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## **Female education inequality in Turkey: factors affecting girls' schooling decisions**

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**Abstract:** Education remains to be an important determinant of economic and social opportunities for individuals. However, within group inequalities for educational elements are not studied broadly. This paper seeks to inspect the reasons of higher inequality among females in terms of schooling distribution in Turkey. Our results suggest that occupation of the household head, size and the composition of the family, and education of the parents have a significant impact on the schooling decision for girls. The paper contributes to the literature in a twofold manner. First, it provides empirical evidence of schooling distribution in Turkey. Second, it investigates the factors that disproportionately affect schooling decisions for girls.

**Keywords:** inequality; education; gender; Turkey.

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### **1 Introduction**

Education is essential for any individual's life chances and both within and across countries it continues to be a dividing line among different social groups. Besides the individual benefits of education, it has positive spillovers, therefore the whole economy and society benefit from a rise in human capital achieved through schooling. Either through its effects on earnings and skills or its function in transmitting the intergenerational disparities, education continues to be a pertinent aspect for studying inequality. Despite the theoretical importance of education, there have been few empirical studies looking at the distribution of it, particularly within a country. Furthermore, there is no detailed examination of schooling dispersion within certain socio-economic groups. Although gaps in educational opportunities between different socio-economic factions have been documented widely, the analysis has not been conducted for variations within the groups.

In the literature, within group inequalities are examined to a large extent for income and wages<sup>1</sup>. For instance, the Mincerian earning equations in a number of countries have shown that between group inequalities contribute to the overall variance by a relatively small fraction. Nevertheless, the 'residual inequality' accounts for the majority of the dispersion and this is verified for many OECD countries. Also, the within group inequality is mostly responsible for the changes in inequality patterns over time (Katz and Autor, 1999). It has been also claimed that the within group inequalities and between group inequalities arise due to similar factors. However, the central reason for wage inequality, namely technology, works through separate channels for within and between group dynamics (Svizzero and Tisdell, 2003). Also, there are differential returns to race and gender but these are mainly analysed by making across group comparisons, and not necessarily paying enough attention to what might generate variations for the members of the same category. For instance, the Mincerian earning equations in a number of countries have shown that between group inequalities contribute to the overall variance by a relatively small fraction. Nevertheless, the 'residual inequality' accounts for the majority of the dispersion and this is verified for many OECD countries. Also, the within group inequality is mostly responsible for the changes in inequality patterns over time (Katz and Autor, 1999). It has been also claimed that the within group inequalities and between group inequalities arise due to similar factors. However, the central reason for wage inequality, namely technology, works through separate channels for within and between group dynamics (Svizzero and Tisdell, 2003). Also, there are differential returns to race and gender but these are mainly analysed by making across group comparisons, and not necessarily paying enough attention to what might generate variations for the members of the same category.

The investigation of within group inequalities for other socio-economic variables such as education and health has been lacking to a great extent. In a recent paper, it has been discussed that the world education inequality emanates mainly from within country component (Sahn and Younger, 2007)<sup>2</sup>. The decrease in cross country educational attainment is balanced by the rise inside the countries, hence world education inequality remains at high levels. Moreover, in South Africa the earnings inequality have risen among race groups but decreased between them during the period of 1980–1993 (Moll, 2000). The gender gap in education for China has declined over time; however the schooling continued to be more unequal among females (Saccone, 2008). All these studies reveal that socio-economic groups such as gender or race are very broad and usually are divided along income, regional and family background lines. Thus, it is necessary to investigate the within group differentials. The decrease in cross country educational attainment is balanced by the rise inside the countries, hence world education inequality remains at high levels.

This paper analyses the significant factors that influence educational dispersion among females in Turkey. Basic inequality measures all indicate that the female education distribution is more skewed compared to the males and this contributes significantly to the overall disparity. Besides, the higher inequality figures have been persistent over time. Although, Turkey is no different than many countries for having relatively lower levels of education among girls, it exhibits certain peculiarities by having greater education inequality among women. For Turkey, to our knowledge, there are no studies looking at the educational dispersion within groups, hence this paper will contribute to the literature firstly by measuring the extent of schooling distribution, and factors that lead to it. Our results suggest that occupation of the household head, size and

the composition of the family, and education of the parents all have significant impacts on the schooling decision for girls. Also, the paper aims to provide basis for policies that could foster more equal access and accomplishment of education in Turkey.

