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An empirical analysis of household education expenditures in Turkey

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ABSTRACT

Using Turkish Household Budget Surveys from 2003, 2007 and 2012, this paper investigates the determinants of household education expenditures within an Engel curve framework. In particular, we estimate Tobit regressions of real educational expenditures by income groups using a number of household characteristics (i.e. rural residence, employment status, age, educational attainment of the household head, household size, share of female students and primary school students in the household, and total number of students in the household) to examine if and to what extent the determinants of educational expenditures differ by income groups; income elasticities of educational spending evolves over time; and children from middle-class and poor families can benefit enough from educational opportunities. The estimated expenditure elasticities have lower values for the top- and the bottom-income quartiles while they have larger values for the middle-income quartiles. The results also show that for all income groups the expenditure elasticity of education increases over time, indicating that Turkish households allocates greater share of their budgets to education expenditures.

1. Introduction

Turkey has a potential demographic window of opportunity for economic growth given that the share of working age population in total has been rising and expected to continue to do so until 2040s. The number of working age people is projected to expand by on average 800,000 each year in the coming decades. In order to reap the so-called demographic dividend potential, job creation performance of the economy should be capable of absorbing the new entrants into the labor market which necessitates enhancing their knowledge and skill levels through a high-quality education.

Despite some improvements over the recent years, Turkey's educational outlook is still bleak. Average years of schooling of adult population is only seven years, falling well below the levels in developed countries. Nevertheless, with the extension of compulsory education from five to eight years in 1997 and twelve years in 2011, new entrants to the market are expected to raise average years of schooling of the workforce in the near future. The introduction of 8-Year Basic Education Program in 1997 also contributed significantly to enrollment rates at elementary and secondary schools which have reached comparable levels with those in developed economies. Notwithstanding, only little progress has been recorded on the qualitative front. According to the 2012 Program for International Student Assessment (PISA) report, Turkish students performed the second poorest after Mexico among OECD countries in math, science and reading tests. Henceforth, Turkey's next and topmost challenge now is to improve the quality and equity of its education system at all levels, which requires more and better investment. As a matter of fact, both public and private spending on education has been rising in Turkey. Thanks to the fiscal discipline secured after the 2001 economic crisis reducing the budget deficit, debt ratio, and public sector borrowing requirement, the government created a larger room for increasing its non-interest expenditures and started spending more on basic services such as health and education. Accompanied with the country's changing demographic structure and government's decision to extend the years of compulsory education, share of education expenditures in total government spending increased from 6.5% in 2002 to 9% in 2012.

In the meantime, private out of pocket spending on education has also grown. The share of education spending in households' total expenditures rose from 2% in 2003 to 2.4% in 2012. The reasons are mainly twofold. Firstly, per capita income more than tripled from 3000 USD in 2001 to approximately 11,000 USD in 2012, and the number of middle class households expanded by

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around twenty percent. New members of the middle class that are used be poor started to spend more on education. Proportionately, the number of households, which can afford the cost of private education increased. Secondly, the government has undertaken initiatives to support private schooling, providing financial incentives to families. The Ministry of National Education (MoNE) subsidizes the per student cost of private kindergarten education by 2500 Turkish liras (TL), 3000 TL for private primary school, and 3500 for private high schools, which on average make up around twenty percent of full tuition. Respectively, the share of students attending private schools more than doubled from 1.74% to 4.13%, and the share of private schools rose from 2.97% to 7.18% from 2002–2003 to 2012–2013.

Against this framework, the aim of this paper is to investigate the determinants of household education expenditures and to see whether income elasticity of education expenditure has increased throughout the period in line with the ongoing privatization of the education system. In the event that privatization and subsidization policies have extended the gap in quality of education between the private and public schools, an income inequality in the long-run will be inevitable. As a matter of fact, recent evidence has shown that there exists a significant performance gap in favor of private schools (Aksit, 2007). Given the facts that intergenerational educational mobility in Turkey is one of the lowest among the OECD countries, with 66% of young people having only the same level of education as their parents and one's education level is one of the most important determinants of his/her income level, there is a high chance that the low level of intergenerational mobility in education would translate into a low level of intergenerational mobility in income, meaning that the children of poor families are destined to have lower income than children of affluent families in the future (Davies et al., 2005). Thus, the growth of private schooling could aggravate the already low levels of intergenerational mobility in education and income.

We use data from 2003, 2007 and 2012 Turkish Household Budget Surveys, and estimate Tobit regressions of real educational expenditures by income groups using a number of household characteristics (i.e. rural residence, employment status, age, educational attainment of the household head, household size, share of female students and primary school students in the household, and total number of students in the household). In particular, we seek to find out whether the determinants of educational expenditures differ by income groups; to what extent and in which direction, if income elasticities of educational expenditures have evolved over time; and children from middle-class and poor families were able to benefit enough from the expansion of educational opportunities. To this end, we employed two functional specifications of Engel curves: the double logarithmic form and the Working-Leser form.

The contribution of this study is threefold. First, the paper focuses on the demand for education rather than the supply-side factors which have drawn rather more interest in the literature. Moreover, we concentrate on the determinants of educational expenditures unlike traditional studies which typically consider the determinants of educational attainment. As pointed out by Qian and Smyth (2011), educational attainment depends also on the child's personal characteristics, such as performance at school (child's ability), hence only partially explains the demand for education. Whereas, focusing on education expenditures has the advantage that it directly reflects parents' willingness to pay for improving their children's educational opportunities. Second and to the best of our knowledge, there are only a few studies on the determinants of educational expenditures in Turkey (Tansel, 2002; Tansel and Bircan, 2006). Third, unlike existing studies which employ OLS or standard logistic regression models, this paper is conducted using a Tobit model which considers and corrects for the possible left-censoring in the data given the fact that many poor families are in fact characterized by zero educational expenditures.

In the remainder of the paper, an overview of education expenditures in Turkey is presented in Section 2. Section 3 reviews existing literature, and Section 4 describes the data and model. Then, Section 5 presents the empirical results and discussion. Last section concludes.

2. A brief account of education expenditures in Turkey

With an aim to profit from its demographic window of opportunity, the government has been consistently increasing the amount spent on education both in absolute terms and as a share of central government budget since 2003 (Fig. 1). Central government's education expenditures increased from 10 billion TL (7% of total) in 2003 to more than 55 billion TL (13% of total) in 2014. The majority of the increased education budget was spent on building more schools and classrooms. The number of new classrooms built has increased by more than 230,000 since 2002. The need for extra classrooms emerged mainly after the reforms that extended the number of years of compulsory education. The cost of the most recent education reform act called 4 + 4 + 4 is calculated as more than 50% of the central government's education budget in 2012.

Despite the increase in education expenditures of the central government, education expenditure per student both in primary and secondary level are significantly lower than the OECD average (Fig. 2).

