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Can Cultural Barriers Be Overcome in Girls' Schooling?: The Community Support Program in Rural Balochistan

Jooseop Kim[a]
Harold Alderman[b]
Peter Orazem[a]

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Development Research Group
The World Bank

[a]Iowa State University
[b]World Bank

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Abstract

In many communities in Pakistan, parents prefer to have female teachers for their girls. However, there are often few educated women in rural areas who could serve as teachers. This study measures the success of an effort to encourage female enrollments by increasing the supply of both schools and female teachers and by encouraging parental involvement through the creation of community public girls' schools in rural areas of Balochistan, Pakistan. We find that the Community Support Process (CSP) program increased girls' enrollment by an average of 22 percentage points. Moreover, the opening of a CSP school also increased boys' enrollment by an average of 9 percentage points, even though boys' schools had previously been available. Thus, the targeted program for increasing girls' educational opportunities appears to have spillover benefits for boys as well as direct benefits for girls.

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Introduction

Increasing educational opportunities for rural children presents many challenges to the governments of developing countries. Rural parents are often less educated and may see less value from schooling than do their educated urban counterparts. In addition, opportunity costs for child time may be higher in rural areas.[1] Even if demand for schooling were equal between rural and urban areas, there are serious impediments to addressing rural schooling needs. First, villages are quite remote with few educated adults who might meet the qualifications to teach. While urban residents can be assigned to teach in rural areas, teacher absenteeism increases with commuting distance between home and school. In addition, rural teachers often apply for transfer to urban schools, leading to high turnover among rural teachers.

These problems are even more daunting for increasing rural girls' education in Balochistan, the least urbanized province of Pakistan. Parents prefer to have female teachers for their girls, but there are even fewer educated women than men who could serve as teachers in rural areas. Furthermore, social taboos on female travel make it difficult for women teachers to commute daily from urban to rural areas. The combination of constrained supply and weak demand have resulted in much poorer educational outcomes for rural girls in Balochistan. Only 15 percent of females aged 10 and older in Balochistan have ever attended school. The female literacy rate in Balochistan is only 8 percent, while the literacy rate of females in urban areas of the province is 49 percent.[2]

The government of Pakistan has set a goal of universal primary education by the year 2006. Attainment of this goal will require rapid expansion of primary enrollments in rural areas, with particular emphasis on expansion of female primary enrollments. This study measures the success of such an effort to encourage female enrollments through the creation of community public girls'

schools in rural areas of Balochistan. Under the assumption that girls' education is a rationed good in the absence of a girls' school in the community, we treat the creation of a Community Support Process (CSP) school as a relaxation of this rationing constraint. We find that regardless of how the impact is measured, the CSP program increased girls' enrollment by an average of 22 percentage points. The opening of a CSP school also increased boys' enrollment by an average of 9 percentage points. Thus, the targeted program for increasing girls' educational opportunities appears to have spillover benefits for boys as well.

I. The Community Support Process (CSP) Program

From January 1992 to March 1993 an experiment to create community support for promotion of female primary schools was initiated in Zhob, Mekran, and Naseerabad divisions of Balochistan. The purpose of the pilot program was to increase girls' primary enrollments by establishing segregated girls' primary schools taught by local female teachers. The program was based on a partnership between the government and the community. The government provided funding for the community school provided that the community supplied a temporary school facility, and female teacher from the community. A village education committee, composed of parents of daughters, was responsible for identifying the teacher, motivating parents to send daughters to the school, and monitoring the progress of the school, the children and the teacher. If the school was successfully operated for a probationary period, it was made a permanent government girls' school.

From the start, the program design was to accommodate parental preferences by using female teachers from the community. Because educated females are in short-supply in rural areas, the educational qualifications were relaxed relative to the standard requirements for a government

teacher. Women qualified as potential teachers if they had, at minimum, eight years of schooling and were residents of the same village or lived within walking distance of the village. To make up for lack of educational background and teacher training, women were given a short course in teaching methods before the school opened. Teachers were also given in-service training. Those with educational deficiencies were required to make them up over time.

