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## The Gender Gap in Education in Eritrea In 1991-98: A Missed Opportunity?

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and  
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## **IMF Working Paper**

African Department and Policy Development and Review Department

### **The Gender Gap in Education in Eritrea in 1991-98: A Missed Opportunity?**

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#### **Abstract**

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This paper shows that during the 1990s, and before the 1998-2000 border war with Eritrea, the gender gap in education in Eritrea has widened on the national level, and large regional disparities have persisted. The gender gap appears to be linked to lower female teacher participation and limited employment opportunities. The widening of the gender gap is likely to have a long-term negative impact on both economic growth and poverty reduction.

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## I. INTRODUCTION

During the 30-year-long independence war, Eritrea strived to improve the social and economic situation of women. Women actively participated in the war, in itself an unusual phenomenon in African conflicts, and the emerging legal structure placed an unusual emphasis on women's rights. Moreover, women were given equal access to basic literacy courses, and a priority was also put on increasing access of girls to primary and secondary education. As a result, by the end of the 1980s, the female and male primary and secondary education enrollment rates were almost identical. Some of the gains in narrowing the gender gap in education, however, were reversed in the 1990s, during the independence period and prior to the 1998-2000 border war with Ethiopia. We stop our analysis in 1998, because of the disruption caused by the war and problems with data collection. Of course, the aftershocks of the conflict are likely to affect social developments in Eritrea in years to come and may dwarf the progress achieved during the 1990s.

The gender gap began to widen soon after the independence in 1991. The ratio of female-to-male enrollments (for both primary and secondary education) fell against the background of a rapid increase in total enrollments. Interestingly, these developments put Eritrea at odds with other African countries and developing countries in general, where the gender gap has usually either been closing or remained unchanged (World Bank, 2001). While some initial postwar decline in female secondary enrollments was to be expected, the drop was more pronounced than in similar cases. Moreover, in light of the prevailing trends in the hiring of female teachers and female employment opportunities in general, the gap is likely to widen further. Given the importance of reducing gender disparities for achieving sustainable development in developing countries (see, for example, Birdsall and McGreevey, 1978, and Bladen and Bhanu, 1998), this increase in the gender gap in education is likely to have a negative impact on both economic growth and poverty reduction.

Neglecting human capital investment affects the long-term rate of growth and endangers the goal of poverty alleviation (Becker, 1993; or Hill and King, 1993). The effect of low female schooling relative to men on growth is both direct and indirect, and is likely to depend on the development in overall education attainments (Klasen, 1999; and Esteve-Volart, 2000). More directly, countries with poor human capital, be it male or female, cannot absorb new, productive technologies. Less directly, depriving women of access to education is likely to limit the efficiency of education, health, and family planning programs. The literature shows that female schooling generates substantial long-term social gains: countries with large gender gaps are likely to end up in a perpetual circle of low per capita incomes, high fertility, and little human capital investment (Galor and Weil, 1996).<sup>2</sup> The gender gap documented in this paper is clearly not the main problem faced by Eritrea—the displacement and destruction caused by the recent border war with Ethiopia is clearly more pressing—but it is one that should not be overlooked especially since it may be addressed relatively easily.

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<sup>2</sup> See also International Monetary Fund, Organization for Economic Cooperation and Development, United Nations, and World Bank Group (2000).

The paper is organized as follows. Section II briefly describes the improved access of women to education during the war and highlights the main goals and developments in the education sector after the war. Section III presents evidence of the widening in the gender gap in education after the war at the national and regional levels. Section IV discusses the implications for economic growth and social indicators, and Section V concludes.

## II. ACCESS TO EDUCATION IN ERITREA

Eritrea gained independence from Ethiopia in May 1991, and two years later, following a referendum, the country was formally declared an independent state.<sup>3</sup> Contrary to most other African conflicts, women of all classes became active participants in the war, their roles ranging from providers of intelligence to fighters.<sup>4</sup> Furthermore, in Eritrea this involvement brought about improvements in their economic and social status, including increased access to education. For example, in the 1980s, the Eritrean's People Liberation Front (EPLF) began to conduct a major literacy campaign, targeting both men and women (Leonard, 1988). While girls' education was limited to well-off urban families until the 1980s, the girls' enrollment rates in the elementary schools were identical to that of boys by the early 1990s, as opposed to Ethiopia, where the female-to-male ratio was much lower.

Destruction of infrastructure and disintegration of social services during the war caused deterioration in the quality of education compared with the prewar period, and, as a result, the female and male illiteracy rates were about 80-90 percent, respectively, at the end of the war (World Bank, 1996). Hence, in addition to the immediate goals of agricultural development and postwar reconstruction, education was given a prominent role in Eritrea's development program, even though government financing of education remained relatively modest (Box 1). The main goal of the education sector policy was "to make basic education available to all," that is, to create the same opportunity of access for all school-aged

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<sup>3</sup> After 60 years of colonial rule, in 1952, the United Nations returned Eritrea to Ethiopian sovereignty as an autonomous unit of Ethiopia. However, the 1962 decision to annex Eritrea as a province of Ethiopia sparked the civil war that ended in 1991, together with the fall of Ethiopia's Marxist regime. At that time, the provisional Eritrean government was on good terms with the new Ethiopian regime, but the two governments' subsequent falling-out eventually led to the bloody and devastating war of the late 1990s.

<sup>4</sup> During the 1950s and 1960s, women's role in the war was largely supportive. During the 1970s, women were gradually included in the ranks of the EPLF combat troops and, by the mid-1980s, they constituted 25 percent of combat troops (World Bank, 1996). In contrast, even though some women fought in Museveni's National Resistance Army in Uganda during the 1980s, their involvement had a lower profile, and it did not do much to improve their social status. The positive changes in the situation of women in Uganda were driven mainly by the policies adopted after the civil war.

children.<sup>5</sup> The specific 15-year education targets announced in 1991 included (1) raising the elementary school enrollment rates to 80 percent; (2) increasing access to, and quality and efficiency of, secondary and technical schools plus vocational programs; and (3) reducing the illiteracy rate to 40 percent by the year 2003.

**Box 1. Financing of the Education System in Eritrea**

Eritrea spends comparatively little on education: less than 2 percent of GDP, of which one-fourth is spent on administration. Parents' contribution to primary and secondary schooling is significant: in addition to textbooks and administrative fees, parents pay also for transportation and food. Teachers' salaries are centrally funded, but the government does not provide any pension benefits. Other recurrent costs at the elementary level (electricity, phone bill, maintenance, and administration) are usually also covered from parents' contributions.

How far was Eritrea from reaching these objectives at the end of the 1990s, that is, in the middle of the targeted period and before the start of the war with Ethiopia? Regarding the overall enrollment rates, Eritrea made some progress during the 1990s. Specifically, from the 1991/92 to 1997/98 school years, the overall elementary school gross enrollment rates improved by about 15 percentage points, from 36 percent to slightly over 50 percent (Figure 1).<sup>6</sup> Similar improvement was also visible in middle schools, but the improvement in secondary school gross enrollment rates was more modest. On a net basis, however, the enrollment rates have risen only at the elementary school level, see Box 2 for definitions of these rates. In other words, with the exception of elementary schools, the percentage of school-age children enrolled in 1997/98 was only slightly higher than in 1991/92.