In majority of OECD countries, the share of private sources in total education expenditures is less than it is in Turkey (Fig. 3). In 2011, 13% of all education expenditures are made by households. High share of private expenditures in total is a major underlying

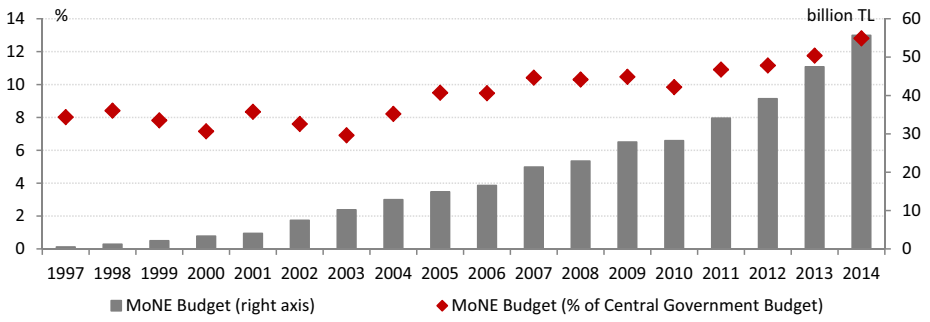

Fig. 1. Central government's education expenditures (TL and% of central government budget).
Source: MoNE.

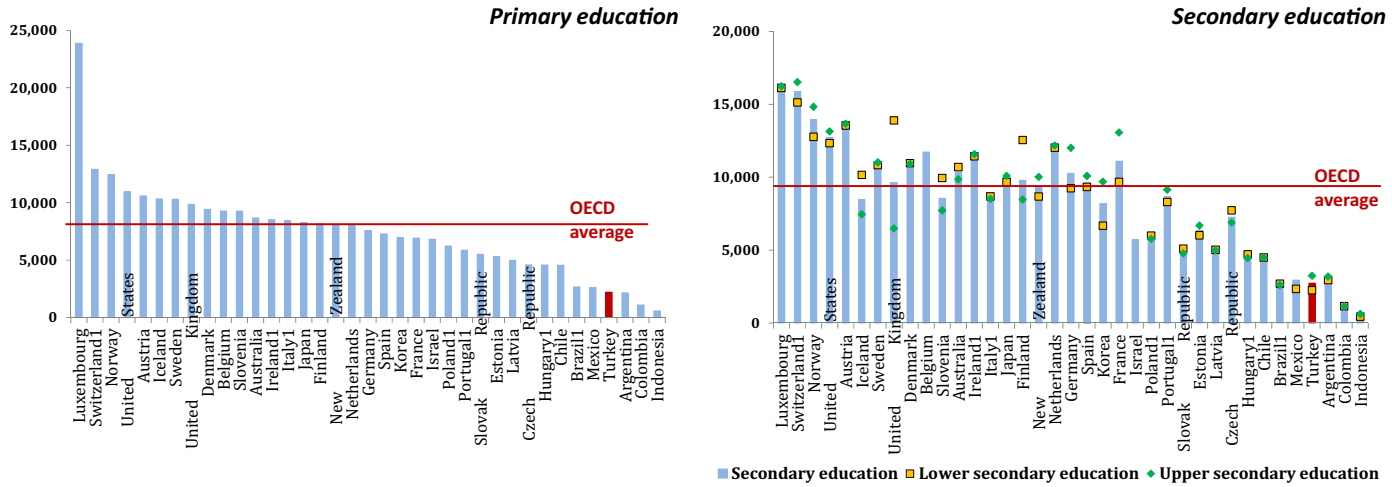

Fig. 2. Annual expenditure per student by educational institutions for all services, by level of education (2011) *In equivalent USD converted using PPPs, based on full-time equivalents.*
Note: (1) Public institutions only.
Source: OECD.

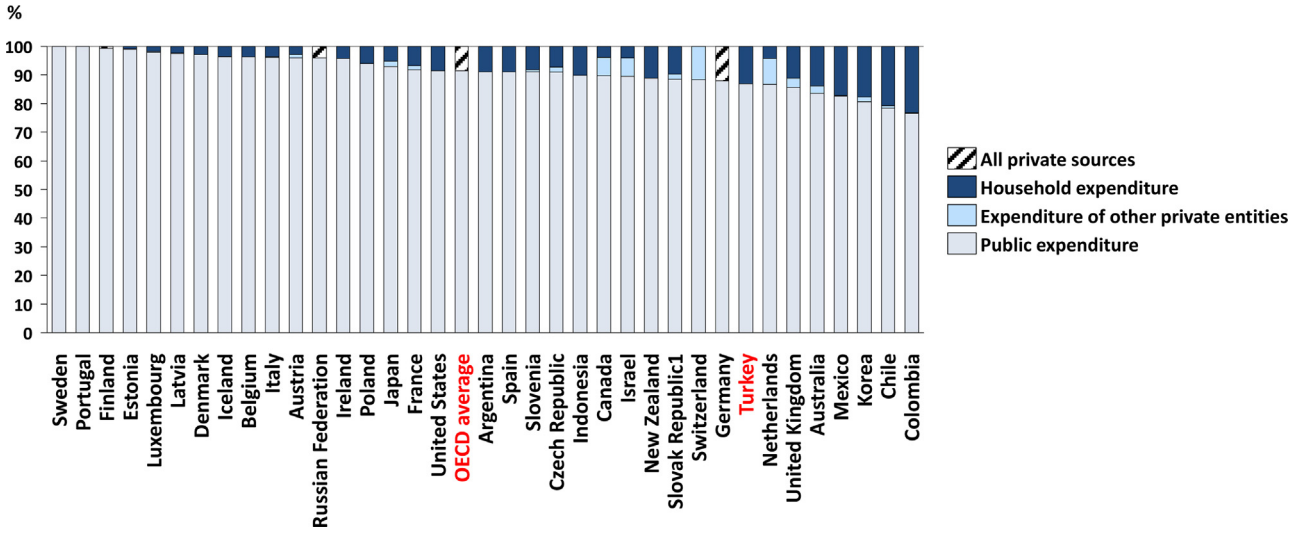

Fig. 3. Distribution of public and private expenditure on educational institutions (2011) (Primary, secondary and post-secondary non-tertiary education).
Source: OECD.

factor of the gap between educational outcomes of the students coming from poor and affluent families.

The high share of private sources in total education expenditures is mainly due to the dual institutional structure of the Turkish education system. On the one end, there are public schools and on the other end there are private schools and dershanes, which are institutions that offer courses to the students specifically for national high school and university examinations.

According to MoNe statistics, the number of private schools in total has increased from 1086 to 3919 in numbers and from 2.6% to 7.3% in share between 2003 and 2004 and 2014–2015. In line with the increase in the share of private schools, the share of students attending private schools in total has also climbed up in the same period from 1.7% to 4.0%.

3. Literature review

The determinants of household educational expenditures have received rather less attention in the literature compared to educational attainment. For Turkey, the situation is even more bleak with only a handful of studies on educational spending of the Turkish households. Against this background, first we summarize the most cited studies in the relevant international literature, then present existing studies on educational expenditure in Turkey.

Using data from household surveys for 1990 and 1992, Psacharopoulos et al. (1997) examine the extent of private expenditure on education in Bolivia and calculate an income elasticity of 0.23. They conclude that education expenditure is not a luxury good for Bolivian families.

Kanellopoulos and Psacharopoulos (1997), using data from the 1988 Family Expenditure Survey, find education to be a luxury item in Greece. Moreover, they report that household size and number of children under six years of age negatively affect the probability of private spending on education while the household head's years of education and income have a positive impact on the same variable. Using a sample of over 3000 first year university entrants, Psacharopoulos and Papakonstantinou (2005) find that private higher education is highly inelastic, hence a necessity household expenditure in Greece. The authors show that private out of pocket spending to prepare for the entrance exams and study at college

exceeds that of public spending. In addition, they find that the share of income spent on education to be higher for the poorer households.