II. Theory of Enrollment Response to the Creation of CSP Girls' Schools

Before conducting the statistical comparison of the CSP and comparison groups, it is important to identify the possible endogenous responses to the program. It is also important to identify the exogenous variables that might condition the magnitude of those responses. Creating girls' school in a community will alter how parents allocate resources between boys' schooling, girls' schooling, and other consumer goods. To illustrate the parents' choice, we develop a model in which households are assumed to have parents, daughters and sons. Parents in this model are altruistic in the sense that they are willing to sacrifice their own consumption to invest in their children's schooling. Parents are assumed to derive utility from their own consumption of goods (Z) and from the human capital of their daughters (H_f) and their sons (H_m). The utility function has the form

$$U = U(Z, H_f, H_m, T), \tag{1}$$

where T is a vector of taste indicators that are not subject to choice.

Let Y be household income, P_z be the price of consumption goods, and P_f and P_m are the prices of schooling for their daughters and sons, respectively. The schooling price includes school fees, the cost of transportation, and the cost of materials. The income constraint on parental utility maximization is

(2) $$P_z Z + P_f H_f + P_m H_m = Y.$$

Now assume that schooling for girls is rationed to the amount of S_f, so that parents would invest more on girls' schooling if it were in sufficient supply.[3] The absence of a girls' school within walking distance effectively restricts supply for parents who have a strong aversion for coeducational schooling or to having their daughters interact with a male teacher. The supply constraint on parental utility maximization is

(3) $$H_f \leq S_f .$$

The parents allocate their household income to Z, H_m, and H_f in order to maximize utility given by (1), subject to $P_z Z + P_f H_f + P_m H_m = Y$ and $H_f \leq S_f$. The first order conditions are

(4) $$U_m - \lambda P_m \leq 0 \text{ or } H_m = 0$$

(5) $$U_f - \lambda P_f - \mu \leq 0 \text{ or } H_f = 0$$

(6) $$U_z - \lambda P_z = 0$$

(7) $$Y - P_m H_m - P_f H_f - P_z Z = 0$$

(8) $$S_f - H_f \geq 0,$$

where λ and μ are the Lagrangean multipliers associated with household budget and girls' school supply, respectively.

If the constraints bind, the multipliers will be positive. When the constraint on girls' schooling supply is binding (i.e., $\mu > 0$ and $H_f > 0$, and equation (5) holds with equality) and the prices for boys' and girls' schooling are the same, equations (4) and (5) imply $U_f > U_m$. Diminishing marginal utility would then imply that $H_m > H_f$ at the optimum.

The CSP program relaxes the restrictions on girls schooling.[4] For households whose demands for girls' schooling was constrained, the effect of the CSP program on girls' schooling comes directly from total differentiation of equation (8) as follows:

(8)' $$dH_f / dS_f = 1.$$

This implies that at the margin, an arbitrarily small increase in the rationed amount of girls' schooling will raise girls' enrollment by the same amount. Totally differentiating equations (4) through (7) and inserting $dH_f = dS_f$, we get the following comparative static results:

(9) $$\frac{dH_m}{dS_f} = \frac{U_{mz}P_fP_z + U_{fz}P_mP_z - U_{zz}P_mP_f - U_{mf}P_z^2}{|H|}$$

(10) $$\frac{dH_m}{dY} = \frac{-U_{mz}P_z + U_{zz}P_m}{|H|},$$

where $|H| = -2U_{mz}P_m + U_{zz}P_m^2 + U_{mm}P_z^2 < 0$. From equations (9) and (10), we get

(11) $$\frac{dH_m}{dS_f} = \frac{-P_f dH_m}{dY} + \frac{P_z(U_{fz}P_m - U_{mf}P_z}{|H|}.$$