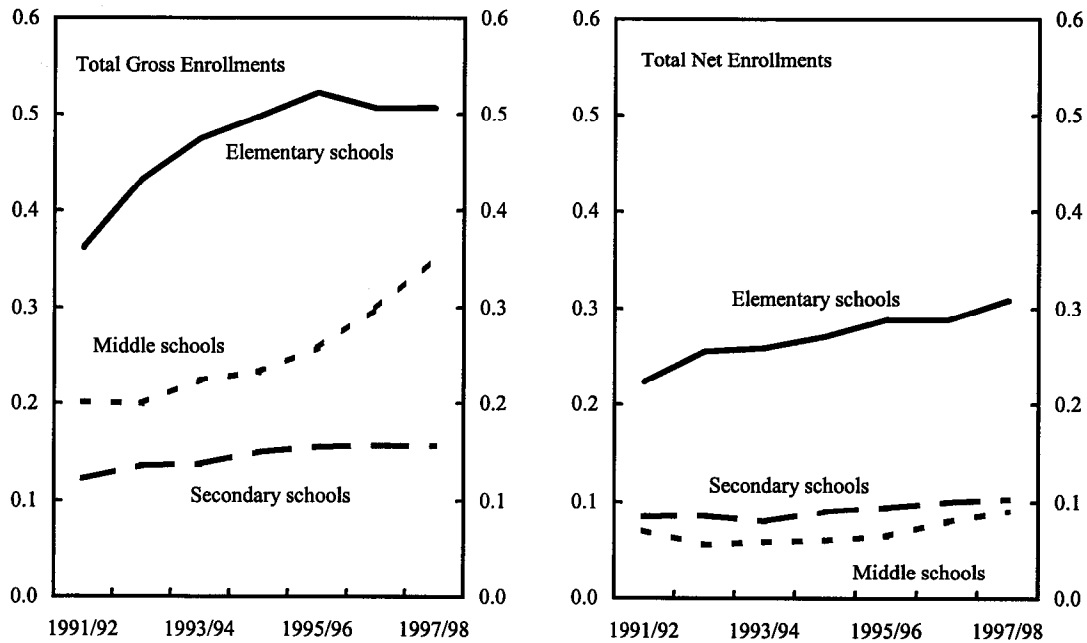
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<sup>5</sup> This goal is equivalent to what is known as the "schooling for all" policy, as opposed to a narrower definition of the so-called "universal primary education" policy. While the former aims at enrolling all age-eligible children at the age-appropriate grades, the latter is defined as targeting a gross enrollment rate of 100 percent irrespective of the age of enrolled pupils. As such, the goal of universal education can be consistent with some children being out of school (Colclough and Al-Samarrai, 2000).

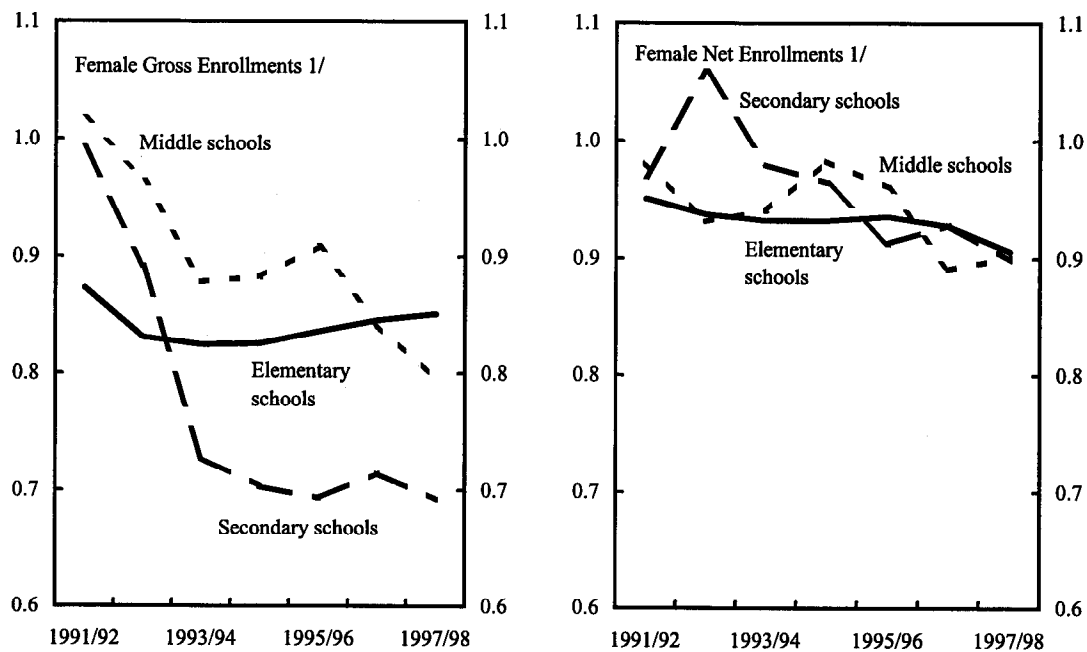
<sup>6</sup> In absolute numbers, in 1997/98, with a population of some 3.9 million, 248,000 pupils were enrolled in elementary schools, 57,000 in middle schools, and 42,000 in secondary schools. By the same token, more than 300,000 of age-eligible children were not enrolled in either elementary or middle schools.

Figure 1. Eritrea: School Enrollment Ratios, 1991/92-1997/98

While the overall access to education has improved substantially . . .



. . . female access to education has declined relative to that of men.



Sources: Eritrean authorities; and authors' calculations.

1/ Expressed as a ratio of female enrollment ratios to male enrollment ratios.



### Box 2. Definition of Gross and Net School Enrollment Rates

The gross enrollment rate is defined as the number of children enrolled at a specific level of education, regardless of age, expressed as a percentage of the official school-age population in a given year for a given level of age-specific education. The net rate represents the percentage of children in the official age group enrolled at a given level of education.

In line with the goal of eradicating illiteracy, the educational program between 1991/92 and 1997/98 focused on expanding and improving the quality of elementary education. The number of teaching staff at all levels increased from 5,300 in 1991/92 to 8,000 in 1997/98, or by about 50 percent. More specifically, the elementary school-level teaching staff grew by about 60 percent, the middle school teaching staff by 48 percent, and the secondary school teaching staff by 27 percent. Still, given the dramatic increase in gross enrollments, these new hirings were not sufficient even to preserve the existing student-to-teacher ratios: at the elementary school level, the student-to-teacher ratio worsened from 41 in 1991/92 to about 44 in 1997/98; at the middle school level, from 36 to 49; and at the secondary school level, from 36 to 45.

Table 1. Eritrea and Africa: Changes in School Enrollments, 1990-96  
(In percent)

	Female-to-Male Ratio					
	1990		1996		Percent change	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
Eritrea	0.96	0.93	0.82	0.71	-14.6	-23.7
Ethiopia	0.67	0.77	0.55	0.79	-17.9	2.6
Uganda	0.80	0.54	0.84	0.59	5.0	9.3
All Africa						
Of which						
Average	0.80	0.69	0.82	0.72	3.8	7.7
Number of countries	49	49	49	49	49	49
Of which						
Countries with improving indicators						
Average	...	...	...	...	28.9	12.2
Number of countries	...	...	...	...	29	35
Countries with worsening indicators						
Average	...	...	...	...	-10.7	-5.2
Number of countries	...	...	...	...	13	10
No change in indicators						
Number of countries	...	...	...	...	7	4

Sources: World Bank, *World Development Indicators*; and authors' calculations.