Using Japanese household data and allowing the elasticities vary non-monotonically with household income, Hashimoto and Health (1995) report that the income elasticity of education expenditure is highest for the middle-income group, lower yet positive for the low-income group, but negative at the upper end of the income distribution.

Quin and Smyth (2011) examining income elasticity of education expenditures in China along the domestic/overseas education divide report strong income efffects on both. The results also display that households where mothers have senior secondary school or college education, and fathers are working in professional occupations are likely to spend more on education. Moreover, being in the highest income category, having a college-educated father, having a mother who is a cadre or middle professional and living in coastal areas increase the probability of sending children overseas for education.

In their study on private schooling in Vietnam, Glewwe and Patrinos (1999) show that higher-income households are less likely to send their children to semi-public schools but more likely to private schools, confirming that as household income increases, the willingness to spend on education rises. The study also reveals that urban households display a higher likelihood of spending resources for education, and that parental education is an important determinant of children's ultimate attainment.

Similarly, Glewwe and Jacoby (2004) use Vietnamese household survey data over the 1993–1998 period to investigate the relationship between household resources and the demand for education. Using consumption expenditures to proxy household wealth, the authors find a positive and significant relationship between changes in wealth and changes in the demand for education. This wealth effect persists even after controlling for several factors such as changes in returns to education, the supply and quality of schools, and the opportunity costs of schooling. The results also reveal that returns to education play a notable role in increasing education demand.

In another study of Vietnam using a Tobit analysis, Huy (2012) also confirms that families with more resources and better human capital spend more resources on their children's education. The probability of greater exenditure is found to be higher for households where the household head has a higher level of education or a professional job. Moreover, households with more primary-school-age or secondary school-age children are found to spend more on education, in contrast to that with pre-school-age or college-age children who make relatively less education expenditure.

Using the 1994 Household Expenditure Survey, Tansel and Bircan (2006) conducted the first study on the demand for private tutoring in Turkey. The determinants of private tutoring examined within a Tobit model framework include total household expenditure, parental education and other household characteristics. The authors show that private tutoring is neither a luxury nor a necessity item in the household's budget. Parents' educational attainments, especially of mothers, are found to significantly affect private tutoring expenditures, which evidences inequity in the intergenerational distribution of education. Moreover, the results indicate that private tutoring expenditures increase at a decreasing rate with the age of the household head, hence implying lifecycle considerations; urban families spend more than rural household residents, and that household private tutoring expenditures decline with the number of children in the household.

In our study, we analyze the income elasticity of education expenditure using an Engel curve methodology. First introduced by the German economist Ernst Engel in the 19th century, the Engel curve is commonly used in the literature to model the relationship between consumer income and quantity demanded. Tansel (1986), who first applied the Engel curve analysis to Turkish households' consumption patterns argues that total expenditure can be used as a proxy of income as it reflects permanent household income better than income itself, due to income being more likely to include transitory and unexpected elements and prone to false reporting. Using the Turkish 1978–1979 urban household expenditure survey, the author estimates Engel curves for eleven expenditure groups employing nine different functional forms. The expenditure elasticity of education which falls under cultural expenditures group is estimated to be greater than unity, hence rendering education as a luxury commodity. In a similar study following the same methodology, Senesen and Selim (1995) disentangle the elasticity of education expenditures from cultural expenditures using the 1994 Household Income and Consumption Expenditures Survey which lists education as a seperate commodity group. The resulting elasticity of education above 2 indicates that it is a highly luxury commodity in Turkey. The Engle curve approach has also been used to test for gender gaps in education expenditure. For example, Kingdon (2005) and Aslam and Kingdon (2008) investigate whether the intra-household allocation of educational expenditure in Pakistan favours males over females, and report a robust pro-male bias in education expenditures. Using a similar methodology, Kenayathulla (2016) finds no significant gender differentials in Malaysian intra-household educational expenditures. Calculating an elasticity of 0.76, she concludes that education behaves like a necessity good in Malaysia.

4. Data and model

In order to analyze the determinants of out-of-pocket education expenditures, we use data from the 2003, 2007 and 2012 Household Budget Surveys. The Household Budget Survey (HBS) contains detailed information on household income and its composition, as well as on household composition and household's socioeconomic characteristics. HBS is representative of the Turkish resident population. Nonetheless, the institutionalized population is excluded from the surveys. Surveys cover urban (population with 20,001 people and above) and rural (population with fewer than 20001 people) households. The sample unit is a household that comprises one person living alone or a group of people living in the same dwelling who depend on pooled income for major expenses. In conducting the survey, households are visited eight times during the interview month. Non-respondents are replaced by households with similar characteristics. Household expenditures are recorded to a diary by a household member during the interview month. In addition to that diary, members above the age fourteen are given an individual expenditure diary to record individual expenditures on a daily basis. Consumption expenditures include not only the purchases of goods and services but also the consumption of the goods derived from the economic activities of household members and the expenditures on the gifts given to the other households or institutions. In constructing the consumption data set, the consumption of goods and services are classified according to the classification of individual consumption by purpose (COICOP).[1] In our study, we only focus on students attending primary schools

[1] The classification is as follows: 1. Food, beverages and tobacco, 2. Alcoholic beverages, tobacco and narcotics, 3. Clothing and footwear, 4. Housing, water, electricity, gas and other fuels, 5. Furnishings, household equipment and routine households maintenance, 6. Health, 7. Transport, 8. Communication, 9. Recreation and culture, 10. Education, 11. Restaurants and hotels, 12. Miscellaneous goods and services.

(8 years of compulsory schooling) and high schools since that the university students are above 18 years old and some of them could finance their own educational expenses.

We analyze the education expenditures in an Engel curve framework which is commonly used in the literature to model the relationship between consumer income and quantity demanded. The general form of the Engel curve is given by

$$y_i = g_i(lnc, x) + \varepsilon_i \quad (1)$$

where y_i represents a measure of expenditure on some commodity or group of commodities i, lnc is the log transformed total expenditures, x is a vector of variables that characterize family composition, and ε_i stands for the error term. The index of the individual household is suppressed. It is assumed that g is common to all households, so that variation across households with the same total expenditures c and the same composition x is only due to the error term ε_i which satisfies $E(\varepsilon_i|lnc, x) = 0$.

In the Engel curve methodology, an important issue that is particularly nuanced is the choice of functional form. The general functional forms include linear, semi-logarithmic, double-logarithmic and Working-Leser model. In our analysis, we estimate two functional forms that differ in terms of dependent variables. The first form is the double-logarithmic form where the dependent variable is the logarithm of education expenditures. The second functional form that we employ is the Working-Leser form.[2] where the dependent variable is the budget share of educational expenditures in the total expenditure.[3] The equations for the double-logarithmic and the Working-Leser forms are given by Eqs. (2) and (3), respectively:

$$\begin{aligned} \ln educex = {} & \beta_1 + \beta_2 \ln EXP + \beta_3 AGE + \beta_4 EMP + \beta_5 HHS + \beta_6 SHRPS \\ & + \beta_7 \mathrm{RURAL} + \beta_8 \mathrm{SHRFS} + \beta_9 \mathrm{RURALF} + \beta_{10} \mathrm{NS} \\ & + \sum_{j=2}^{5} \alpha_j EDUCD_j + \varepsilon \end{aligned} \quad (2)$$

$$\begin{aligned} educshr = {} & \beta_1 + \beta_2 \ln EXP + \beta_3 AGE + \beta_4 EMP + \beta_5 HHS + \beta_6 SHRPS \\ & + \beta_7 \mathrm{RURAL} + \beta_8 \mathrm{SHRFS} + \beta_9 \mathrm{RURALF} + \beta_{10} \mathrm{NS} \\ & + \sum_{j=2}^{5} \alpha_j EDUCD_j + \varepsilon \end{aligned} \quad (3)$$

The equations capture three types of variables; variables for household heads (age, educational attainment level and employment status of the household head), variables regarding household characteristics (household size and location of the household) and variables relating to students in the household (share of primary school students and share of female students)[4] In order to see the differences in results by income groups, we estimate separate regressions for each income quartiles. The estimations are carried out for 2003, 2007 and 2012 to observe the time dynamics for the variables of interest.