Assuming diminishing marginal utility, $U_{ii} < 0$ for i = m, f, and z. Hence, from equation (10), we can see the income effect depends on the sign and magnitudes of U_{mz} and U_{zz}. However, numerous studies suggest that education is a normal good so that equation (10) is positive. The effect of the program on boys' schooling is ambiguous. Equation (11) shows that the effect can be decomposed into an income effect and another term. It is apparent that the effect of relaxing rationing of girls' schooling imposes a cost on the household which can lower boys' schooling through the income effect. The program lowers net income available for other purposes including boys' schooling. However, we can see that under some circumstances, the creation of a girls' school can lead to an increase in boys' schooling as well. If this happens, we can conclude that boys' and girls' education are complements. Boys' and girls' education are more likely to be

complements when the price of girls' schooling is low so that $P_f = 0$. In addition, they are more likely to be complements when $U_{mf} > 0$ and/or when $U_{fz} < 0$. The first condition implies that the marginal utility from boys' schooling increases at higher levels of girls' schooling. The second implies that the marginal utility of consumer goods decreases as girls' schooling rises.[5]

Reduced form equations for boys' and girls' schooling have the following functional forms:

$$H_f = H_f(P_f, P_m, Y, P_z, T, S_f) \quad (12)$$

$$H_m = H_m(P_m, P_f, Y, P_z, T, S_f) \quad (13)$$

The reduced form equations suggest that enrollment will depend on school fees, income, the price level, tastes, and the available supply of girls' schooling.

III. Survey Design and Data Strategy

To evaluate the enrollment effect of the CSP schools, we required a comparison group of villages without CSP schools. A sample of villages was drawn from the 1990 Balochistan Human Resources Survey. This survey was in effect a village census, containing information on village attributes including the number and type of schools in the village, and the population of girls and boys. Villages of size comparable to the CSP village without a girls' school were taken to be potential comparison villages. A total of 10 CSP villages in three divisions were selected by the Balochistan Education Management Information System (BEMIS). Twenty-one comparison villages with boys' schools but no girls' schools were also drawn.

For each CSP and comparison village, BEMIS collected household information from each household. The household survey information included socioeconomic characteristics of each household including parental education and occupation, age, gender, educational attainment and current enrollment status for all children in the household.

A. Differences and Similarities Between Treatment and Comparison Groups

To begin the analysis, we investigate whether the comparison and CSP villages are statistically similar. Statistical properties are summarized in Table 1 for both treatment and comparison groups. Sample statistics are reported separately for boys and girls. The treatment sample included 355 children, 175 girls and 180 boys. The comparison sample included 1,023 children, 595 girls and 428 boys. Enrollment rates for both boys and girls are higher in the treatment than in the comparison group, a first-pass estimate of the impact of the CSP school effect. Nevertheless, there may be other factors responsible for the higher CSP village enrollments.[6] The other variables in Table 1 are those believed to affect parental enrollment choices for their children. Children's age, father's education attainment, and birth order of the child in a family were taken directly from the survey data. There was information on mother's education attainment in the survey data, but almost all the mothers had never attended school. Lack of variation in mother's education led to its exclusion from the analysis. Household income was generated from information on the number and educational attainment of adults in the household, land holdings, and other productive household assets. Details on the estimated measure of household income are contained in Appendix 1.

We performed two different tests of the equivalence between the CSP and comparison villages. One is an equality test of means in characteristics between the treatment and the comparison groups. This test provides information on how closely the comparison villages match the treatment villages. The other test examines whether the behavioral coefficients in the enrollment choice model (based on equation (14)) are equal between the treatment and the comparison villages.

B. Tests of Equality of Means

The third and sixth columns of Table 1 report corrected t-values and degrees of freedom for hypothesis tests that the means of the variables are equal across the treatment and the comparison groups. The sample statistics for boys were statistically equivalent. For girls, fathers were more educated in the CSP villages. Birth order was also significantly higher in the CSP villages, implying somewhat larger numbers of children per household. Nevertheless, the joint test that the means were equal across all variables other than the enrollment rate was not rejected at the 0.05 level of significance. Based upon the results, we can reach a statistical conclusion that the treatment and comparison samples are drawn from the same universe of villages.