By 1996, Eritrea was closer to the average for sub-Saharan African (SSA) countries in most education indicators than in 1991, and it had made some progress toward reaching its ambitious literacy and enrollment rate goals. More than one-half of the population was

literate, and the gross enrollment rate at the elementary level was around 50 percent, still far from the 2003 goals. At the same time, and in contrast with other African countries, Eritrea's gender gap in primary and secondary education had increased (Table 1).<sup>7</sup> While the female share in enrollments had increased in more than 60 percent of African countries, in Eritrea this indicator had declined at the elementary and secondary school levels by 15 percent and 24 percent, respectively.

In 1998, the border war with Ethiopia erupted, quickly drawing both nations into the bloody conflict. The magnitude of the cost to Eritrea—both in human and financial terms—is likely dwarf the progress achieved during the 1990s (Box 3). Education and other social developments will be hard hit in the coming 5 years, even with increased social spending.

### **Box 3. The Impact of the 1998-2000 Border War with Ethiopia**

The recent war has a devastating impact on the Eritrean society. While the number of killed can be as high as 100,000, or 3 percent of population, 300,000 people are yet to be demobilized from the army (as of mid-2001). About 200,000 are to be demobilized during 2001-03, requiring massive training and education assistance to facilitate their return into the labor force. In addition, in some areas the displaced population has not yet returned to normal life. In general, it is not clear how many teachers were drafted in the army or died, and how many have been exempted from frontline duties.

## **III. THE GENDER GAP IN EDUCATION IN THE 1990s**

During the 1990s, the female-to-male student and teacher enrollment ratios fell, and large regional differences prevailed. This section attempts to link those developments to female teacher participation and employment opportunities.

### **A. Female Enrollment Rates**

Between 1991/92 and 1997/98, the female student gross enrollment rates increased at the elementary and middle school levels by about 13 and 10 percentage points, respectively, and remained unchanged at the secondary level (Figure 1). Relative to male enrollment rates, however, female participation declined sharply. In elementary schools, the female enrollment rates dropped from almost 90 percent to about 85 percent of male gross enrollment rates. In middle and secondary schools, the female enrollment rates declined from at par with boys to

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<sup>7</sup> Although Ethiopian data also displayed a widening gender gap in elementary education in 1990-96 (Table 1), this was determined by different dynamics. Boys' enrollments in Ethiopia dropped dramatically during the civil war in the mid-1980s, hitting a low point in 1992, but rebounded sharply with peace. In contrast, since Ethiopian girls did not participate in war, their enrollments were increasing slowly, but steadily (for discussion of gender disparities in education in Ethiopia see Mekonnen, 2000).

80 percent and 70 percent, respectively. The picture is similar when we use net enrollment rates: all three educational levels experienced a decline of female-to-male enrollment of some 5-7 percentage points. In addition, girls are twice as likely than boys to repeat classes and not finish their studies.

Female enrollment was consistently much higher in nongovernment schools than in government ones, and the disparity seemed to be most pronounced at the elementary school level (Table 2).<sup>8</sup> While in nongovernment elementary schools the girls comprised consistently around 52-53 percent of total enrollment, in government schools their share in enrollment declined from a peak of 49 percent in 1990/91 to below 45 percent in 1997/98. Similarly, in nongovernment middle schools girls comprised during the period slightly more than 50 percent of the total, but in government schools their share declined from about 49 percent to less than 42 percent. However, at the secondary school level, the female enrollment declined in both nongovernment and government schools—over the 1990/91-1997/98 period—from about 54 percent to 43 percent in the former, and from 48 percent to 38 percent in the latter.

Table 2. Eritrea: The Share of Female Students in Government and Nongovernment Schools, 1989/90-1997/98  
(In percent)

Period	School Year	Elementary Schools		Middle Schools		Secondary Schools	
		Government	Non-govt.	Government	Non-govt.	Government	Non-govt.
Liberation war	1989/90	48.5	52.9	49.6	50.0	47.3	54.3
	1990/91	48.9	52.0	48.7	50.8	48.6	55.4
Independence	1991/92	46.0	54.1	49.0	49.3	47.7	52.6
	1992/93	44.3	53.7	46.4	50.1	45.5	52.6
	1993/94	44.0	52.8	43.6	49.4	39.8	45.9
	1994/95	44.0	52.7	43.8	49.2	38.6	44.0
	1995/96	44.3	52.1	44.4	47.1	37.6	41.0
	1996/97	44.6	52.0	42.5	48.2	38.7	42.8
	1997/98	44.8	51.3	41.4	49.4	38.2	42.6

Sources: Eritrean authorities; and authors' calculations.

## B. Female Teacher Participation

How did Eritrea fare in terms of female teacher participation? The answer to this question makes a difference if there is a link between declining female school enrollment and diminishing female participation in the teaching process, as some evidence suggests (Bellew and King, 1991). The presence of female teachers is particularly important in regions where

<sup>8</sup> The group of nongovernment schools is diverse, comprising parent- and donor-funded schools, as well as some missionary ones.

parents are illiterate and thus can provide only minimal motivation for young girls to continue their education beyond the level of basic literacy; where only limited formal employment opportunities exist for women; or where the opportunity costs of girls' education is high, as in rural areas.

On a net basis, about 800 female teachers were hired during the 1990s (Figure 2). Most of those hirings were made at the elementary school level, while the female teaching staff remained practically unchanged at the middle and secondary school levels. In relative terms, however, the share of female teachers at the elementary school level declined sharply (from more than 45 percent in the early 1990s to below 35 percent in 1997/98). In middle and secondary schools, women remained grossly underrepresented, as the share of female teachers remained broadly unchanged, at about 15 percent and 12 percent, respectively.

Similar to enrollments, female teacher participation declined more in government schools than in nongovernment ones. At the elementary school level, the share of female teachers fell both in government and nongovernment schools, and the decline—in line with falling female enrollment rates—was more pronounced in government schools (Table 3). At the middle and secondary school levels, the share of female teachers remained broadly constant in government schools and increased slightly in nongovernment schools.<sup>9</sup>

Table 3. Eritrea: Share of Female Teachers in Government and Nongovernment Schools, 1989/90-1997/98  
(In percent)