The dependent variables in Eqs. (2) and (3) are, respectively, the logarithm of total household out-of-pocket education expenditures and the share of total household out-of-pocket education expenditures in the household total expenditure. Education expenditures include the money spent on books, writing materials and on all levels of educational institutions. The share of components of education expenditures are presented in Table 1 for the years under investigation.

Table 1
Components of Education Expenditures (Share, %).

Type of expenditure	2003	2007	2012
Book	11.36	7.93	10.29
Writing materials	11.13	7.26	7.37
Primary school and preschool	17.37	16.33	34.93
High school	20.94	24.03	20.05
Post high school- pre University	34.07	38.45	19.50
Other	5.13	5.99	7.85

As Table 1 illustrates, the largest share of educational expenditures for years 2003 and 2007 belongs to the expenditure on education for post-high school – pre-university item which is mainly the spending for private tutoring (dershanes). However, the share of this item significantly decreases in 2012 which seems like a puzzle. One possible reason of this change in the composition of education expenditures could be the increasing amount of private school attendance for primary and high schools.[5]

A commonly used proxy for income in the Engel Curve studies is the total expenditure due to the fact that it is regarded in the empirical literature to be a better indicator of permanent income. Moreover, compared to income, expenditure suffers less from measurement errors. In this respect, we use the logarithm of total household expenditure ($\ln EXP$) and accordingly calculate the total expenditure elasticity of education. The elasticity is given directly by coefficient β_2 in the double logarithmic specification (Eq. (2)). However, in the Working-Leser specification (Eq. (3)), the elasticity should be calculated by using the following formula:

$$e = 1 + \frac{\beta_2}{W} \quad (4)$$

where e is the total household elasticity of education expenditure, β_2 is the coefficient of $\ln EXP$ in Eq. (3), and W is the mean of the share of education expenditure in total household expenditure. Carrying out estimations for different years allows us to see the evolution of the elasticity through time for different income groups.

Some hypotheses regarding the coefficient of income (total expenditure) variable that we aim to test are based on the work of Benson (1961) who argues that income elasticity of education varies with level of household income. More specifically, for low- and high-income households the income elasticity of education is expected to be between zero and one, while for middle-income households its value is more likely to be greater than one. The reason is that middle-income families place great value on education as a means for their children to achieve upward social mobility. This implies a positive relationship between household income and the share of this income spent on education. The low-income households, on the other hand, attach less importance to upward mobility, and therefore, quality of schooling. Thus, in this group, educational expenditures are expected to rise less rapidly than household income, resulting in an income elasticity between zero and one. Finally, the value of income elasticity is also predicted to be between zero and one for the high-income households. The reason is that there will be an upper limit on educational expenditures for each household that is determined by the number of children in the household. Thus, as household

[2] The model was introduced by Working (1943) and considered by Leser (1963).

[3] We choose these functional forms because the double-logarithmic form is one of the most widely used specifications in empirical Engel curve studies, and the Working-Leser form is identified to be the best performing specification by Tansel (1986) who estimates nine different functional forms of Engel curves using data from the 1978 to 1979 Turkish Urban Household Expenditure Survey.

[4] We also control for the number of students at the university entrance exam ages and high school entrance exam ages due to households' possible higher education expenditures arises from private tutoring expenditures. As their coefficients are statistically insignificant, we do not cover them in the estimations.

[5] When we referred this issue to the Turkish Statistical Institute authorities, they said that this could also be a result of miscoding due to the change in the definitions.

income increases beyond this limit, educational expenditures will grow less rapidly than income.

The educational background of the household head is expected to have a positive impact on the educational investment in children. More educated head could be more conscious of the importance of education and so could spend more on their children's education. We create five categorical education dummies (*EDUCD*) that take the value of one if the household head's highest educational attainment belongs to one of these categories. These five categories are below primary school (the base category), primary school, secondary school, high school and university. Moreover, in order to see how education expenditure varies with age of the household head, we include *AGE* variable. We also control for the employment status of the household head by adding a dummy variable (*EMP)* that takes the value of 1 if the head is working and 0 otherwise.

In Turkey it is common that multiple generations of families live in the same household. This is more significant for less educated (lower income) households (Cilasun and Kırdar, 2013). In other words, poorer households are generally more crowded compared to higher-income households. Therefore, they could allocate a smaller fraction of their household income to educational expenditures. Thus, we expect a negative sign for the household size (*HHS*) variable.

Since education expenditures could differ for students that are at different stages of their education, we include the share of primary school students (*SHRPS*) variable into the model. It is calculated as the number of primary school students in the household divided by the total number of students (primary school students + high school students).

There are significant differences in attitudes towards education between households living in the rural and urban areas in Turkey. In the rural areas, education is considered as a luxury since most of the population is working in the agricultural sector. To control for this effect, we include a rural dummy (*RURAL*) to the model.

Another important aspect of the education environment of Turkey is the attitude towards girls. The traditional role of a woman in Turkey is to be a housewife. Therefore, girls are often not expected to enter into the job market. Girls generally quit school after completing the compulsory education. Educational attainment of girls is considered less important than that of boys by many parents. This phenomenon is one of the factors that explain lower educational levels of females in Turkey. In order to control for this effect, we include a variable that captures the share of female students in the household (*SHRFS*). The above-mentioned attitude towards girls is even more common in rural areas. Thus, we include an interaction term (*RURALF*) that is the product of the rural dummy and the share of female students. Finally, since we are dealing with household educational expenditures and not the expenditure per student, we control for the total number of students in the household (NS).

Because the distribution of education expenditure has a mass at zero, we adopt Tobit analysis which allows for a mass point in the distribution of the dependent variable as our estimation method. Table 2 displays the percentage of households with zero and positive education expenditures by income quartiles. As expected the percentage of households with zero education expenditures decreases with income. One important fact standing out from the table is that, for all income quartiles, the percentage of households with zero expenditure decreases in time, particularly in 2012.

Table 3 presents a list of summary statistics of the variables used in the model. In 2003, the average real total expenditure of the first quartile group is 3677 TL, and 5342 TL, 7418 TL and 13017 TL for the second, third and forth quartiles, respectively. The average real total household expenditure for all quartiles significantly rose by around 50% between 2003 and 2007, whereas the rise is limited to approximately 20% for the period 2007–2012. For the total sample, the mean real consumption spending stands at 7270 TL in 2003, and rises to 9494 TL in 2007, and to 12368 TL in 2012.