The next section briefly summarises the literature on dispersion of education and the existing studies for Turkey. Section 3 presents the findings for education inequality and the possible explanatory variables. Why these factors matter more for female schooling decisions is also evaluated. In Section 4, the data, results and their implications are discussed. The last section concludes.

## **2 Educational distribution and its importance**

Given the importance and the recent emphasis on skill premium and the fact that valuable skills are mostly acquired through schooling, education remains to be vital for examining individual income distribution. There are pervasive labour and capital market imperfections, which education can help to overcome if the opportunities for schooling are equally dispersed, or can aggravate if education is mostly accessible and available to certain segments of the society. Moreover, it has been asserted that education inequality has a negative effect on economic growth of a country and income growth of the poor (Birdsall and Londono, 1997). This is partly due to underutilisation of potential human capital in a nation. The income growth is also dependent on educational opportunities since in any labour market, earnings are highly correlated with schooling. Over years the share of income accruing to primary school graduates have decreased while the income received by people with higher education rose up significantly. For example, in Turkey, the ratio between illiterate and university graduate earnings soared, and this was accentuated for females. A female with no schooling earned 272.21 TL while a female with higher education received 1,273.64 TL<sup>3</sup> in real terms. Although a causal relationship cannot be inferred, it can be said that income and education are highly correlated in Turkey.

Schooling levels and allocation can also affect the earnings inequality in a country. It has been widely believed that higher educational attainment will bring lower wage inequalities; hence one way to overcome labour market related problems is to increase the schooling opportunities for everybody. There are various studies investigating the earnings differentials across levels of schooling in the Turkish case<sup>4</sup>, however, these studies do not focus on educational distribution. A more equitable allocation of schooling can decrease the gap between the returns to educations. Therefore, making education more accessible to masses and equalising the schooling years can contribute to the earnings inequality reduction. This study, by emphasising the Gini and quintile distribution, can facilitate a discussion on ways to improve income for different social groups.

There are numerous reasons why education could be unequally distributed in a society. Among them, gender, region, and culture are striking, and continue to affect decisions for human capital investments. The same households sometimes display different choices over the schooling between girls and boys. Therefore, household characteristics can generate dissimilar schooling preferences for the groups. This can be also seen regionally since formal education is generally undervalued more in rural provinces compared to urban areas. Finally, the culture can have varied effects on girls

and boys' educational decisions. Thus, it becomes important to measure the distribution of education – independent of its relation to income- besides the level of it in a country. Moreover, it is useful to look at the within group inequalities and the possible reasons to identify the differential affects of the same factors across and inside the gender categories.

There have been extensive studies on differential education opportunities among genders. King and Hill (1993) examined the barriers to women's education in developing countries, and conclude that despite the decrease in the gender gap, girls still receive less education than boys. One of the main factors behind this is the institutional structure where there are biases against girls' school choice, and another one is the cultural impediments and different standards applied to genders<sup>5</sup>. There is also discrimination and segregation in the labour market, which pushes women to select certain professions and get training for them. The World Bank data show that there has been a significant improvement for the girls' enrolment in schools. For example, the secondary school enrolment rate among girls in low income countries was around 26% in 1990 and rose to 41% in 2001. The school enrolment rate for boys in the same set of countries has gone up from 42% in 1990 to 51% in 2001 (World Bank, 2005). This indicates a convergence but there is still a 10% gap between the genders.

Despite the low investment in girls' education, the returns to schooling for women are found to be quite high. In some cases, the returns to secondary schooling for girls are estimated to be higher than it is for boys (Dollar and Gatti, 1999). This is also true for Turkey, where for all schooling categories; the female rate of return is higher according to the most recent data<sup>6</sup>. The biggest discrepancy is for secondary school, and vocational training. Women benefit extensively from attaining both formal schooling and vocational training while for men the returns have remained stable over time. Besides to the private returns, there are also socially negative effects of not sending girls to schooling or underinvesting in their education. Economic growth is adversely affected by gender inequality through two channels. The first is the direct influence of having lower average years of education and lower average quality of human capital in the nation. The second impact comes indirectly from the consequences gender education inequality has on child mortality, and fertility rates (King and Mason, 2001). It has been shown that as mother's education increases child mortality and fertility rates decrease. Both of these factors are extremely significant for the overall development of the low income countries. As understood from these studies, several factors can influence boys' and girls' education options in a dissimilar manner leading to not only disparities across genders but also among the females themselves. Therefore, analysing the education opportunities for girls is a prominent exercise, especially for developing countries where schooling for this group offers potential contribution to economic growth and individual well-being.