C. Test of Equality of Behavioral Coefficients in the Enrollment Choice Model

Parental decision-making regarding their children's education may differ between the treatment and comparison group. To check this, we estimate the following model of parental choice regarding their children's schooling:

(14) $$R_i^* = \beta' X_i + U_i$$

where $R_i = 1$ if $R_i^* > 0$

$R_i = 0$ if $R_i^* \leq 0$

In equation (14), an unobserved variable R_i^* depends on the index function, $\beta' X_i$, where X_i is the vector of characteristics in equations (12) and (13) which affect children's enrollment. When R_i^* is positive, we observe the child in school and R_i=1. Otherwise, the child will not enroll.

Table 2A reports the coefficients and z values of the probit analysis of enrollment choices for boys and girls. Separate estimates are presented for the treatment and the comparison groups. All of the estimates exhibit the same sign pattern of coefficients with the exception of the generally small and imprecisely estimated coefficients on birth order for boys and girls. The coefficient on

household income is positive in both samples. Parental education also positively influences children's enrollment. Enrollment increases with age, but at a diminishing rate.

Table 2B shows the result of the tests of equality of coefficients between the treatment and the comparison groups. The coefficients for the two groups are not statistically different, except for father's educational level in the enrollment equation for girls. In addition, the joint test of equality of behavioral coefficients across the CSP and comparison villages does not reject the null hypothesis of equality for the girls sample, while it was rejected for the boys' sample and the pooled sample. This result suggests that the patterns of the parental decision-making regarding their girl's education are identical in the treatment and the comparison groups.[7] Coupled with our earlier finding that the household attributes in the CSP and comparison villages are equal, we can conclude that our CSP and comparison villages are drawn from the same universe of villages.

IV. Evaluation Strategy

Accuracy of a quantified impact evaluation depends mainly on how well the comparison group was constructed. Since child i cannot be simultaneously in both the treatment state (R_{1i}) and the non-treatment state (R_{0i}) of the CSP program, we cannot observe the true impact of the program $\alpha_i = R_{1i} - R_{0i}$. Instead, the observed outcome (R_i), can be expressed as $R_i = d_i R_{1i} + (1-d_i)R_{0i}$, where $d_i = 1$ if child i lives in a CSP village. Given the impossibility of observing the true impact of the fellowship program, the goal is to get an unbiased estimator of α_i.

One way to get an unbiased estimator of α_i is to use a comparison group to derive estimates of the counterfactual state. If we have a comparison group that mimics the treatment group very well, the comparison group is a good proxy for the counterfactual state of the CSP program. In this case, the expected program effect can be measured by the gap between the post

program outcome in the treatment group and that in the comparison group. Mathematically, this is defined as

(15) Matched comparison:

$$E^{M}(\alpha_i | d_i = 1) = E(R_T) - E(R_C)$$

where subscripts T and C represent treatment group and comparison group, respectively. This method is called the ex-post matched comparison method.

Another way to get an unbiased estimator of α_i is to fit the following econometric model assuming the effect is invariant across individuals:

(16) Covariate post-test:

$$R_i = X_i\beta + d_i\alpha + U_i$$

Equation (16) is the same as equation (14) except for the addition of a dummy variable indicating residence in a CSP village. Assuming X_i and d_i are independent of the unobserved variables U_i, so that $E(U_i | d_i, X_i) = 0$ for all i, we can estimate equation (16) using a cross-sectional data set.