If we look at the corresponding real education expenditures, we can observe the same increasing pattern over time for all quartiles and years except that of the second quartile between 2007 and 2012. This rise in absolute value in the education expenditures can also be traced in its share in household consumption expenditures for all quartiles over time. Still, the share of education in total household spending is very limited for all quartiles, ranging between 1 and 5% increasing along the income distribution. Education expenditures make up only 3% of the total expenditures for an average Turkish household as of 2012. If we consider the magnitude of education expenditures rather than its share, we observe a higher level of inequality along the income distribution. While the highest income group has nearly six times higher income than the lowest income group, their educational expenditures is almost ten times of that of the poorest quartile.

The level of schooling of the household head displays a noticeably increasing relationship with income level, hence with education expenditures. While the share of university graduates (*EDUCD5*) in the lowest income quartile is zero percent, it reaches 24% in the top income quartile in 2003. Whereas, the share of household heads with a secondary school degree displays a flat trend along the income distribution for all years. Another noteworthy point is that, while the share of university graduates in the highest income group is very similar in 2003 and 2007, it sharply increases in 2012.

The average age of the household head in our sample stands between 42 and 45 for all three years, which corresponds to the middle age group, thereby allows interpreting the estimation findings within the framework of the life cycle hypothesis.

The share of an employed household head follows an increasing pattern with income level, from 74% for the poorest to 87% for the richest in 2012. Over time, we do not see a change in the relevant shares for the upper quartiles, whereas the share of employed household head in the first quartile drops gradually by around 4% points between 2003 and 2012.

On average the households in our sample have between 4 to 5 members. We also note a slight fall in the household size of all income groups over time.

A strongly discernible pattern reveals itself in the relationship between residential area and income status. The share of rural

Table 2
Households With Zero and Positive Education Expenditures (%).

Income quartiles	Households with zero education expenditures (%)			Households with positive education expenditures (%)		
	2003	2007	2012	2003	2007	2012
First quartile	57.95	54.21	42.22	42.05	45.79	57.78
Second quartile	51.61	41.42	31.50	48.39	58.58	68.50
Third quartile	45.65	37.49	24.17	54.35	62.51	75.83
Fourth quartile	37.00	28.95	15.49	63.00	71.05	84.51
Total	48.23	41.21	27.99	51.77	58.79	72.01

Table 3
Summary Statistics.

2003

	1 st Quartile			2nd Quartile			3rd Quartile			4th Quartile			Total		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
reeleduc	3008	35.26	131.33	3005	81.97	429.69	2811	520.13	1911.93	2811	520.13	1911.93	11871	195.64	1014.73
educshr	3008	0.01	0.03	3005	0.01	0.04	2811	0.03	0.07	2811	0.03	0.07	11871	0.02	0.05
reelc	3008	3677.31	1796.30	3005	5342.74	2189.30	2811	13017.13	9182.80	2811	13017.13	9182.80	11871	7270.85	6065.91
educd1	3008	0.19	0.40	3005	0.10	0.30	2811	0.04	0.19	2811	0.04	0.19	11871	0.10	0.30
educd2	3008	0.65	0.48	3005	0.60	0.49	2811	0.34	0.48	2811	0.34	0.48	11871	0.52	0.50
educd3	3008	0.09	0.29	3005	0.13	0.34	2811	0.11	0.32	2811	0.11	0.32	11871	0.12	0.32
educd4	3008	0.06	0.24	3005	0.15	0.36	2811	0.26	0.44	2811	0.26	0.44	11871	0.17	0.38
educd5	3008	0.00	0.04	3005	0.02	0.14	2811	0.24	0.43	2811	0.24	0.43	11871	0.09	0.28
age	3008	41.50	10.15	3005	42.81	9.91	2811	44.53	9.13	2811	44.53	9.13	11871	43.09	9.80
emp	3008	0.78	0.41	3005	0.79	0.41	2811	0.87	0.34	2811	0.87	0.34	11871	0.82	0.39
hhsize	3008	5.46	2.10	3005	5.20	1.98	2811	5.10	2.08	2811	5.10	2.08	11871	5.23	2.03
primshare	3008	0.83	0.32	3005	0.78	0.36	2811	0.71	0.40	2811	0.71	0.40	11871	0.77	0.37
rural	3008	0.39	0.49	3005	0.32	0.47	2811	0.20	0.40	2811	0.20	0.40	11871	0.29	0.45
girlshare	3008	0.39	0.41	3005	0.36	0.41	2811	0.34	0.42	2811	0.34	0.42	11871	0.36	0.41
totalstu	3008	1.78	0.89	3005	1.70	0.87	2811	1.55	0.76	2811	1.55	0.76	11871	1.67	0.84

2007

	1 st Quartile			2nd Quartile			3rd Quartile			4th Quartile			Total		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
reeleduc	1116	61.14	297.52	1014	186.17	704.67	898	949.76	3479.58	898	949.76	3479.58	4027	349.77	1757.55
educshr	1116	0.01	0.04	1014	0.02	0.05	898	0.05	0.08	898	0.05	0.08	4027	0.02	0.06
reelc	1116	4891.04	2262.98	1014	7424.84	2872.47	898	16583.80	9099.90	898	16583.80	9099.90	4027	9494.00	6736.43
educd1	1116	0.25	0.43	1014	0.09	0.29	898	0.04	0.20	898	0.04	0.20	4027	0.11	0.31
educd2	1116	0.59	0.49	1014	0.60	0.49	898	0.35	0.48	898	0.35	0.48	4027	0.52	0.50
educd3	1116	0.08	0.28	1014	0.13	0.33	898	0.11	0.31	898	0.11	0.31	4027	0.11	0.31
educd4	1116	0.06	0.24	1014	0.15	0.36	898	0.27	0.44	898	0.27	0.44	4027	0.18	0.38
educd5	1116	0.01	0.09	1014	0.02	0.16	898	0.24	0.42	898	0.24	0.42	4027	0.09	0.29
age	1116	41.98	10.25	1014	43.31	9.80	898	44.38	9.05	898	44.38	9.05	4027	43.32	9.72
emp	1116	0.76	0.43	1014	0.80	0.40	898	0.87	0.33	898	0.87	0.33	4027	0.81	0.39
hhsize	1116	5.40	2.12	1014	5.10	2.12	898	4.92	1.96	898	4.92	1.96	4027	5.09	2.01
primshare	1116	0.87	0.29	1014	0.79	0.34	898	0.70	0.41	898	0.70	0.41	4027	0.78	0.36
rural	1116	0.49	0.50	1014	0.35	0.48	898	0.15	0.36	898	0.15	0.36	4027	0.31	0.46
girlshare	1116	0.45	0.41	1014	0.47	0.42	898	0.46	0.45	898	0.46	0.45	4027	0.47	0.43