### **3 Factors behind female education in Turkey**

#### *3.1 Education inequality*

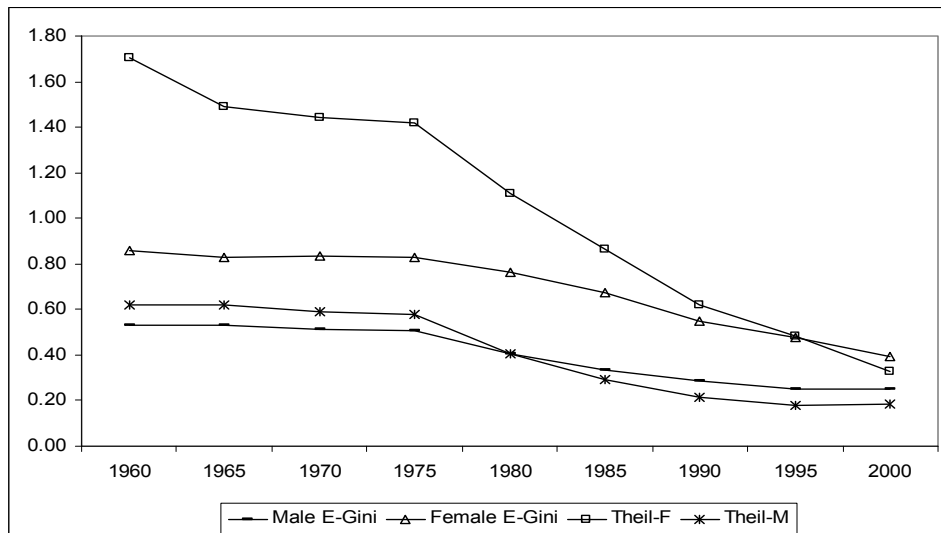
Turkish educational system can be mainly divided into two broad sections; formal and non-formal education. The former is defined as the regular education of individuals in a certain age group and given in schools at the same level with programs prepared for

definite purposes, which includes pre-primary education, primary education, secondary education, and higher education institutions (MEB)<sup>7</sup>. Non-formal education largely aims to assist the formal institutions and offer life-long learning for children and adults. Contemporarily, the primary education is compulsory and free in public schools. The starting age for primary schooling is six but in rural areas age seven is more common. Also, some of the pre-primary education institutions give training until the age of seven. Until 1998, compulsory education was for five years and this was extended to eight years after that year. There are discussions to increase the compulsory schooling years to twelve years, yet these are not specified as concrete plans.

Thomas et al. (2002) measure the education GINI by looking at the mean of the difference between every possible pair of individuals, divided by the mean size. In many developing countries, the total years of schooling for a majority of the population tend to be close to zero, especially for girls. In the literature, it has been argued that education Gini and Theil indices are both better measures of inequalities in schooling especially when a big proportion of the population has no education<sup>8</sup>. Hence, to estimate the degree of inequality, these indices might be more useful. The next section will outline the Gini and Theil indices for education for both genders, and then move on to discuss the particular factors that might offer an explanation for the discrepancy.

The paper calculates education Gini and Theil indices for the last four decades for both males and females. One can immediately see that both measures have seen a dramatic decline over the years for both groups. Figure 1 represents the development over time. The data is gathered from Barro-Lee dataset, which is constructed for 140 countries across the world<sup>9</sup> using the census and survey data for the period of 1960–2000. Seven levels of schooling categories are defined in the paper, which are no-schooling, partial primary, complete primary, partial secondary, complete secondary, partial tertiary, and complete tertiary. The corresponding years of education for each category is derived from the Ministry of Education. Figure 1 summarises the results.