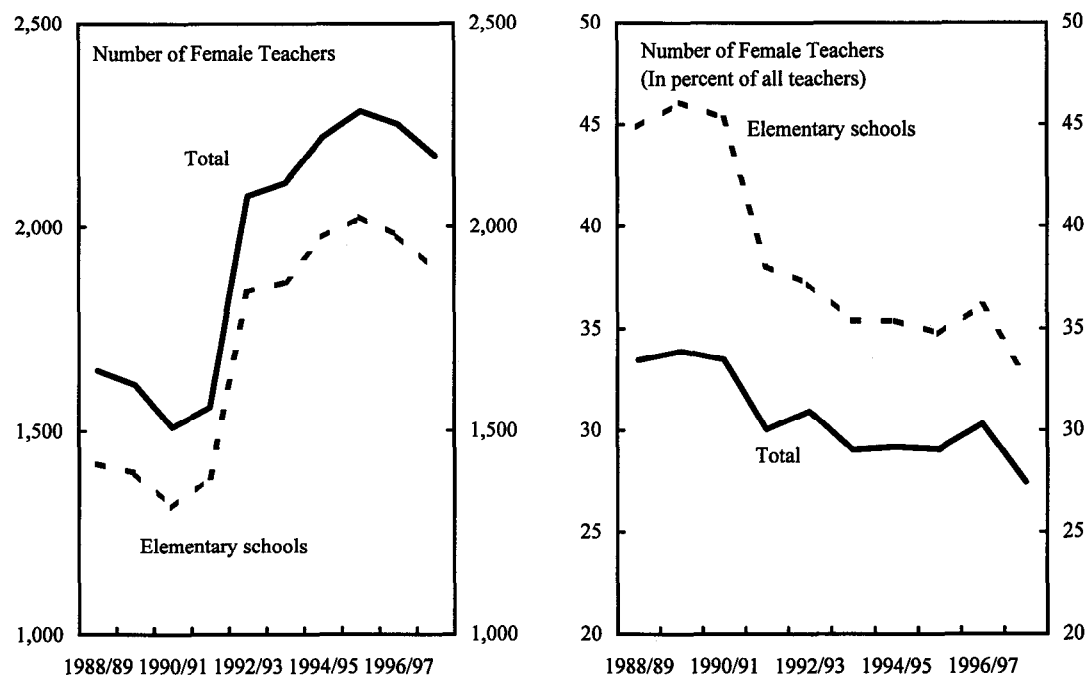
Period	School Year	Elementary Schools		Middle Schools		Secondary Schools	
		Government	Nongovt.	Government	Nongovt.	Government	Nongovt.
Liberation war	1989/90	48.3	40.4	15.3	9.1	11.3	10.4
	1990/91	47.6	39.7	16.2	8.3	10.5	9.1
Independence	1991/92	38.0	38.1	14.0	8.3	8.9	18.5
	1992/93	37.2	37.0	17.5	14.3	10.6	6.3
	1993/94	35.7	33.2	16.4	3.7	10.5	2.7
	1994/95	35.5	34.3	16.6	4.0	10.5	3.0
	1995/96	34.5	35.9	16.9	10.6	10.5	5.4
	1996/97	36.1	36.4	19.1	5.2	12.4	0.0
	1997/98	32.2	35.5	15.5	8.3	11.6	14.0

Sources: Eritrean authorities; and authors' calculations.

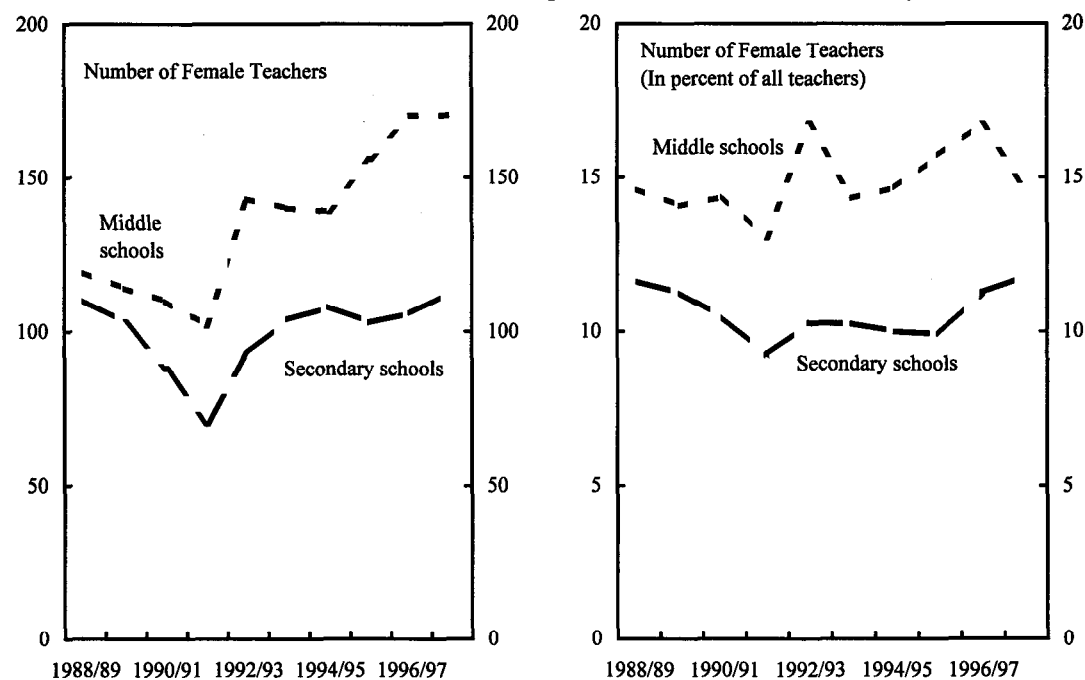
<sup>9</sup> The sample of secondary non-government schools is, however, quite small (there were 12 female, secondary school-level teachers out of a total of 86 teachers in 1997/98).

Figure 2. Eritrea: The Role of Women in Education, 1988/89-1997/98

More female teachers were hired for elementary schools, although their share has declined . . .