V. Results

The first row of the Table 1 presents the enrollment rates of the treatment and the comparison group three years after the program intervention. Applying the ex-post matched comparison method given by equation (15), the measured CSP program effect was to increase girls' primary enrollment by 20.8 percent and to increase boys' primary enrollment by 9.5 percent. As shown in Appendix 3, the success of the CSP program does not appear to differ with respect to household or village socioeconomic attributes. The implication is that the CSP schools have similar success probability across all types of households or communities that meet the CSP village guidelines.[8]

The covariate post-test results reported in Table 3 are consistent with the results from the ex-post matched comparison method. The measured effect of the CSP program, based on equation (16), is a 21.8 percent increase in girls' enrollment and a 12.9 percent increase of boys' enrollment. The other estimated parameters exhibit the same sign patterns in the CSP and comparison enrollment choice equations for both girls and boys. The magnitudes are also comparable. Moreover, the coefficients are consistent with the results obtained in other studies of enrollment. The coefficient on household income is positive in both samples, so education of children is a normal good. Father's education level positively influences children's enrollment. Child age also positively affects enrollment choice, but at a decreasing rate. Peak enrollment for girls occurs 1.5 years below boys and drops off faster, so girls have smaller projected time in school. First-born children have a slightly higher probability of enrollment than their younger siblings, but the coefficient is not significant.

Income elasticities based on the coefficient of income in Table 3 and means of household income in Table 1 were 0.044 for boys and 0.049 for girls, which are highly inelastic.[9] This implies that income growth in rural areas does not guarantee an increase in primary enrollments. This also predicts that an alternative program, which aims to increase attendance through an income subsidy to households, will not be effective.

VI. Conclusions and Extensions

There has been concern that the provision of a girls' school can boost girls schooling in the rural areas only if there is excess demand for girls' schooling. A pessimistic view is that cultural barriers or lack of parental interest about girls' schooling prevail in rural areas. Parents would not send their girls to school, even if more girls' schools are provided. However, this study shows that

the creation of the CSP schools led to a substantial increase in attendance for rural girls. Although the reason for the success cannot be identified from available data, the use of parental participation and local female teachers are apparently critical to breaking cultural barriers to female schooling. An interesting side benefit of the program is that boys' enrollment also increased. The program effect on boys' enrollment is apparently due to an underlying complementarity between boys' and girls' schooling so that relaxing the constraint on girls' schools also raises incentives to send boys to school. The results were not sensitive to the methods used to measure the program effect based on different assumptions. All of the results suggest that expanding the CSP program to other villages is a promising strategy to raise rural schooling.

Future work of impact evaluation on CSP program will be required to assess the performance of the children attending CSP schools. The ultimate goal of the CSP program is to make children attain literacy. It would also be useful to compare educational outcomes in CSP schools to educational outcomes in traditional government schools. In particular, the role of local parental control may be an important factor in making all schools more effective and not just girls' schools.

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Table 1. Summary Statistics of Datasets and Tests of the Equality of Means Between the CSP and Comparison Groups

	Girls			Boys		
Variable	CSP	Comparison	t-value	CSP	Comparison	t-value
Enrollment rate	0.623	0.415	5.546	0.761	0.666	2.844
	(0.486)	(0.493)	[768]	(0.428)	(0.472)	[606]
Household income	3197	5143	1.878	3675	6871	0.767
	(6476)	(8323)	[768]	(6552)	(14178)	[606]
Age	7.411	7.401	0.717	7.437	7.439	0.087
	(1.762)	(1.725)	[768]	(1.804)	(1.717)	[606]
Father's education	2.280	1.404	3.679	1.781	1.595	1.917
	(4.116)	(3.235)	[735]	(3.537)	(3.502)	[586]
Birth order	3.040	2.417	2.149	2.972	2.626	1.017
	(1.468)	(1.273)	[768]	(1.508)	(1.245)	[605]
Joint test			12.99			4.89
Number of observations	175	595		180	428	

Note: Critical value for joint test is 13.5.