**Figure 1** Education inequality across genders



One immediate feature that is also observable in some other parts of the world is the higher education inequity among females. In 1960, the schooling dispersion for women was much more skewed scoring a Gini coefficient of 0.86. The coefficient dropped down to 0.40 in 2000, which is still higher than the inequity for the whole population, and the males, but there has been considerable convergence. The Theil index gives similar results, although the decrease has been more rapid. However, the female Theil index started with a staggering 1.7 in 1960 and went down to 0.33 in 2000. One of the reasons for having a much higher inequality in terms of Theil index is because of the index's sensitivity to values near zero. Since at the earlier periods, there was a big chunk of population both among females and males with no education, the index has shown higher initial values and fell more dramatically than Gini index. Moreover, the survey data used for the individual level estimations<sup>10</sup> show that the Gini index is around 0.29 for males and 0.34 for females. The Theil indices are computed as 0.14 and 0.21 for males and females respectively. Once again, the higher inequality among women is evident, and needs further exploration.

The contribution of between group inequalities to overall schooling dispersion has ranged from 12% to 5% throughout the years. Table 1 portrays the decomposition of Theil index with respect to genders. As can be seen, the within components have a prime importance in determining the whole educational inequality, up to 95%. The results, derived from the 2004 Household Income and Consumption Expenditure Survey, reiterate this finding, the within group inequality accounts for 92% of the overall education difference. This point fits into the results of existing literature about the significance of residual inequality for variation in incomes. Education distribution in Turkey is more skewed among females. The higher levels of inequality among women indicate that the gender intensifies the within and between group inequalities. One of the ways to overcome the schooling dispersion is to focus on the inequalities among females, and identifying the determinants for this pattern.

**Table 1** Decomposition of educational inequality by genders

	<i>Between (%)</i>	<i>Within (%)</i>
1960	0.12	0.88
1965	0.10	0.90
1970	0.11	0.89
1975	0.10	0.90
1980	0.13	0.87
1985	0.13	0.87
1990	0.10	0.90
1995	0.10	0.90
2000	0.06	0.94

*Source:* Author's calculations based on Household Income and Consumption Expenditure Survey (Turkish Statistical Institute, 2006).

Nonetheless, this does not mean that there is no substantial gender gap in terms of education in Turkey. Table 2 presents the school enrolment rates for boys and girls for different categories, and it can be immediately seen that the biggest disparity is for the

secondary school enrolment. For tertiary education the gap is smallest, hence the bulk of the policies to overcome the differences between girls and boys should target primary and secondary education. Also, the average years of education for females increased from 1.05 years in 1960 to 3.95 years in 2000. For women, the world average for years of schooling was 4.31 in 1960 and 6.13 in 2000, therefore it can be said that Turkey is performing poorly in facilitating educational opportunities for women. While the educational inequality has decreased, Turkish women on average are behind the world standards. Especially the literacy rate among adult females, which is recorded as 79.6% in 2006, is still low compared to many developing countries.

**Table 2** Enrolment rates by gender

	<i>Total</i>	<i>Girls</i>	<i>Boys</i>	<i>Gender gap</i>
Gross enrolment (Primary)	96.5%	93%	100%	7%
Gross enrolment (Secondary)	66.7%	57.2%	74.3%	17.1%
Gross enrolment (Tertiary)	21.5%	18.7%	24.3%	5.6%

Source: <http://www.unicef.org/turkey/gr/ge21b.html>

### 3.2 *Determinants of girls' education decisions*

In this section, we identify some of the factors that can affect girls' schooling decisions prominently. Among these, we consider the aspects that are disproportionately important for the girls. Although various reasons have been provided in the literature why education remains to be biased towards boys, there aren't many studies which focus on why education can be unequally distributed within the gender categories, and differentially distributed across genders. We argue that occupation of the household head, size and the composition of the family, and education of the parents have a differential impact on girls and boys' schooling decisions. In addition to the preference given to males over females when schooling decisions are made, several socio-economic features deprive girls with particular backgrounds from education in Turkey. These factors can account for the majority of the within and between group education inequalities.

Income is seen as a crucial factor for schooling decisions since it determines the amount of available resources for each child and the family. Especially, when families are credit constrained the current income will significantly shape the family's ability to invest in children's education (Glewwe and Jacoby, 1994). A number of studies have found a positive connection between household income and schooling of children<sup>11</sup>. Certainly, in addition to the current income the families can have other financial assets and these are also expected to affect the education investment in a similar manner. We will use the incomes accruing from land and property owned to estimate the permanent income available for education expenditures. We will argue that income per capita for the household is more important for girls' schooling in Turkey particularly since there is son preference. In this case, parents allow girls to specialise in child labour while boys are able to acquire an education. The budget constraints make it less likely for the girls to attend any schooling categories, but especially higher education since the lower levels are state subsidised. Thus, the variable employed for financial assets of the family becomes total annual income per family member.