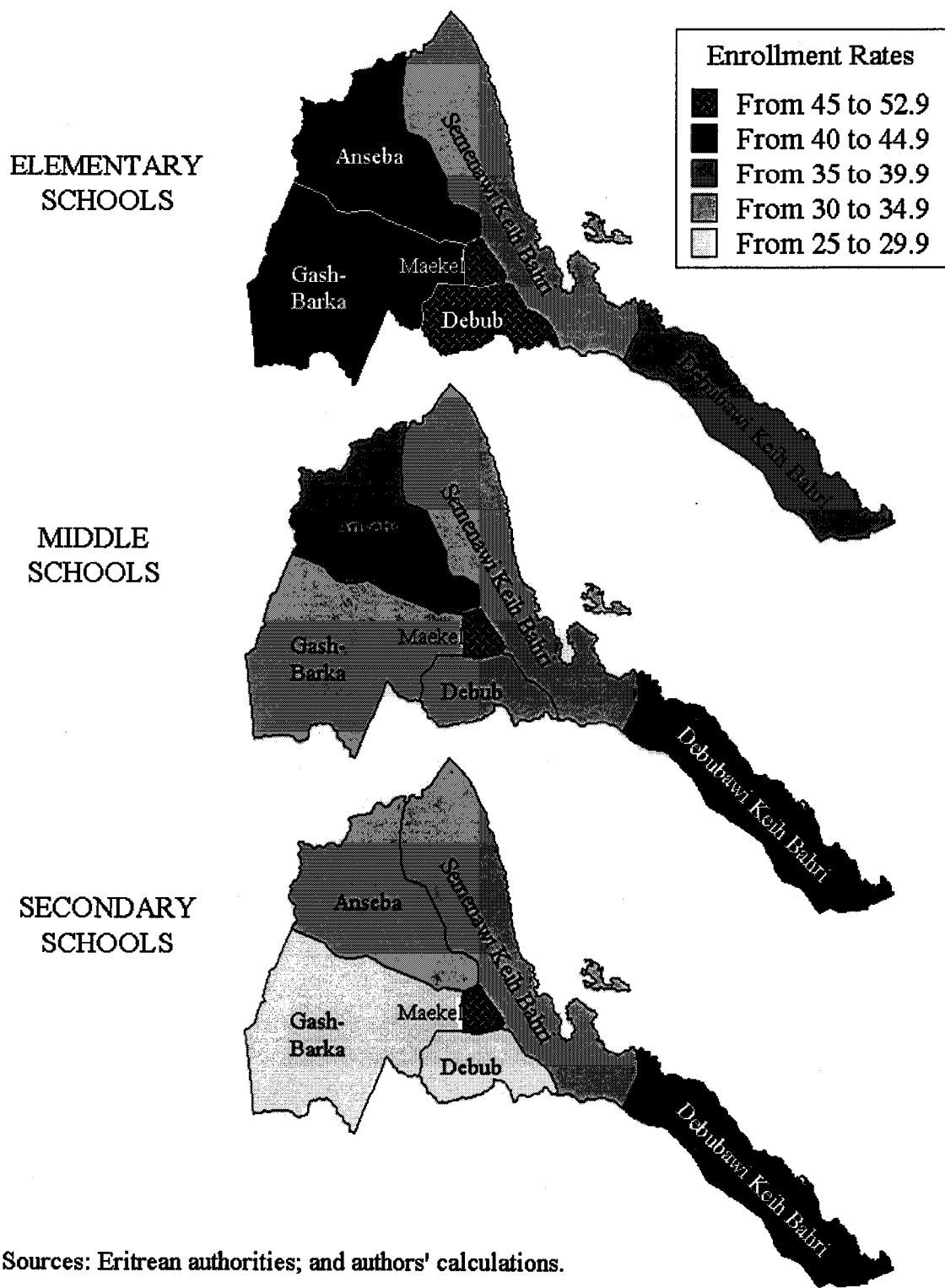


... while female teachers remained underrepresented in middle and secondary schools.



Sources: Eritrean authorities; and authors' calculations.

Figure 3. Eritrea: Regional Distribution of Female Gross Enrollments, 1997/98  
(In percent)



Sources: Eritrean authorities; and authors' calculations.

### **C. Regional Patterns of Female Enrollment and Employment Opportunities**

Despite its relatively small size (124,320 square kilometers) and population of 3.9 million, Eritrea is a very diverse place. It is divided into six main administrative units—Debubawi Keih Bahri (Southern Red Sea), Semenawi Keih Bahri (Northern Red Sea), Anseba, Gash-Barka, Debub (Southern), and Maekel (Central) (Figure 3). Upon independence, the country inherited a complex system of gender relations, formed by the coexistence of various ethnic and religious groups, as well as by diverse living conditions in highlands and lowlands shaped by different farming methods. This diversity affects regional school enrollment levels, as well as the regional gender gaps.

Leaving aside the capital region (Maekel), where female enrollments are the highest at all levels, the other regions exhibit different patterns of female enrollment that have changed little over time. In some regions, the female enrollment rates are comparatively high at elementary schools but drop sharply at middle and secondary schools (Anseba, Gash-Barka, and Debub). In others, the enrollment rates are lower than average, but stable at all levels (Semenawi Keih Bahri and Debubawi Keih Bahri).

We find that regions with higher participation of female teachers have higher female enrollment (Figure 4). For example, in the two rural regions where only one in five elementary school-level teachers is female, girls comprise only about 35 percent of all elementary school students. This contrasts with the Maekel region (with the capital, Asmara) where one in two elementary school teachers is female and girls comprise 50 percent of the school population.<sup>10</sup> A similar pattern, albeit less pronounced, can be observed also at the middle and secondary school levels.

The regional data also show a positive correlation between the achieved level of female education (both primary and secondary) and the percentage of women with paid jobs (Figure 5, upper panels).<sup>11</sup> Interestingly, no such link is visible for male primary education, and the link between male secondary education and male employment appears to be negative. Also, female enrollment is much stronger in regions where women hold professional jobs (Figure 5, lower panels). However, we find a positive link between male secondary school enrollment and the share of male professional employment.

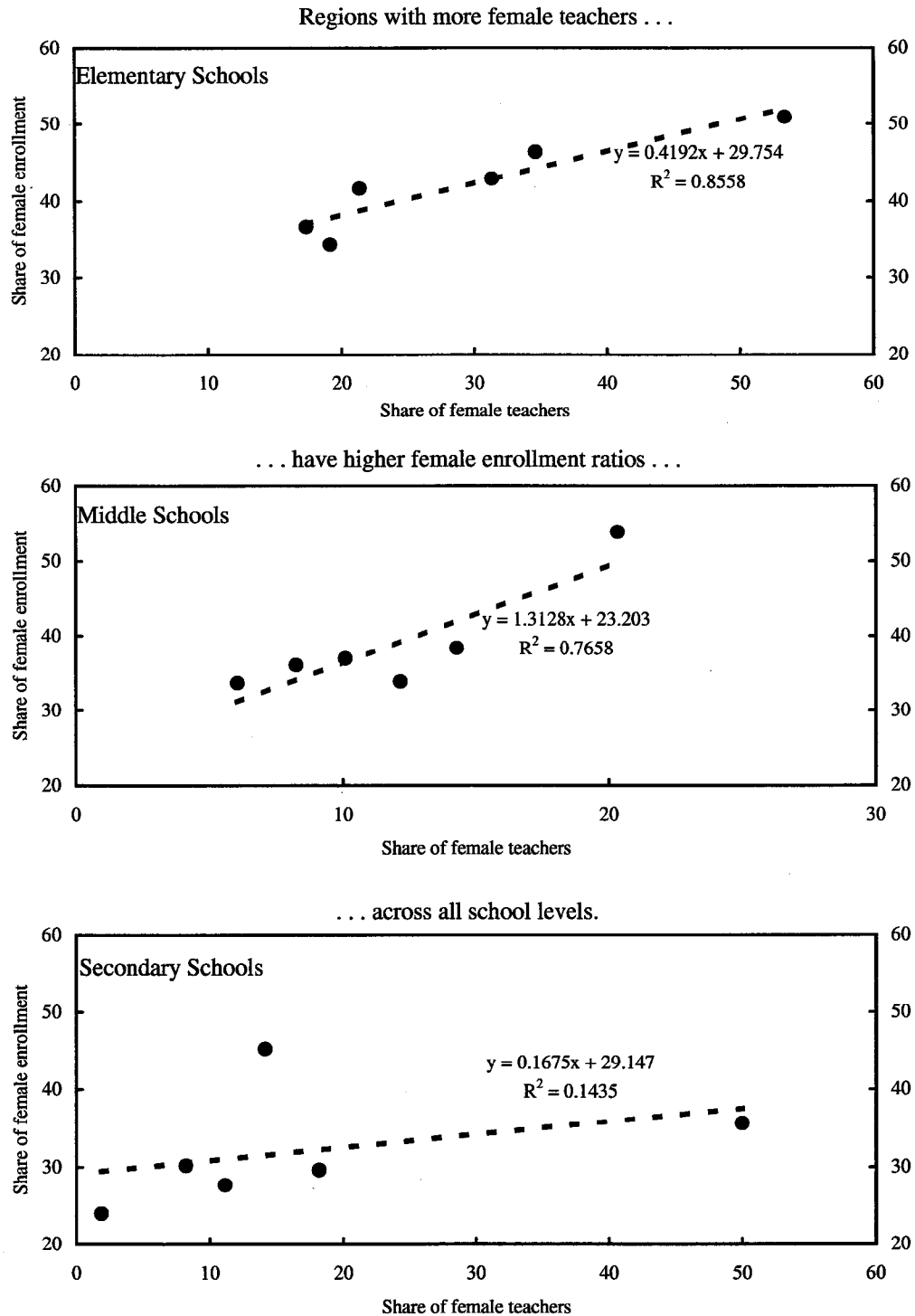
These regional findings confirm that the pattern of female enrollment is not accidental. On the one hand, low female teacher participation does not motivate girls to continue their education beyond the elementary school level. On the other hand,

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<sup>10</sup> Numerically, for every percentage point increase in the share of female teachers, the share of female students in elementary and middle schools increases by 0.4 and 1.3 percentage points, respectively. The relationship is insignificant in secondary schools.

