educated siblings can strengthen each other's educational success through direct support and play inspired by educational activities. Similarly, couples with similar education levels may promote each other's life-long learning.

[3] See also Lagerlöf (1999) and Galor and Weil (1996) for similar arguments.

[4] For a critical survey, see Lorgelly (2000).

[5] Moreover, as argued by Knowles *et al*. (2002), the use of base-period values for human capital in their growth regression also contributes to this effect as the high growth Asian economies had large initial gender gaps in 1960 that were only closed subsequently so that the coefficient on female education might pick up East Asia's initial gaps as growth-enhancing. Inclusion of regional dummy variables should deal with this problem as well. Finally, Lorgelly and Owen (1999) suggest that it may also partially be due to the impact of some outliers.

[6] Given that there might be reverse causality involved in the relationship between these averaged variables, they also use instrumental variable procedures to control for this endogeneity, which does not qualitatively affect their results. If anything, the effects of female education are now larger.

[7] Two points are worth noting here. Knowles *et al*. (2002) use the average income of 1960-1990 as the dependent variable to determine a long-term steady state relationship between male and female education levels and per capita income. To do that, they want to estimate the relationship over as long a time period as possible in order to assess the long-term steady state relationship. 1960-1990 is the longest time span for which they have data. Their interpretation is thus focused on the long-run steady state relationship between the two variables rather than on deriving a particular point estimate for the impact of education on average incomes in the time period chosen. Second, they and the other cross-country studies report an *average* effect of all countries included and it is clear that this average effect will not be the same for each individual country. Barring country-level data, these average effects are the best guess of expected individual country effects so we rely on them for our analysis.

[8] One should point out that their growth specification is merely done to compare results with other findings in the literature. They do not control for endogeneity and do not place high confidence point estimate of this specification.

[9] In particular, they use religion and civil liberty variables as instruments for explaining male and female educational achievement. This would work if both of these variables are uncorrelated with economic growth. The latter, however, has been used in a variety of growth regressions and does indeed appear to be associated with economic growth (Taylor, 1998; Sachs and Warner, 1995).

[10] The paper also reconciles its results with other studies' and finds them to be similar to Knowles *et al*., while it is possible to show that the Barro results are indeed driven by multicollinearity and the absence of regional dummy variables. Using the data by Dollar and Gatti but a different (and arguably more plausible) specification, Klasen (2002) is able to show that then gender inequality will have a negative impact on growth in rich and poor countries alike. See Klasen (2002) for further details.

[11] Forbes (2000) using panel data with five-year intervals and a GMM estimator finds that female education has a significant positive impact on economic growth, while male education has an insignificant (and slightly negative) impact on economic growth, thus providing very similar results to Knowles *et al*. (2002) and Klasen (2002). Appiah and McMahon (2002) examine the impact of male and female education on growth, fertility, mortality, and other social and political indicators in Africa. Their findings support both the sizable effect of average education and the particularly important impact of female education on growth, where indirect effects operating via fertility and child mortality play a particularly important role in the case of female education. It may also be useful to briefly discuss two studies that might question some of the findings of the studies discussed above. First, Pritchett (2001) suggests that the expansion of education during the past 30 years has had a negligible (or possibly even negative) impact on economic growth, particularly in Africa. His growth accounting framework does not explicitly address the conditional convergence typical of growth models and does not include many variables that might have accounted for growth differences. In Klasen (2002) the change in educational capital, a similar variable used by Pritchett, shows a clear positive and significant impact on economic growth. The difference might be due to the fact that Klasen (2002) additionally controls for initial levels of education and not only changes thereof, suggesting that there might be a complementarity between initial levels and subsequent growth rates. Also, we focus on female education which, according to the studies above, appears to have had a larger effect than male levels, and Pritchett's results on average levels might be influenced by the smaller impact of male levels. Second, Devarajan *et al*. (2001) find that investment in Africa might not be very productive and thus Klasen's finding that reduced gender inequality in education boosts investment rates might not do much for growth there. Klasen (2002) ran a separate growth regression for Africa and indeed also found that the impact of investment rates on growth was small and insignificant. On the other hand, the total impact of gender inequality on economic growth was somewhat larger in Africa than elsewhere, suggesting that the direct effect and other pathways more than off-set the causal chain involving the investment rate. But the general implication of

both studies, that the effects of education and gender gaps in education differ from country to country, is clearly valid and our exercise is one that is based on average effects that might be larger or smaller in any individual country.

[12] In Klasen (1999), child mortality was included as an independent variable. As shown in Table 5, child mortality itself is influenced by the gender gap in education so that the coefficient of 0.23 only measures the direct impact of the gender gap on fertility and omits the indirect linkage via child mortality. By excluding child mortality, we thereby measure the total impact of the gender gap on fertility. While it is clear that child mortality and fertility are influencing each other (in the face of high child mortality, parents will have more children to have a sufficient number of surviving children, and high fertility involving short birth intervals increases child mortality as resources and care levels for each child are lower), by omitting them in the regression we implicitly account for the total effect education has on both variables.