Additionally, the occupation of the household head is argued to be explanatory for the schooling decisions. Self-employment in this regard can influence the work chances for girls and boys differently. The boys in Turkish society are viewed as the successors of the family business; hence self-employment might decrease their schooling chances. On the contrary, girls might not face a challenge for allocation of their time between family work and education. However, it has been documented that education has a higher return for men in self-employment than wage-employment. This might decrease the successor effect and make boys more likely to attend formal schooling. We argue that self-employment has a positive effect on girls' and negative effect on boys' education attainment, especially at the middle and high school level. Therefore, girls whose parents are self-employed are more advantaged in terms of educational attainment. The measure will be a dummy variable accounting for the parent's self-employment status.

The community structure has a large impact on the education investment and differentially forms the schooling opportunities for boys and girls. Both the quality and quantity of schools are lower in rural areas in developing countries, and furthermore the perceived value of education tends to be lower in these communities (Hyde, 1993). Cost of education can be higher in rural regions given that the schools are farther away and the ratio of school quality to expenditure is lower. The rural-urban distinction can also capture the labour market chances to a certain extent. Since farm employment is more widespread in the rural areas; education is less of a requirement. Although this might decrease the schooling prospects for both girls and boys, we will claim that the effect is more profound for females. The already inadequate number of available jobs in the formal markets will be allocated mostly to males; therefore, the education for girls in the rural communities is limited. Rural-urban distinction will be captured by a dummy variable in which rural area is defined as locations with populations less than twenty thousand.

Child labour in developing countries is pervasive and children are expected to undertake a range of low-skilled tasks such as taking care of siblings, and household duties. It has been shown in many studies that these types of chores tend to reduce the educational attainment (King and Hill, 1993). We assert that the size of the family and the age of the siblings will be negatively related to girls' schooling. In Turkey, girls are the prime contributors to household errands, hence, they are expected to stay at home and perform these duties more often than boys. Particularly, child care servicing of the sibling will be provided by the females<sup>12</sup>. Also, the number of dependent family members might increase the amount of tasks needed to be carried<sup>13</sup>. For example, in rural India the number of children aged 6–16 has a positive impact on the time used to work and a negative effect on the time used to attend school (Cigno and Rosatti, 2002). However, it should be noted that in advanced countries, family size turned out to be insignificant under most specifications. The size of the family will definitely create a pressure on the resources and cut down the finances available for each child. Besides, the effect may be higher for girls because the extended family networks are used to the advantage of boys (Lloyd and Blanc, 1996). The size of the family and the number of siblings are derived directly from the survey.

Another factor that is influential for the children's schooling prospects is the parental education. More educated parents are more open-minded, more willing to send their kids to schools, and perceive education as more worthy (King and Hill, 1993). Moreover, the incomes are largely determined by education, and in Turkey the returns to schooling is quite high. Thus, the income and wealth will be correlated with the parents' education



level. We will claim that parental education is more significant for females in traditional societies. Also, mothers with more education have more bargaining power and generate a better allocation of resources towards children's human capital (Thomas, 1994). Once again, we argue that this increases the chances of girls' schooling more because an educated mother will be less likely to have a strong preference for the son. The variable estimating parental education examines the father's and mother's education separately.

## **4 Data, methodology, and results**

### *4.1 Data*

Individual level estimations are conducted by using the data coming from the Household Income and Consumption Expenditure Survey (HICES) in 2006. The survey included 8,600 households, and 36,000 individuals around the country. Since our main goal is to distinguish the variables that affect the schooling decisions for girls, we first split the sample by households with children. Additionally, the study considers the children between the ages of 6–17. Although the typical age is seven for entering primary school in Turkey, some parents send their kids a year earlier especially when alternative pre-schooling opportunities are non-existent. Thus, we regard six as the starting age. This gives a sample of 9,722 individuals. We will consider the primary schooling attainment and high school attainment together, the dataset has 6,069 children between the age of six and 15. The sample is also divided according to the gender categories; there are 4,871 boys and 4,851 girls living with their parents given the age profiles.