<sup>11</sup> Paid jobs are defined as jobs with monetary components in National Statistics Office of Eritrea (1997).

Figure 4. Eritrea: Shares of Female Teachers and Female School Enrollments, 1997/98

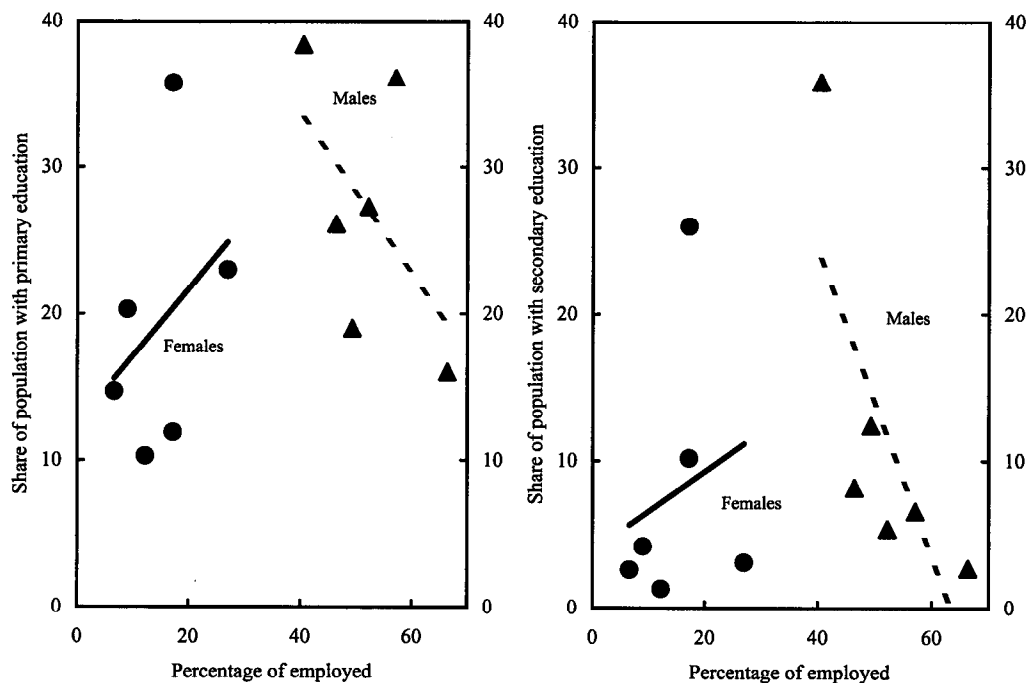


Sources: Eritrean authorities; and authors' calculations.

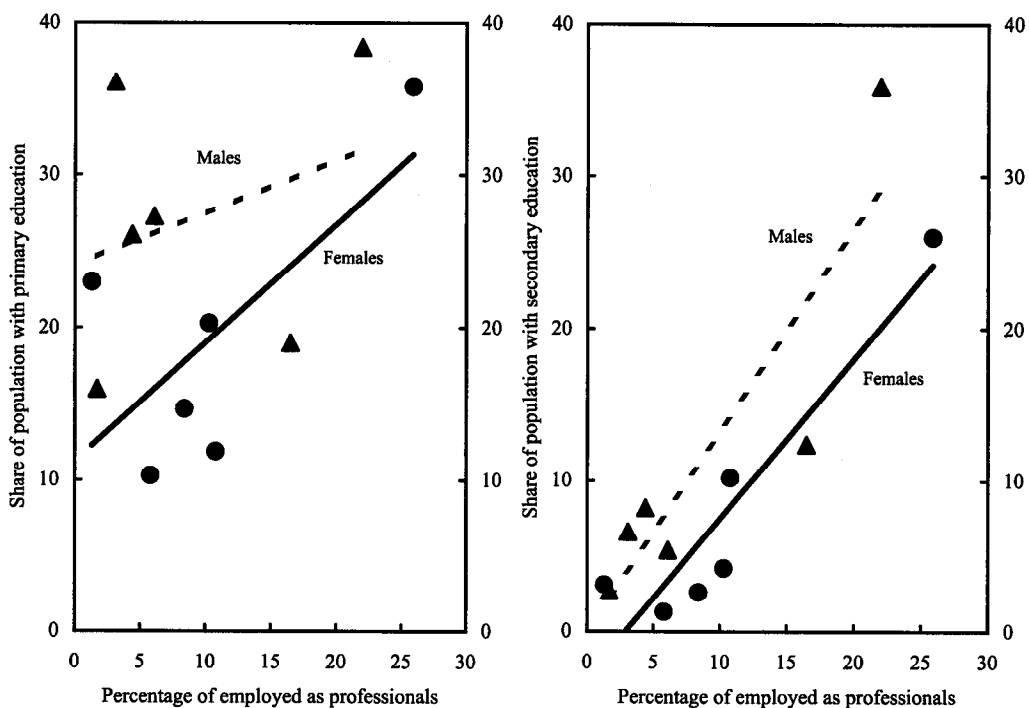


Figure 5. Eritrea: Regional Education Level and Employment, 1997/98  
(In percent)

Unlike male education, female primary and secondary education is correlated with contemporaneous, "cash" employment. . .



. . . and primary and secondary education is correlated with professional employment opportunities for both sexes.



Sources: Eritrean authorities; and authors' calculations.

Note: Observations for females and males are denoted with circles and triangles, respectively; and their respective linear regression lines are full and dashed lines.

parents in regions with limited female employment opportunities act rationally in not investing in low-return female education.

#### **D. Reasons for Widening of the Gender Gap**

After the war, the Eritrean government re-affirmed its commitment to continue improving the situation of women in Eritrea and yet the gender gap widened. Some initial decline in female secondary enrollment was to be expected—fertility rates are generally inversely related to female labor force participation and enrollment rates. As predicted, following the fertility increase in the postwar period, female secondary school enrollment declined along with female labor force participation (Galor and Weil, 1996). The effect of increased fertility was exacerbated by demobilization of male soldiers and their return to secondary schools. This causality, however, would explain neither the widening of the gender gap at the primary level, nor the continuing widening of the gender gap at the secondary level after 1993/94.

In addition, implementation of social policies lagged—as in many other postconflict countries—behind the official national strategies to deal with social issues. The slow implementation of those strategies was combined with the return to traditional ways of life, effectively reversing some of the accomplishments made during the independence war (Connell, 1998). In rural areas communities returned to the customary property and marriage laws, thus putting women in serious disadvantage as far as their access to employment opportunities is concerned and reducing incentives for parents to invest in girls' education.<sup>12</sup>

### **IV. IMPLICATIONS OF THE WIDENING GENDER GAP**

What are the growth and social implications of the observed educational patterns in Eritrea? The endogenous growth literature attributes a significant portion of the growth of per capita income to human capital, and another recent stream of this literature emphasizes the importance of female education for growth (Klasen, 1999; and Blackden and Bhanu, 1998). In addition, it is known that education, and female education in particular, raises the quality of life by improving health and labor productivity in both paid employment and household production, increasing the individual's access to paid employment, and facilitating social and political participation (Summers, 1994).