[13] Apart from these cross-country studies, within-country studies have found similar effects. For example, Murthi *et al*. (1995) and Murthi and Drèze (2001) find that female education (they use female literacy as the indicator) has a significant effect on district-specific total fertility rates in India. Moving from a female literacy rate of 22 percent to 65 percent would reduce total fertility by 1 child per woman (Murthi and Drèze, 2001). Finally, micro level studies have also supported this effect of female education on fertility. For example, data from the World Fertility Surveys shows that women with more than seven years of education have between 2-4 fewer children than women with no education (Summers, 1994; Schultz, 1997). For a review of other studies documenting this linkage, see World Bank (2001).

[14] Klasen (2000), using female literacy as the educational variable, has very similar findings.

[15] For example, if the under five mortality rate was 100/1000, the child survival rate would be 900/1000; expressed in percent, this would be 90 percent.

[16] We this time only use the results from the pooled panel data, not the fixed effects estimates which Schultz claims are poorly specified. For a discussion, see Schultz (1994).

[17] Similarly strong evidence of the impact of female education on child mortality come from district-based data in India, presented by Murthi *et al*. (1995) and Murthi and Drèze (2001). Using micro data, Summers (1994) reports that the difference in under-five mortality rates between women with more than seven years of education and those with none is between 80 and 120, which incidentally is quite consistent with the findings in Table 7, which will form the basis for our estimation of the losses of failing to meet the goal on gender equality. For other studies, please refer to World Bank (2001).

[18] This linkage has also been found using micro data where gender inequality in education is an important part of overall female status which was found to be significantly and strongly (negatively) correlated with undernutrition rates (Smith et al., 2001).

[19] With some modifications, the World Bank classified countries as on track if the ratio of the number of years required to reach the goal to the number of years remaining was between 0 and 1; slightly off track if this ratio was between 1 and 2; off track if this ratio exceeded 2; and seriously off track if the country exhibited a decline in the ratio of girls to boys in school. For example, if the latest available data for a country are from 1998 and so it has 7 years to reach the goal, and based on its 1990-98 growth rate for the ratio of girls to boys in school it would require 10 years to achieve gender parity, it would be classified as slightly off track (rank 2).

[20] Since we are using gross enrolment rates, a few caveats regarding our projected enrolments are in order. Countries with positive growth rates in enrolments are assumed not to exceed the gross enrolment rate of 115, which is deemed a rate compatible with universal enrolment. In addition, countries with initial and final actual enrolment rates exceeding 100 that exhibit negative growth are assumed not to fall below the enrolment rate of 100. The assumption here is that these countries are moving closer to reducing repetition and over-aged enrolment and should not be penalized for this in the projections.

[21] In fact, in some countries, including some in Southern Africa, Latin America, and Eastern Europe, it is already the case that girls have higher enrolment rates in parts or even throughout the educational system. This may begin to become a problem in its own right when these differential enrolment rates persist for a long time and lead to higher female educational achievement throughout all age groups, which is presently only the case in Eastern Europe. Due to the importance of female education for fertility, child mortality, and undernutrition, a case could be made that it could be socially efficient to have females having slightly higher education than males. But significantly higher education rates would generate the same distortions that have been discussed in the theoretical section.

[22] The World Bank classified China, Egypt, and Saudi Arabia as a 2 while, based on our indicator, they are projected to meet the goal, and thus are rated 1. The difference is precisely in the male excess in the school-age population in these countries due to a large excess of males at birth and some excess female mortality post-birth.

[23] Even with gross enrolment rates, there are questions about data reliability. Sometimes there are unusual jumps in gross enrolment rates and it is not always clear that they come from a consistent source. Thus, the data will have to be scrutinized on an on-going basis.

[24] Therefore we do not subscribe to the suggestion by Knodel and Jones (1996) who argue that success in boosting female enrolment rates has been so large that it should no longer be a major concern of policy-makers.

[25] Klasen (2002) would allow an estimation of these effects as well since average education is included in the assessment. But such an assessment is beyond the scope of this paper.

[26] In principle, one could think of some costs of these gaps in enrolment per se. They could include that girls out of school are likely to marry earlier (possibly immediately after leaving school early) and thus have more (and earlier) children, or that girls out of school could be socially disruptive in some ways. Conversely, girls out of school could assist parents with generating income or helping in the household so that there might be some off-setting benefits. But clearly the main issue is not the gaps in enrolment per se but the result of these gaps, which are gender gaps in the educational attainment of adults.