When we look at the mothers' and father's mean education years for the same age cohorts, we see lower levels implying that education has become more general in Turkey from one generation to the next. The inequality indices are also higher. For fathers, the education Gini is around 0.27 and the Theil is around 0.1. For mothers, both inequality indices are also greater; Gini is approximately 0.36 while Theil is 0.21. This suggests that the previous generation might have more between group inequalities for schooling than the current one. However, the females still have a more unequally distributed education profile than their male counterparts.

The other variables considered in the estimation -age of the child, composition and size of the family, parental education, self-employment, rural-urban location, logarithmic disposable income per head, and regional dummies- do not display statistically significantly different means for the girls and boys belonging to the same age cohort. However, the mean values of several variables change notably within the groups and across age cohorts. These are composition of the family, parental education, and father's self-employment. For example, the mean number of siblings for the girls in the age group 6–14, is 1.3 while this is 1.9 for girls in the age group 15–17. Also, the mothers have a mean education of 3.6 years for the second group while they have 4.1 years on average for the first group. These show that it is important to look not only between girls and boys in terms of their schooling investments but also within these groups.

### *4.2 Econometric specification*

The following section discusses the econometric specification, which is employed to regress the education on the previously defined variables. Because the final schooling

level is not known for the girls and boys who are enrolled in an education institution at the time of the survey, there can be biases in the attainment model. In order to overcome this problem we will employ a censored ordered probit model. This model provides the best remedies for non-negative restriction, the discreteness, the spikes and the right-censoring (King and Lillard, 1987)<sup>14</sup>. All of these problems are present in the case of educational attainment estimations. The model is as follows:

$$E^* = \beta_1 X + \varepsilon \quad (1)$$

where  $E^*$  is the desired level of education,  $X$  is the explanatory variable, and  $\varepsilon$  is the stochastic error term. In reality, we cannot observe the desired level of education but this can be linked to the actual educational attainment of the individual, which is denoted by discrete levels. We have four categories of education, no schooling, primary school, secondary school, and high school.

$$\begin{aligned} E &= 0 \text{ if } E^* \leq \mu_1 \\ &= 1 \text{ if } \mu_1 \leq E^* \leq \mu_2 \\ &= 2 \text{ if } \mu_2 \leq E^* \leq \mu_3 \\ &= 3 \text{ if } E^* > \mu_3 \end{aligned} \quad (2)$$

The parameters,  $\mu_1$ ,  $\mu_2$ , and  $\mu_3$  are unknown thresholds, and are needed to be estimated along with the coefficients. Then the probability of moving from one category of education to the next, for uncensored observations, will be as follows given  $\varepsilon$  is normally distributed:

$$\begin{aligned} \text{Prob}(E = 0) &= \Phi(\mu_1 - \beta_1 x) \\ \text{Prob}(E = 1) &= \Phi(\mu_2 - \beta_1 x) - \Phi(\mu_1 - \beta_1 x) \\ \text{Prob}(E = 2) &= \Phi(\mu_3 - \beta_1 x) - \Phi(\mu_2 - \beta_1 x) \\ \text{Prob}(E = 3) &= 1 - \Phi(\mu_3 - \beta_1 x) \end{aligned} \quad (3)$$

When we move to the censored observations, or in other words, individuals who are still enrolled, we cannot observe the completed level of education but we know that the desired level of education,  $E^*$ , is higher than the observed years,  $E$ . Therefore,

$$\begin{aligned} \text{Prob}(E = 0) &= 1 \\ \text{Prob}(E = 1) &= 1 - F(\mu_1 - \beta_1 x) \\ \text{Prob}(E = 2) &= 1 - F(\mu_2 - \beta_1 x) \\ \text{Prob}(E = 3) &= 1 - F(\mu_3 - \beta_1 x) \end{aligned} \quad (4)$$

The likelihood of the sample, both for uncensored and censored observations is computed as follows, where  $u$  represents uncensored and  $c$  represents censored observations:

$$\ln L = \sum_{j=0}^3 d_j \ln u + d_j \ln c \quad (5)$$

Censored ordered probit model helps us to estimate the education decisions for the individuals more accurately. Because it takes care of the non-negative restriction, the probability spikes and the discreteness of schooling, we have unbiased estimators. Additionally, we consider the likelihood functions of enrolled students and individuals

who have completed their educational cycle separately, hence allowing for right-censoring issues.