2012

	1 st Quartile			2nd Quartile			3rd Quartile			4th Quartile			Total		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
reeleduc	990	103.59	240.90	1111	181.25	321.66	1146	316.98	557.53	1091	1257.50	2440.34	4341	469.81	1353.34
educshr	990	0.02	0.03	1111	0.02	0.03	1146	0.02	0.04	1091	0.05	0.07	4341	0.03	0.05
reelc	990	6178.4	3900.74	1111	8981.35	4180.30	1146	12669.14	6125.31	1091	21134.05	13939.10	4341	12368.00	9883.64
educd1	990	0.20	0.40	1111	0.09	0.29	1146	0.05	0.21	1091	0.04	0.20	4341	0.09	0.29
educd2	990	0.59	0.49	1111	0.54	0.50	1146	0.44	0.50	1091	0.26	0.44	4341	0.46	0.50
educd3	990	0.11	0.32	1111	0.16	0.37	1146	0.14	0.34	1091	0.09	0.29	4341	0.13	0.33
educd4	990	0.09	0.28	1111	0.17	0.38	1146	0.25	0.43	1091	0.23	0.42	4341	0.19	0.39
educd5	990	0.01	0.08	1111	0.03	0.18	1146	0.13	0.34	1091	0.37	0.48	4341	0.14	0.34
Age	990	43.29	10.88	1111	43.45	9.95	1146	44.68	9.38	1091	45.39	9.29	4341	44.22	9.90
Emp	990	0.74	0.44	1111	0.79	0.40	1146	0.84	0.37	1091	0.87	0.34	4341	0.81	0.39
hhsize	990	4.90	1.83	1111	4.75	1.77	1146	4.71	1.70	1091	4.77	2.15	4341	4.78	1.87
primshare	990	0.76	0.37	1111	0.72	0.38	1146	0.65	0.41	1091	0.66	0.41	4341	0.69	0.40
rural	990	0.45	0.50	1111	0.30	0.46	1146	0.26	0.44	1091	0.18	0.39	4341	0.29	0.46
girlshare	990	0.45	0.41	1111	0.47	0.42	1146	0.48	0.43	1091	0.47	0.44	4341	0.47	0.42
totalstu	990	1.87	1.03	1111	1.76	0.93	1146	1.69	0.83	1091	1.62	0.84	4341	1.73	0.91

residence decreases along the income distribution. According to the most recent data in 2012, the share of households living in a rural area is 45% for the population in the lowest income group, 30% for those in the second, 26% for those in the third and 18% for the forth income quartiles.

As per share of female students in the household, our sample does not display a discernible difference among different income groups, but a clear rise for all quartiles over time. For the poorest households, female students make up 45% of the students in the family in 2012 but only 39% in 2003. Girls' share has risen even more sharply for the upper income groups, by 11, 13 and 13% respectively. The total number of students in all groups ranges between 1.55 and 1.78, the first belonging to the richest and latter to the poorest households.

5. Estimation results

Tables 4–6 give the estimation results of the double logarithmic model of household educational expenditures (Eq. (2)) for years 2003, 2007 and 2012, respectively. In each table, the first four columns present the estimated coefficients (the unconditional marginal effects) for the income quartiles while the last column shows the results for the overall sample. The parameter estimates for the household expenditure variable

Table 4
Tobit estimation results of household education expenditures for the double log specification, 2003.

Variables	Bottom 25 Marginal Effects	Second 25 Marginal Effects	Third 25 Marginal Effects	Top 25 Marginal Effects	Total Marginal Effects
lnEXP	0.472***	1.674***	1.504***	0.913***	1.078***
	(0.051)	(0.141)	(0.167)	(0.074)	(0.0246)
EDUCD2	0.201	0.0826	0.282	0.437	0.124
	(0.126)	(0.190)	(0.264)	(0.400)	(0.108)
EDUCD3	0.295	0.0767	0.292	0.547	0.197
	(0.211)	(0.226)	(0.289)	(0.455)	(0.134)
EDUCD4	0.343	0.0847	0.352	0.579*	0.203
	(0.236)	(0.730)	(0.288)	(0.295)	(0.163)
EDUCD5	1.115*	0.461	0.380	1.112**	0.478***
	(0.594)	(0.413)	(0.320)	(0.457)	(0.163)
AGE	0.00294	−0.00957	−0.000229	0.00670	−0.00209
	(0.00499)	(0.00626)	(0.00743)	(0.00906)	(0.00343)
EMP	−0.0424	−0.0591	0.284*	−0.184	−0.0111
	(0.111)	(0.135)	(0.167)	(0.233)	(0.0791)
HHS	−0.104***	−0.131***	−0.248***	−0.168***	−0.159***
	(0.0289)	(0.0331)	(0.0414)	(0.0430)	(0.0184)
SHRPS	0.242	0.258	0.335*	−0.157	0.153*
	(0.157)	(0.164)	(0.171)	(0.198)	(0.0868)
RURAL	−0.229*	−0.286*	−0.321*	−0.682***	−0.384***
	(0.126)	(0.148)	(0.177)	(0.216)	(0.0837)
SHRFS	0.0930	0.0263	0.0386	−0.0713	0.0157
	(0.126)	(0.133)	(0.151)	(0.192)	(0.0766)
RURALF	0.0310	−0.0294	−0.116	0.187	0.0345
	(0.110)	(0.132)	(0.187)	(0.202)	(0.0773)
NS	0.276***	0.341***	0.553***	0.491***	0.415***
	(0.0627)	(0.0679)	(0.0795)	(0.105)	(0.0395)
Observations	3008	3005	3045	2811	11,871

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5
Tobit estimation results of household education expenditures for the double log specification, 2007.

Variables	Bottom 25 Marginal Effects	Second 25 Marginal Effects	Third 25 Marginal Effects	Top 25 Marginal Effects	Total Marginal Effects
lnEXP	0.634***	1.827***	1.836***	0.979***	1.312***
	(0.104)	(0.300)	(0.301)	(0.168)	(0.105)
EDUCD2	0.0197	0.647*	0.514	0.919	0.0283
	(0.202)	(0.343)	(0.486)	(0.817)	(0.201)
EDUCD3	0.210	1.527**	0.668	0.989	0.458*
	(0.323)	(0.597)	(0.506)	(0.975)	(0.269)
EDUCD4	0.218	1.585**	1.186**	1.287**	0.381*
	(0.382)	(0.582)	(0.466)	(0.504)	(0.223)
EDUCD5	0.312	2.646***	1.884***	2.262**	0.965***
	(0.716)	(0.921)	(0.482)	(0.954)	(0.303)
AGE	−0.00771	0.0163	−0.0219	−0.00264	−0.00436
	(0.00845)	(0.0127)	(0.0141)	(0.0172)	(0.00641)
EMP	−0.221	0.456*	0.131	−0.730	−0.0299
	(0.197)	(0.270)	(0.334)	(0.466)	(0.153)
HHS	−0.190***	−0.236***	−0.310***	−0.379***	−0.285***
	(0.0561)	(0.0653)	(0.0799)	(0.0918)	(0.0372)
SHRPS	−0.292	0.135	0.536*	−0.0887	0.122
	(0.283)	(0.316)	(0.314)	(0.363)	(0.165)
RURAL	−0.268*	−0.531*	0.292	−0.188	−0.225
	(0.142)	(0.282)	(0.401)	(0.502)	(0.163)
SHRFS	0.0637	−0.226	0.296	0.113	0.0722
	(0.220)	(0.268)	(0.269)	(0.314)	(0.138)
RURALF	0.273*	0.300	−0.352	0.323	0.188
	(0.147)	(0.216)	(0.337)	(0.436)	(0.123)
NS	0.310***	0.491***	0.437***	0.700***	0.496***
	(0.117)	(0.144)	(0.159)	(0.195)	(0.0776)
Observations	1116	1014	995	898	4027

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(lnEXP) denote elasticities because in this model, as mentioned before, education expenditure and total household expenditure are both in logarithmic form. The coefficient estimates on lnEXP are highly significant for all years and income quartiles. The results support Benson's (1961) hypothesis regarding the basic pattern of elasticities by income groups, that is, a peak in the middle income quartiles and a decrease at both ends of the income distribution.