[27] Jong-Wha Lee kindly provided the average and female enrolment figures, and we generated the male enrolment figures using these and the sex ratio of the population aged below 15 years. In their analysis, Barro and Lee cap their gross enrolment rates at 100 percent, but we use the uncapped data as we believe that enrolments above 100 percent will also impact attainments. One should point out that the UNESCO figures that Barro and Lee employ are not identical to the UNESCO enrolment figures that the World Bank uses for

assessing progress towards the MDGs. The differences are based on revisions done by UNESCO and the World Bank. While we think it best to use Barro and Lee's enrolment figures to estimate the effects on attainment (for purposes of internal consistency), we apply the World Bank data as described above to project enrolments into the future and then estimate the costs.

[28] We should point out that we omit tertiary education in the assessment although the studies that estimated the impact of gender gaps in schooling always used total years of schooling of the adult population, which includes tertiary education. We did this because the MDG is focused on gender gaps in primary and secondary education. Moreover, the data on tertiary education enrolments are scarce and not easily comparable across countries. But this should not affect our results significantly as the average number of tertiary years of schooling of the adult population in virtually all developing countries is very small, certainly when compared to the much larger number of years of primary and secondary education.

[29] Given that the right-hand side of the regression contains a lagged dependent variable, the error terms might be correlated with the lagged dependent variable thus biasing the coefficients. Simulation studies have shown, however, that this bias largely affects the coefficient on the lagged dependent variable, but not the other regressors. As our simulation results depend on the coefficients on lagged enrolments and change in enrolments, this econometric problem has little impact on our results. For a discussion, see Forbes (2000).

[30] Please also note that there is some discontinuity between the 2000 attainment and the 2005 and 2015 projections in a couple of countries. This is probably due to the fact that our projections are based on the revised and updated UNESCO data and not the enrolment data Barro-Lee used in their attainment calculations.

[31] The reason these countries are still rated a 2 or 3 is the fact that enrolment rates in 2005, while exceeding 100 percent for both females and males, are still significantly larger for males. But since we cap enrolments at 115 percent for both before calculating the costs, there are no gender differences and thus no costs.

[32] For a discussion of this and related issues see Pritchett (2001) and Devarajan *et al*. (2001). There is some interesting evidence, however, that greater female education as well as women's economic and political participation might actually improve the institutional environment (and particularly reduce corruption) which might help improve the overall growth performance. For evidence, see World Bank (2001).

[33] After all, the effects are estimated based on the policy and institutional setting from 1960-1990 and thus the average effect include many countries with poor policies and institutional frameworks as well as high growth countries.

[34] We do not have to consider the impact of a higher initial ratio for this time period as the ratio in 1995 is the same regardless of whether countries embark after 1995 to reach the goal or not.

[35] As they used a 30-year time span to estimate these long-run relationships, we similarly use such a time span and thus estimate the effect of reduced gender gaps in education on average income levels between 1975-2005 and on growth between 1975 and 2005, and do the same for the period 1985-2015.

[36] We do not report the results for Iraq for 1995-2005 and for India between 2005-2015 since they are implausibly large due to a peculiarity of the construction of the gender gap variable in Klasen (2002). The reason for this is that the projected male expansion of schooling 1995-2005 (2005-2015) is very small so that increasing the female expansion has a huge impact on the female-male ratio of expansion of education and thus generates a huge growth effect. Thus, these results are entirely driven by the use of the ratio in the regression and the very small denominator and should therefore be discounted. This problem also appears, to a lesser extent, in Cameroon for 1995-2005, and in Turkey for both periods. Thus, those effects should be treated with some caution and may well be biased upward.

[37] Due to the different specification, there is no perfect correlation between the two estimates. Since the Knowles *et al*. specification is based on elasticities, it will report particularly large effects in countries that currently have low female education such as Afghanistan.

[38] Table 6a also uses the Klasen specification but considers, as was done in Klasen (2002), a 30-year period rather than a 10-year period. Now the effects are predictably smaller but one has to bear in mind that the smaller effects would be compounded over a longer time period. As a result, the findings are really quite similar to those discussed above.

[39] This is not surprising given that, in contrast to growth, fertility, child mortality, and undernutrition depend much more on the situation of households rather than the overall policy environment.

[40] Of course, the same expansion in female education might lead to a change in the demographic conditions by 2005 and thus change the actual number of excess deaths in the countries missing the target.

[41] The undernutrition estimate is based on a different educational variable than the one used for the other effects. While the others all refer to the gender gap in schooling attainments, the undernutrition result is based on a study that uses female secondary enrolments (Smith and Haddad, 1999). Since change in enrolments is only an imperfect proxy of change in attainment, these results should be treated with some caution.

[42] Of course, the epidemic also reduces girls' access to education, since girls are more likely than boys to be retained at home for domestic work when household income drops due to AIDS deaths, or to care for sick relatives. Yet girls' education can go far in slowing and reversing the spread of HIV by contributing to female empowerment and economic independence, delayed marriage, and family planning.