### 4.3 Results

Table 3 summarises the regression results for all age cohorts for girls. As can be seen from the table below, there are several variables that turn out to be statistically significant. As expected age positively affects the education years, and schooling is inversely related to age squared. This is well established in the literature and confirmed by our results. Unsurprisingly, the education level on average is higher among older cohorts. Parental education is positively and significantly related to girls' education. Mother's education has higher coefficient for the girls than the father's education. This finding is in line with the earlier studies. For example, it has been established that mothers' education matter more for daughters in Turkey, and this is even more prominent for high school (Tansel, 2002). This is also discussed in the context of other developing countries<sup>15</sup>.

**Table 3** Censored ordered probit estimation

	<i>Girls</i>	
	<i>Coefficient</i>	<i>(T-statistic)</i>
Age	0.24	(3.99)
Age squared	-0.01	(-4.19)
Mother's education	0.12	(4.28)
Father's education	0.10	(4.05)
Log income	0.03	(7.54)
Rural	-0.25	(4.81)
Family size	-0.37	(-7.75)
Family composition	-0.21	(-3.57)
Father self-employed	0.32	(1.67)
Constant	-1.16	(-0.33)
Aegean	0.95	(1.97)
Mediterranean	0.93	(2.31)
Central Anatolia	-0.99	(3.56)
Black Sea	-1.11	(3.53)
East Anatolia	-1.36	(5.72)
Southeast Anatolia	-1.16	(4.8)
m1	0.03	(6.33)
m2	0.08	(9.4)
m3	0.14	(12.48)
Chi-squared		10,652.08
Significance level		0.00
Number of observations		4,851
Log-likelihood		-4,902.73

Education is a normal good, hence higher income per head brings more years of schooling. The rise in the household income decreases the probability of no schooling and increases the probability of formal education for girls. This finding is unsurprising and has been evaluated already in a number of existing papers<sup>16</sup>. Financial resources are essential to for the households to be able to invest in the children's education, especially when there are no public subsidies available or the children are credit constrained. Therefore, having a higher financial resource is positively associated with more education.

Living in a rural area negatively affects the education of girls and the coefficient is statistically significant. As stated before urban-rural distinction might be more important for girls since the schooling opportunities are scarcer in the latter and families are more likely to keep their daughters at home. This effect is verified in Tansel (2002), and Rankin and Aytac (2004). The rural regions decrease the likelihood of having formal education for girls in Turkey. Our analysis use a very crude measure of rural effects, by simply distinguishing between the urban and rural areas using a dummy, and several other indicators can be inserted. For example, looking at the quality of schools in those regions, or the distance to the nearest educational facility might be helpful. Another proxy can be the teacher-pupil ratio.

The family size and family composition variables both have negative and significant coefficients for girls. First measure is computed by taking the number of people living in the same household into consideration. This decreases the probability of attaining school for girls. One should note that this is independent of the financial resources since the squeeze on funds is encapsulated by the income per head variable. Hence, family size matters through child labour channel or the girls are sacrificed when there are boys in the family at schooling age. Family composition is a proxy for families with small children, to check the child care service effect. The negative and significant sign for girls indicate that daughters are expected to take care of their younger siblings.

Although both mother's and father's self-employment are put in the regression equation, only fathers are reported. There are extremely few mothers who are self-employed in the sample, thus we evaluate only father's self-employment. Self-employment increases the chances of schooling for a girl but the variable remains to be statistically insignificant. To our knowledge, Tansel (2002) is the only other study that utilises this measure for Turkey, and she found a negative and significant effect for middle and high school levels for boys.

When we inspect the regional dummies, we can see that except the Aegean all of them are statistically significant for girls. The reference region is Marmara. Central Anatolia, Black Sea, East Anatolia, and South East Anatolia regions are negatively related to girls' schooling. Although being in the Aegean region increases the odd ratios of attaining higher levels of education for girls, the coefficient is not statistically significant. However, Mediterranean region has a significant and positive association with girls' schooling. These results differ from Bakis et al. (2009), in which they found a negative effect for Aegean region for instance, but the regions are divided along the statistical regional units rather than geographical units in their research.