Table 2A. Probit Analysis of the Probability of Enrollment by Gender and Village Type

	Girls and Boys		Girls		Boys	
Variable	CSP	Comparison	CSP	Comparison	CSP	Comparison
Income/10,000	0.269	0.111	0.212	0.115	0.324	0.146
	(1.04)	(3.43)	(0.87)	(1.11)	(1.08)	(4.46)
Age	0.782	1.471	0.501	1.296	1.171	1.724
	(13.5)	(7.79)	(3.29)	(6.13)	(3.80)	(31.0)
Age square	-0.043	-0.087	-0.029	-0.082	-0.064	-0.091
	(31.3)	(9.24)	(2.14)	(7.48)	(2.80)	(22.0)
Father's education	0.078	0.058	0.087	0.045	0.061	0.091
	(3.37)	(1.63)	(2.43)	(1.34)	(1.79)	(2.15)
Birth order	-0.053	-0.026	-0.084	0.007	0.003	-0.080
	(0.76)	(0.82)	(2.56)	(0.11)	(0.03)	(2.68)
Girl	-0.456	-0.663	—	—	—	—
	(1.64)	(14.3)				
Constant	-2.577	-5.536	-1.709	-5.204	-4.389	-7.018
	(3.88)	(4.96)	(3.35)	(3.88)	(3.64)	(14.0)
Number of observations	353	972	175	562	178	410
Pseudo R^2	0.11	0.12	0.07	0.04	0.10	0.21

Table 2B. Test of Equality of Coefficients Between CSP and Comparison Groups

	Girls and Boys		Girls		Boys	
Variable	P^2	result	P^2	result	P^2	result
Income	0.38	no reject	0.15	not reject	0.51	not reject
Age	0.29	no reject	0.49	not reject	1.04	not reject
Age square	0.29	not reject	0.12	not reject	5.68	not reject
Father's education	5.72	not reject	14.36	reject	0.58	not reject
Birth order	0.01	not reject	0.86	not reject	1.49	not reject
Girl	0.47	not reject				
Joint test	7.83	reject	3.39	not reject	8.24	reject

Significance level: $\alpha = 0.05$.
Note: The critical value for the joint test is 6.88.

Table 3. Post-test Probit Analysis of Probability of Enrollment Using Cross-sectional Data

Variable	Girls and Boys	Girls	Boys
CSP dummy	0.182	0.218	0.129
	(5.55)	(4.77)	(3.06)
Income/10,000	0.050	0.048	0.052
	(2.84)	(1.95)	(2.15)
Age	0.495	0.428	0.498
	(5.88)	(3.92)	(4.23)
Age square	-0.029	-0.027	-0.026
	(5.20)	(3.74)	(3.38)
Father's education	0.025	0.023	0.026
	(5.58)	(3.97)	(3.75)
Birth order	-0.015	-0.010	-0.015
	(1.26)	(0.67)	(0.93)
Girl	-0.234	—	—
	(8.16)		
Number of observations	1325	737	588
Pseudo R^2	0.13	0.06	0.18

Note: The coefficients reported here are dF/dX, where F is dependent variable and X is independent variable, not actual coefficients. Since the dependent variable is a discrete variable, dF/dX is not identical to actual coefficients.

Appendix 1

Estimation of household income requires information on household production, informal labor market arrangements, barter trade and other economic activities occurring outside formal markets. That type of information is difficult and costly to obtain. This project did not include sufficient resources to measure household income accurately. Instead, we utilized the Pakistan Integrated Household Survey (PIHS), which contained a detailed survey of household income and socioeconomic attributes in 1991. The PIHS allows us to predict household income based on a regression of income on easily observed household attributes. The current study collected information on these household attributes and then used the PIHS estimates to generate predicted incomes based on those attributes.

The PIHS income equation is reported in Table A1. The specification follows that used by Alderman and Garcia (1996). That study estimated income and expenditure equations for 217 households in a rural area of Balochistan. The predicted household income using Alderman-Garcia estimates performed well in explaining household savings, loans, and nutrition status in their study. However, the Alderman-Garcia estimates are less useful for our purpose because their data are from 1986 and some of the variables in their data do not match very well with the survey data for our current study. The variables in the income equation include the number of adult males and females, the number of males and females with primary, secondary and tertiary level schooling, and the value of household assets. As can be seen in Table A1, households with more adult males, more human capital, and more capital assets have higher income in both the PIHS data and the data used in the Alderman-Garcia study.