Table 6
Tobit estimation results of household education expenditures for the double log specification, 2012.

Variables	Bottom 25 Marginal Effects	Second 25 Marginal Effects	Third 25 Marginal Effects	Top 25 Marginal Effects	Total Marginal Effects
lnEXP	1.248***	1.951***	2.045***	1.800***	1.951***
	(0.221)	(0.341)	(0.295)	(0.170)	(0.0869)
EDUCD2	0.137	0.00179	0.298	0.404	0.0751
	(0.252)	(0.381)	(0.552)	(0.733)	(0.207)
EDUCD3	0.1847	0.391	0.460	0.275	0.260
	(0.350)	(0.455)	(0.619)	(0.801)	(0.249)
EDUCD4	0.317**	0.883**	0.832**	1.400**	0.826***
	(0.126)	(0.446)	(0.329)	(0.556)	(0.241)
EDUCD5	1.226	0.993	1.477**	1.911**	1.384***
	(0.786)	(0.619)	(0.635)	(0.760)	(0.265)
AGE	−0.00825	0.00528	0.0109	0.0318**	0.0103*
	(0.0103)	(0.0118)	(0.0132)	(0.0136)	(0.00619)
EMP	0.0986	−0.0343	−0.152	0.498	0.118
	(0.221)	(0.256)	(0.291)	(0.329)	(0.139)
HHS	−0.252***	−0.317***	−0.332***	−0.397***	−0.333***
	(0.0730)	(0.0732)	(0.0780)	(0.0789)	(0.0379)
SHRPS	0.00302	0.187	0.0389	−0.00199	0.0452
	(0.255)	(0.255)	(0.241)	(0.234)	(0.124)
RURAL	−0.207	−0.272	0.0169	−0.499	−0.295
	(0.257)	(0.285)	(0.307)	(0.371)	(0.253)
SHRFS	0.183	0.415*	0.139	0.224	0.228**
	(0.239)	(0.223)	(0.226)	(0.209)	(0.113)
RURALF	0.103	0.229	−0.166	−0.0375	0.105
	(0.183)	(0.188)	(0.270)	(0.308)	(0.116)
NS	0.446***	0.580***	0.446***	0.650***	0.538***
	(0.123)	(0.133)	(0.131)	(0.141)	(0.0670)
Observations	990	1111	1146	1091	4341

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The estimated elasticities have lower values for the top- and the bottom-income quartiles and larger values for the middle-income quartiles. Regarding the magnitude of elasticities across income groups, our results generally support Benson's predictions. As mentioned before, the income elasticity of education is expected to vary by level of household income. More specifically, the income elasticity for the bottom- and the top-income households is expected to be between zero and one while the income elasticity of education for the middle-income households is expected to be greater than one.

We find that the null hypothesis that the elasticity coefficient is equal to one is rejected for the lowest income quartile in years 2003 and 2007, while it cannot be rejected for the same quartile in 2012. Thus, as total expenditure increases in this income group, educational expenditure increases less rapidly than total expenditure in years 2003 and 2007, indicating that education is a necessity item in the households' budget. It could also imply that the quality of education is of less importance in these families. For the two middle-income quartiles (the second and the third quartiles), the estimated elasticity is significantly greater than one for all years. In other words, for the households in these income groups, education is a luxury good; as total expenditure increases, educational expenditure rises more rapidly than total expenditure. The same result could also be a mere reflection of the middle-income households being more concerned about the quality of their children's education. For the highest-income group, the estimated elasticity is not different from one for years 2003 and 2007. Thus, for the highest-income households in these years, education seems to be neither a necessity nor a luxury good. For 2012, on the other hand, it is statistically significantly greater than one. Therefore, contrary to the expectations, the finding for the highest-income group in 2012 is similar to that obtained for the middle-income groups for all years. That is, education is a luxury good, and the parents seem to care about the quality of their children's education. Finally, the results for the overall sample are similar to those obtained for the highest-income group; that is, education is a luxury in 2012 while it is neither a necessity nor a luxury in 2003 and 2007.

Another noticeable finding is that for all income groups and for the overall sample, expenditure elasticity of education increases over time. This is particularly important considering the fact that textbooks have been distributed to students free of charge by the government since 2004. This result might reflect that households in Turkey have allocated greater share of their budgets to education expenditures through spending on private schools and private tutoring. This conviction has indeed some support from data given that both the number of students attending private schools and the number of students receiving private tutoring grew much faster than the total number of students during the period under investigation (Ozdebir, 2014; TOBB, 2012).

Coefficient estimates of the household head's educational attainment, though not significant in all estimations, reveal, as expected, that the head's level of education has an increasingly positive effect on the children's educational expenditures. The result is consistent with previous studies showing that parental education is an important determinant of education demand (Tansel, 2002; Shafiq, 2009; Kenayathulla, 2016). In particular, for the upper middle income and the top income quartiles, the coefficients of EDUCD4 and EDUCD5 are almost always significant implying that household heads in these income groups who have high-school and university degrees spend significantly more than those who do not have any education. For example, for the top income quartile in 2012, high-school- and university-educated household heads spend, respectively, 140 and 191.1% more than those household heads in the below-primary school category. Same pattern also holds for the overall sample. The other noticeable findings regarding the educational attainment dummies are that for the second income quartile in 2007, all households with a graduate head spend significantly more than households whose head lacks a diploma; and in all income

quartiles in 2012, the household heads with a high-school degree invest more in their children's education than those heads without any educational attainment.

Household size (HHS) variable is highly significant in all estimations. The negative coefficient on this variable implies that crowded households, which are generally poorer as mentioned before, may not be able to spend much on education, as demand for resources for alternative purposes is relatively higher. The share of children attending primary schools in the household (SHRPS) is found to be insignificant in almost all estimations. This indicates that spending on primary education and high school education does not differ significantly. The results on variable RURAL tells us that in year 2003, urban households spend more on education than rural households. This result is expected since in rural areas, where most of the population works in the agricultural sector, education is often considered as a luxury. In 2007, however, this finding weakens and holds only for lower-income families; and in 2012, the coefficient of RURAL turns out to be insignificant for all income quartiles. A possible explanation for this pattern might be the changing attitudes towards education in the rural areas.

Tables 7–9 show the estimation results of the Working-Leser specification (Eq. (3)) for years 2003, 2007 and 2012, respectively. The elasticity calculations associated with these estimations are presented in Table 10. Similar to the double logarithmic form estimations, the results show that the estimated elasticities have lower values for the top- and the bottom-income quartiles and larger values for the middle-income quartiles. The elasticities are significantly greater than one for the two middle income quartiles (the second and the third quartiles), as they were for the first specification. However, now the estimated elasticities are not significantly different from one for the lowest income quartile. Thus, the results from estimating the Working-Leser form support our previous finding that for the households in the two middle-income groups education is a luxury good, but they do not give support to our earlier results for 2003 and 2007 that education is a necessity item in the budgets of lowest-income households. In the Working-Leser model estimation results, education seems to be neither a necessity nor a luxury for the bottom income-quartile for all years. The same result also holds for the top income-quartile for years 2003 and 2007. In 2012, on the other hand, education has been found to be a luxury good for the highest-income families. In the double logarithmic form estimations for the overall sample, education stands out as a luxury item in the households' budgets in 2012 while it is neither a necessity nor a luxury in 2003 and 2007. In the Working-Leser form estimations for the same sample, it turns out to be a luxury good for all years. Finally, the Working-Leser estimation results confirm our previous finding that the expenditure elasticity of education increases over time for both all income groups and the overall sample.