Table 4 provides the marginal effects on the probability of attaining five years of schooling for censored ordered probit estimations. Age, age square, parental education, income per head, rural-urban distinction, family size and family composition are considered in the estimations. To improve the female educational attainment and to achieve a better distribution among the girls, these factors need to be enhanced. Provision

of child and elderly care, and better educational in the rural areas will both reduce the gender gap and make schooling less dispersed within the female group.

**Table 4** Marginal effects on the probability of attaining five years of education

	<i>Effect</i>	<i>Standard error</i>
Age	0.0116	0.02
Age squared	-0.0004	0.001
Mothers education	0.0057	0.03
Father's education	0.0046	0.03
Log income	0.0014	0.001
Rural	-0.0146	0.12
Family size	-0.0117	0.067
Family composition	-0.0177	0.004
Constant	-0.0001	0.34

## 5 Conclusions

The paper examined the education inequality among girls in Turkey. Although education levels continue to be different between girls and boys, and the gender gap, remains, schooling is unequally distributed within the groups as well. Educational attainment generates economic and social opportunities for any individual and hence leaving certain groups outside the educational circles will limit their chances. Despite the importance of schooling, there have not been many studies on the distribution of it, particularly within socio-economic categories. In the paper, the gender schooling dispersion is investigated in more detail.

Females in Turkey display higher inequality and we considered numerous variables to explain why girls with specific characteristics are less likely to be enrolled in schools. This is supported by the over time developments in the educational inequalities between boys and girls, and within each type. The individual level estimations are conducted to distinguish the factors that can explain the female education. The results suggest that size, and the composition of the family and education of the parents have a significant impact on the schooling decision for girls.

Family size is found to be explanatory for girls with a negative sign. The larger the family, the less likely the females will attend schools. Since the financial resource allocation is controlled by the income per head, the family size impact is working through provision of child labour. This is more expected from girls residing in the household. Family composition has similar effects, decreasing the opportunities for girls to have higher education. In this case taking care of the younger sibling is the reason and this is once more demanded from girls. All these explanatory factors need to be considered to develop appropriate policies enhancing human capital investment in Turkey. Although the same policies might narrow the gap between gender groups, attention should also be paid to programs that can reduce the dispersion within these categories. Given that females have a more skewed distribution of schooling in Turkey, policies should aim to remedy for the obstacles that restrain girls with specific backgrounds to accomplish schooling.

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## Notes

- 1 For a broader discussion see, Aghion et al. (1999), and Machin and van Reenen (1998).
- 2 These results are quite similar to measurements and decompositions conducted for health inequality in the world.
- 3 For more explanation see Tansel (2004). The returns to education for girls are higher for all schooling categories.
- 4 See, Duygan and Guner (2006) for more explanation. All the educational categories are found as statistically significant.
- 5 For example, teachers are prejudiced against girls for their math and science skills.
- 6 Tunaer and Gulcan (2006) point out that this might be due to the lower level of educational opportunities, hence higher marginal returns for women.
- 7 For a broader overview, see; [http://www.meb.gov.tr/Stats/apk2002ing/apage29\\_48.htm](http://www.meb.gov.tr/Stats/apk2002ing/apage29_48.htm).
- 8 The standard deviation figures become biased since in many countries no schooling category has a great share of the population.
- 9 107 of them have complete information for all variables and years.
- 10 We employed 2006 Household Income and Consumption Expenditure Survey to analyse the individual schooling decisions for girls.
- 11 Birdsall (1985), and Parish and Willis (1993) are some examples. In societies with a son bias, Parish and Willis (1993, p.866) note that "... one of the best things that can happen to a male, besides being born to rich, well-educated parents, is to have an older sister".
- 12 Anderson (1988) pointed out that school attendance for females is more sensitive to the number of children under the age of five in the household than male attendance.

- 13 Although, most of the effect might come from the number of siblings, elderly care can be important in the Turkish context.
- 14 See King and Lillard (1987) for the earliest application of this model to education attainment. There have been several other studies utilising the method later on.
- 15 Behrman (1997) provides a survey of the effect of mother's schooling on child education. The mother's education is found to be continually more important for daughters.
- 16 Birdsall (1985), Parish and Willis (1993) are among the examples.