In general, the predicted incomes based on the PIHS provided reasonable estimates for both CSP and comparison villages. The higher mean and variance in predicted incomes for the comparison villages, especially for boys, was due to the presence of a single wealthy household with ten boys and one girl among the comparison households. Exclusion of that household resulted in nearly identical income moments across boys and girls and across the two village groups.

Appendix Table A: Income Equations

Variable	Alderman and Garcia	PIHS, rural
Intercept	5,999	-777
	(2.61)	(-6.39)
Number of males aged 16 or more	938	541
	(0.92)	(4.37)
Number of males aged 6-16	1,691	[a]
	(2.09)	
Number of females aged 16 or more	-709	315
	(-0.54)	(2.59)
Number of females aged 6-16	1,009	[a]
	(0.64)	
Number of children 5 or below	2,820	[a]
	(2.99)	
Number of males with primary schooling	6,140	121
	(2.95)	(0.69)
Number of males with secondary schooling	2,279	960
	(1.69)	(5.60)
Number of males with more than secondary schooling	6,435	449
	(1.41)	(4.65)
Number of females with primary schooling	6,707	-427
	(1.85)	(-1.88)
Number of females with middle schooling or more	7,758	747
	(1.35)	(5.87)
Value of land/1,000		1.24
		(10.97)
Rainfed land	110	[a]
	(2.34)	
Irrigated land	665	[a]
	(4.93)	
Orchards[b]	4,065	196
	(2.57)	(1.55)
Value of livestock	0.335	[a]
	(1.05)	
Cow[c]		62.1
		(1.88)
Camel[c]		955
		(2.19)
Donkey/horse[c]		9.45
		(0.04)
Goat/sheep[c]		11.8
		(0.65)
Value of vehicles	0.171	0.03
	(8.55)	(2.95)
Value of machinery and tools	0.125	0.02
	(1.27)	(1.31)
R^2	0.747	0.430
N	217	894

[a]Not available in the current data.
[b]Unit is acres for Alderman-Garcia, and value for PIHS.
[c]Unit is the total number owned.

Appendix 2

A theoretical prediction of the effect of the CSP program was based upon the assumption that girls' schooling supply was rationed in the treatment and comparison villages. It would be logically complete to check if boys' schooling also has been rationed in those villages. Table A2 reports the average walking distance to school for boys, by village. Average distance is less than 15 minutes in every village. This suggests that boys have at least one accessible school in every village, and so rationing is not a problem for boys in these villages.

Appendix Table A2. Average Walking Distance in Minutes for Enrolled Boy Students, by Village

CSP Village Name	CSP	Comparison village name	
killi gomazgi	5.07	panwan/haji noor muhammad/reikoo	8.22
	(7.01)		(3.06)
killi atta mohd	7.38	killi zangi abad	6.60
	(6.40)		(3.21)
killi zangal khan	10.29	killi jorkeen	8.00
	(18.73)		(2.26)
killi jamaldini	3.43	killi dedar	7.00
	(0.85)		(2.54)
kosh kak	3.36	gorgaige	2.43
	(1.50)		(1.81)
guroo chowki	8.40	haji muhammad khan	4.29
	(11.38)		(1.25)
bakhshi colony	13.46	dura khan mangal	3.50
	(10.08)		(1.31)
kumhari ward	6.08	mir bahadur khan	1.50
	(2.43)		(0.55)
kuntagi line	13.57	jan baig	5.64
	(9.00)		(3.13)
shipanko bazar	5.27	killi naik muhammad/satani/khund umrani	6.95
	(2.80)		(4.12)
		chad shair ali/khawaja irbraheem	5.19
			(2.93)
		ghanga lori	7.00
			(4.00)
		dasht matora	1.40
			(0.84)
		ghar rustamzai	2.08
			(0.28)
		raiki zai	1.60
			(0.50)
		gatti door/panwan/kosar-e-bazar	9.47
			(9.99)
		bandary/killi shankani dar	5.00
			(0.00)
		shamb-e-ismail	8.33
			(8.16)
		surbandar	12.80
			(5.63)
		nailent	11.21
			(2.12)
		jalli door	4.29
			(1.89)

Note: Numbers in the parentheses represent standard errors.