#### **A. Growth Considerations**

As mentioned above, the widening inequality between female and male education in Eritrea is likely to impose direct costs on productivity and growth by hindering the accumulation of human capital and, indirectly, through inefficient allocation of resources

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<sup>12</sup> Parents expect more direct benefits from investing into education of boys, who, unlike girls, would be anticipated to provide for parents in their old age. In theory, the wife's earning potential should be reflected in the value of the dowry, indirectly compensating her parents, however, we do not see any empirical evidence of this in Eritrea.

within household and higher fertility rates.<sup>13</sup> The impact of the gender gap on potential output is often large enough to offset a positive impact of increasing male enrollment rates: “underinvestment” in girls would subtract more from the rate of growth than “overinvestment” in boys would add to it. However, if total education achievements grow very fast, the negative impact of the gender gap is unlikely to offset the aggregate increase in human capital, both male and female.

Given data availability and potential measurement problems, to quantify the negative impact of the gender gap in a single-country, time-series approach is not possible. Hence, we employed simple simulations using parameters from two previously estimated cross-section models, constructing a hypothetical contribution to the rate of growth of the recent educational developments. Formally, we are comparing growth regressions under the conditions prevalent in 1991/92 and 1997/98.

We find that the effect of increased education inequalities in Eritrea would, other things being equal, reduce long-term per capita GDP growth by about 0.1-0.2 percentage point a year.<sup>14</sup> Hence, the negative effect of the gender gap outweighs the positive effect of additional investment in male human capital.<sup>15</sup> First, we used parameters from Klasen (1999) who has modeled the contribution of educational attainment to per capita GDP growth (Box 4). Using parameters from his cross-country regressions, we find that the long-term extrapolation of the slower rate of growth of female-to-male educational attainments (by about 0.5 percentage points annually) in Eritrea between 1991/92 and 1997/98 would have reduced long-term per capita GDP growth by almost 0.2 percentage point annually, based on gross enrollments. Second, using regression coefficients from Esteve-Volart (2000, Table 1), we find that a 2 percentage point fall in the female-to-male gross primary school enrollment rate between 1991/92 and 1997/98 would have lowered long-term per capita GDP growth by about 0.1 percentage point.

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<sup>13</sup> In general, the impact of the gender gap is nonlinear. For example, Esteve-Volart (2000) has derived a model in which sex discrimination does not matter as long as it affects both skilled and unskilled labor, but it matters if women are denied access to skilled jobs.

<sup>14</sup> While such a loss of growth potential may not appear large, we should keep in mind that Eritrea’s output per capita grew on average by only 1 percent during 1990-98.

<sup>15</sup> The impact of the overall increase in human capital accumulation, both male and female, is, of course, positive and larger than the negative impact of the gender gap.

**Box 4. Endogenous Growth Models with Explicit Gender-Based Variables**

Klasen (1999) included the following control variables: initial real GDP per capita (in logs), population and labor force growth, openness of the economy, the investment rate, life expectancy, total years of education (both male and female), and regional dummies.

Esteve-Volart (2000) has included the following control variables: initial real GDP per capita (in logs), secondary education, life expectancy (in logs), interactive term of real GDP per capita and human capital, the investment-to-GDP ratio, the government consumption-to-GDP ratio, the black market premium (in logs), terms of trade, and several regional and social dummies. Both models control for the specific state in which overall education attainments improve, although female attainments decline, and vice versa.

**B. Poverty Considerations**

Persistent gender inequalities in education are likely to endanger achievement of the goal of poverty eradication. Although schooling has similar marginal private returns for males and females, female education generates larger marginal social benefits (Hartnett and Heneveld, 1993; or Thorbecke and Hong-Sang, 1996). For example, educated women generally have fewer children, and those children tend to be healthier and better educated. Educated women are better informed about how to become and stay healthy, and they have lower maternal mortality rates and lower rates of HIV/AIDS infection. Educated women are also in a better position to receive paid employment in the formal sector, which is crucial for the survival of female-headed households after the male breadwinner has died of AIDS.

All of the social benefits of female education have been observed in Eritrea. On the national level, higher female education levels are associated with lower fertility rates, better nutritional status of children, a lesser prevalence of female genital mutilation, and increased use of family planning and AIDS prevention (Table 4). Some of the results are impressive: women with some primary school education have fertility rates 40 percent lower than those with no education, their children are twice as likely to be well fed, and so on. Improvements in these indicators are even greater for women with secondary school education. We observed similar results at the regional level: in regions with a larger share of educated women (years of schooling), knowledge about HIV/AIDS is more common, family planning is used more widely, and children are better fed (Figure 6).

Table 4. Eritrea: Selected Female Social Indicators by Education Level, 1995

Highest Achieved Female Education	Fertility		Teenage Pregnancy and Motherhood 1/	
	Total fertility rate 2/	Currently pregnant 3/	Mothers	Pregnant with first child
No education	6.9	11.0	33.5	8.1
Primary incomplete	5.5	8.4	17.5	3.1
Primary complete	4.3	4.0	6.6	1.3
Secondary+	3.0	3.4	1.7	0.4

Highest Achieved Female Education	Health Issues		Median Age at First Marriage	
	Agrees with genital mutilation 4/	Uses family planning techniques	Ages 20-49	Ages 25-49
No education	71.0	1.0	16.2	16.2
Primary incomplete	36.6	7.9	17.8	17.7
Primary complete	28.9	20.5	18.4	17.9
Secondary+	17.9	29.6	...	23.9

Highest Achieved Female Education	Nutritional Status of Children 5/		AIDS Prevention	
	Height for age	Weight for age	Knowledge	Changed behavior 6/
No education	20.8	19.7	58.9	32.0
Primary incomplete	11.4	9.9	96.0	41.1
Primary complete	10.2	7.7	99.3	57.6
Secondary+	4.3	2.4	99.9	67.1

Sources: National Statistical Office of Eritrea, 1997; and authors' calculations.

1/ In percent of women aged 15-19 years with corresponding education.

2/ Number of children per woman aged 15-49 years with corresponding education.

3/ In percent of women aged 15-49 years with corresponding education.

4/ In 1994, 94 percent of women had some form of genital mutilation done.

5/ Percentage below minus three standard deviations from the average.

6/ By education of mothers.

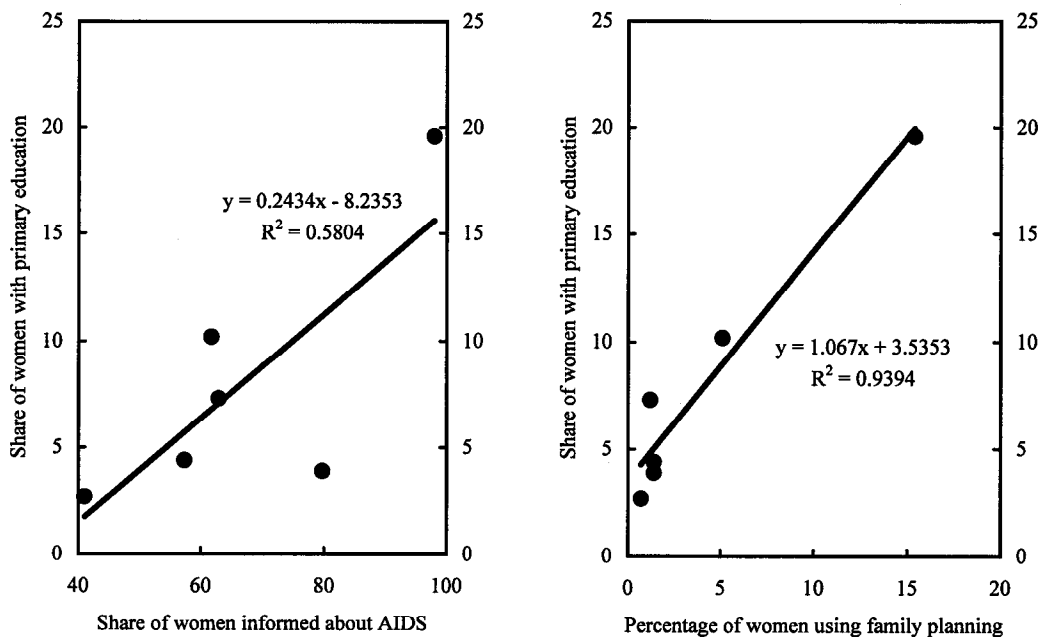
### C. Is Underinvestment in Girls Rational?

If the overall positive impact of female education is so widely recognized, why does the gender gap remain large in a number of low-income countries, or even increase in some? Dollar and Gatti (1999) quote three possible reasons for lower investment in girls' education: (1) its efficiency as an economic choice as a result of the low marginal product of females; (2) cultural or social preferences, effectively implying that the period of gender equality in the early 1990s was an aberration and that Eritrea now returns to some "natural rates of enrollment"; and (3) market failures, that is a situation where social gains to girls' education exceed private returns.<sup>16</sup>

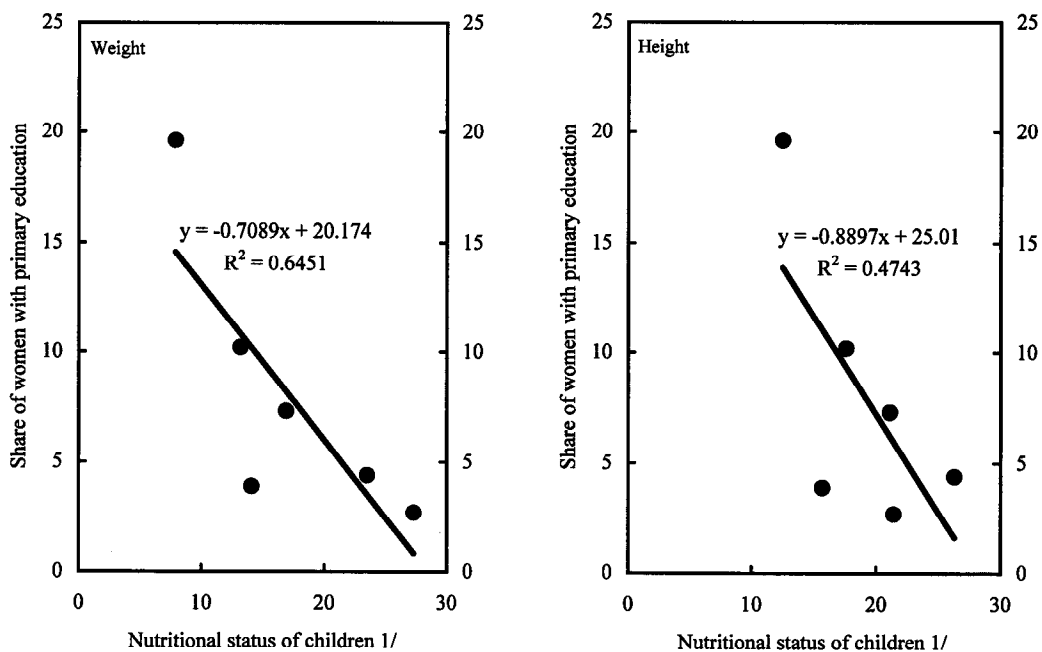
<sup>16</sup> For discussion of social gains to girls' education see, for example, Subbarao and Raney (1995) and Summers (1994).

Figure 6. Eritrea: Regional Education Levels and Health Indicators, 1997/98  
(In percent)

In regions with larger shares of schooled women, the AIDS virus is less of a risk and family planning is more widely used . . .



. . . and children are better fed.



Sources: Eritrean authorities; and authors' calculations.

1/ Percentage of children below three standard deviations of average height and weight.

The first possible reason—that limiting female education is an efficient economic choice—would apply if the education of girls would lead to lower net returns than the education of boys. However, the empirical literature on developing countries largely refutes this explanation. For example, Appleton (1995), using data from urban labor markets in Ethiopia, Uganda, and Côte d'Ivoire and finds that, in those markets, returns to women's education are typically equal to or higher than the returns to male education. However, Appleton points out that parents may still underinvest in girls' education because daughters are less likely than boys to work for wages and to remit their earning to parents. This may well be pertinent to the developments in Eritrea, where women traditionally join their husbands' families.

The other two reasons—cultural barriers to girls' education and market failures generated by the wedge between private and social returns to girls' education—can both be interpreted as a form of distortionary taxation that lowers human capital accumulation below its optimum level and thus leads to lower growth.<sup>17</sup> However, the policy implications of the “cultural differences” and “market failure” causes of low investment in girls are different. While the market failure argument provides a direct justification for government interventions,<sup>18</sup> the implications of the cultural barriers argument are not clear, as the benefit of higher growth owing to policies promoting greater female human capital accumulation can be outweighed by the loss of welfare of those with a preference for gender inequality. At the same time, the traditions underlying the cultural barriers to girls' education themselves are not static, but rather decreasing with economic development and education of both sexes.

## V. CONCLUSIONS

In this paper, we examined developments in the educational sector in Eritrea prior to the 1998-2000 border war with Ethiopia and found that, while the overall enrollment rates rose substantially, the gender gap in education widened during the 1990s in all levels of schooling. We also observed that, on the regional level, a smaller gender gap in education is positively related to female employment opportunities and overall enrollment rates, as well as to the availability of female teachers in the regions. We also illustrated that the increase in the gender gap between 1990/91 and 1997/98 has likely reduced the long-term growth of GDP per capita and slowed the improvement of social indicators.

Why do so many households in Eritrea underinvest in female schooling? To some degree, the answer is straightforward: given the severe poverty and limited outside-of-the-family employment opportunities for females, the relative private return of female schooling is low, especially in rural areas. The widening of the gender gap is further caused by diverse

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<sup>17</sup> For example, little or no formal economic employment opportunities may exist, and access to paid jobs may be gender based.

<sup>18</sup> Becker and Becker (1997) have argued that active government policies to promote the advancement of women have been traditionally more successful in countries where governments play a large role in the determination of wages and employment.

cultural preferences and some apparent market failures, as the social gain of female education is not captured by households' decisions.

The evidence presented in this paper—that the increasing gender gap in education has likely constrained Eritrea's growth and development—suggests that public intervention may be necessary to reverse this trend. More specifically, public intervention may be needed to improve the legal and institutional framework, and to correct for market failures in girls' education. However, a concrete design of these interventions should be subject to further research and must be based on a society-wide consensus.



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