Appendix 3

The effect of the CSP school on boys' or girls' enrollment could vary depending on the socio-economic status of the household or the village. To check this possibility, we reestimate equation (16), allowing for different marginal enrollment effects for each regressor. The specification is

$$R_i = (1 - d_i)X_i\beta_C + d_i X_i(\beta - \beta_C + d_i\alpha + U_i$$

where β_C are the enrollment coefficients in the comparison villages, and β is the impact of the household attribute on the CSP enrollment effect. The coefficient estimates of $(\beta\text{-}\beta_C)$ will differ from zero if the corresponding variable disproportionately increases or decreases the effect of the CSP school on enrollment. As can be seen in Table A3, none of the coefficients are significantly different from zero, and the joint test also fails to reject the hypothesis that the CSP schools have a uniform effect across all households. This implies that, at least for the type of communities selected for the CSP program, the program's success does not depend on household or individual attributes.

Appendix Table A3. First Difference Analysis with Interactions (Rural)

Variable	Girls	Boys
Treatment dummy	3.495	2.629
	(1.50)	(0.94)
Income/10,000	0.115	0.146
	(1.70)	(1.88)
Age	1.296	1.724
	(4.06)	(3.93)
Age square	-0.082	-0.091
	(3.91)	(3.15)
Father's education	0.045	0.091
	(2.63)	(3.53)
Birth order	0.007	-0.080
	(0.14)	(1.26)
CSP*Income/10,000	0.098	0.178
	(0.52)	(0.73)
CSP*Age	-0.796	-0.554
	(1.24)	(0.73)
CSP*Age square	0.054	0.027
	(1.26)	(0.54)
CSP*Father's education	0.042	-0.030
	(1.25)	(0.66)
CSP*Birth order	-0.091	0.083
	(1.06)	(0.84)
Number of observations	737	588
Pseudo R^2	0.07	0.19
Joint test[a]	5.20	7.12

[a]The critical value of the $\chi^2(5)$ test at the .05 significance level is 11.07.

Endnotes

[1] For example, in Balochistan, province of Pakistan, 39 percent of rural boys who never attended school were withheld because they had to help at home. The corresponding figure was 23 percent in urban Balochistan.

[2] Statistics based on 1995-1996 Pakistan Integrated Household Survey.

[3] We could generalize the model to incorporate rational supply of boys' schools as well. Data on walking distance to school reveals that in all 31 villages in the study, boys walked less than 15 minutes to school (see Appendix 2). This suggests that boys' schooling was available generally, although the absence of a girls' school effectively restricts the supply of schooling to girls.

[4] This is a special case of rationing in the sense that only one good is rationed. Tobin and Houthakker (1951) analyzed the more case of multiple rationed goods.

[5] An alternative way to reach the same perspective is by viewing ration constraints as virtual prices which condition a full matrix of demand responses through price and cross price effects (Neary and Roberts, 1980). These price responses can be further decomposed into income and compensated price responses that can be complements or substitutes. The intervention reduces the price of schooling (as measured by the fee and the disutility and cost of travel to school and of attending it).

[6] It is important to note that enrollments in the comparison villages also exceed the average enrollment rates for rural boys and girls in Balochistan. The reason is that the CSP and comparison villages are both larger and more educated than rural Balochistan generally.

[7] It should be emphasized that in this ex post design, the tests of equality of behavioral parameters are not definitive. If the implementation of the CSP schools changed parental behavior, then ex ante identical groups will look different ex post. Therefore, the previous test of equality of time invariant household attributes is more relevant.

[8] The most important of these are adequate village size, for at least 25 girls of primary age, presence of a local girl who qualifies as a teacher, and a group of parents willing to serve as a Village Education Committee.

[9] According to Kim, Alderman and Orazem (1998), the corresponding elasticities were 0.115 for boys and 0.503 for girls in Quetta, the capital of Balochistan.