The results for the other variables in the Working-Leser regressions are qualitatively very similar to those reported for the double logarithmic specification. The household head's level of education has an increasingly positive effect on the educational expenditures of children. As before, the household heads with a high-school or a university diploma in the upper middle income and the top income quartiles spend significantly more than those heads without any schooling. Household size variable has a highly significant and negative coefficient implying that the demand for resources for alternative purposes increases, and the resources of the household are stretched over a large number of people. The earlier finding that households in the urban areas spend more on education than those in the rural areas in year 2003 holds in Working-Leser estimations, for all households except for those in the highest-income groups. Finally, the variable NS has been added to the models to control for the number of students in the household. The coefficient of this variable is positive and highly significant in all estimations as expected.

The findings of this study are comparable with those for other countries where the share of private out of pocket spending on education is sizeable. In fact, not only OECD countries but also

Table 7
Tobit estimation results of household education expenditures for the Working-Leser specification, 2003.

Variables	Bottom 25 Marginal Effects	Second 25 Marginal Effects	Third 25 Marginal Effects	Top 25 Marginal Effects	Total Marginal Effects
lnEXP	−0.00157***	0.0168***	0.0161***	−0.00331***	0.0113***
	(0.00032)	(0.00220)	(0.00248)	(0.00051)	(0.000967)
EDUCD2	0.00132	0.000369	0.00236	0.00623	0.000801
	(0.00115)	(0.00210)	(0.00296)	(0.00525)	(0.00123)
EDUCD3	0.00224	0.00147	0.00255	0.00515	0.000891
	(0.00228)	(0.00244)	(0.00347)	(0.00583)	(0.00157)
EDUCD4	0.00313	0.00211	0.000337	0.00702*	0.00141
	(0.00212)	(0.00296)	(0.00346)	(0.00413)	(0.00170)
EDUCD5	0.00411	0.00444	0.000501	0.0111*	0.00468**
	(0.00320)	(0.00372)	(0.00376)	(0.00653)	(0.00215)
AGE	3.83e-05	−0.000119	8.37e-05	1.75e-05	−1.56e-05
	(4.15e-05)	(7.61e-05)	(8.10e-05)	(0.000142)	(4.23e-05)
EMP	−0.000389	3.61e-05	0.00384*	−0.000823	0.000528
	(0.00103)	(0.00164)	(0.00209)	(0.00318)	(0.000957)
HHS	−0.00107***	−0.00165***	−0.00278***	−0.00252***	−0.00199***
	(0.000256)	(0.000427)	(0.000488)	(0.000563)	(0.000221)
SHRPS	−0.00148	−0.00147	−0.00309	−0.00926***	−0.00380***
	(0.00152)	(0.00206)	(0.00215)	(0.00313)	(0.00115)
RURAL	−0.00235**	−0.00286**	−0.00306*	−0.00940	−0.00417***
	(0.00108)	(0.00141)	(0.00166)	(0.00874)	(0.00107)
SHRFS	0.000888	0.000119	−0.000403	−0.000787	−9.30e-05
	(0.00115)	(0.00159)	(0.00174)	(0.00280)	(0.000949)
RURALF	−0.000281	−0.000739	−0.000694	0.00487	0.000688
	(0.00107)	(0.00152)	(0.00215)	(0.00415)	(0.00103)
NS	0.00293***	0.00379***	0.00569***	0.00738***	0.00490***
	(0.000709)	(0.000887)	(0.000981)	(0.00157)	(0.000518)
Observations	3008	3005	3045	2811	11,871

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 8
Tobit estimation results of household education expenditures for the Working-Leser specification, 2007.

Variables	Bottom 25 Marginal Effects	Second 25 Marginal Effects	Third 25 Marginal Effects	Top 25 Marginal Effects	Total Marginal Effects
lnEXP	−0.00069***	0.0283***	0.0172***	0.00148***	0.0162***
	(0.00014)	(0.00993)	(0.00411)	(0.00052)	(0.00262)
EDUCD2	0.00102	0.00848*	0.0103**	0.0101	0.000635
	(0.00198)	(0.00456)	(0.00514)	(0.0130)	(0.00257)
EDUCD3	0.00378	0.0189**	0.00131	0.0103	0.00315
	(0.00452)	(0.00890)	(0.00621)	(0.0157)	(0.00381)
EDUCD4	0.00503	0.0127*	0.00303*	0.0154*	0.00488*
	(0.00448)	(0.00682)	(0.00163)	(0.0082)	(0.00262)
EDUCD5	0.000782	0.0388**	0.00667**	0.0379**	0.0185***
	(0.00538)	(0.0191)	(0.00332)	(0.0176)	(0.00553)
AGE	−6.72e-05	0.000256	−0.000105	0.000156	1.47e-05
	(7.84e-05)	(0.000184)	(0.000155)	(0.000321)	(9.31e-05)
EMP	−0.00284	0.00722*	−3.35e-05	−0.00358	0.000141
	(0.00225)	(0.00389)	(0.00461)	(0.00764)	(0.00210)
HHS	−0.00195***	−0.00374***	−0.00390***	−0.00620***	−0.00404***
	(0.000586)	(0.00126)	(0.000956)	(0.00159)	(0.000579)
SHRPS	−0.00903**	0.000497	0.00182	−0.00882	−0.00303
	(0.00397)	(0.00514)	(0.00403)	(0.00649)	(0.00253)
RURAL	−0.00264*	−0.00499*	0.00716	0.00272	−0.000417
	(0.00142)	(0.00268)	(0.00568)	(0.00957)	(0.00253)
SHRFS	−0.00275	−0.00286	0.000981	0.00593	0.000412
	(0.00243)	(0.00435)	(0.00352)	(0.00549)	(0.00207)
RURALF	0.00387**	0.00395	−0.00539	0.00475	0.00208
	(0.00177)	(0.00280)	(0.00408)	(0.00710)	(0.00166)
NS	0.00292**	0.00619***	0.00471**	0.0106***	0.00649***
	(0.00130)	(0.00221)	(0.00200)	(0.00360)	(0.00120)
Observations	1116	1014	995	898	4027

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9
Tobit estimation results of household education expenditures for the Working-Leser specification, 2012.

Variables	Bottom 25 Marginal Effects	Second 25 Marginal Effects	Third 25 Marginal Effects	Top 25 Marginal Effects	Total Marginal Effects
lnEXP	0.00469***	0.02836***	0.02412***	0.0227***	0.01938***
	(0.00064)	(0.00459)	(0.00445)	(0.00358)	(0.00156)
EDUCD2	0.00114	0.00212	0.000398	0.00393	0.000563
	(0.00249)	(0.00275)	(0.00497)	(0.00848)	(0.00203)
EDUCD3	0.00207	0.00617*	0.00232	0.00671	0.00662
	(0.00326)	(0.00366)	(0.00591)	(0.0102)	(0.00553)
EDUCD4	0.00255*	0.00860**	0.00466**	0.0210**	0.00682***
	(0.00151)	(0.00356)	(0.00225)	(0.00986)	(0.00245)
EDUCD5	0.00732	0.00911	0.0142**	0.0382***	0.0245***
	(0.00875)	(0.00846)	(0.00688)	(0.0100)	(0.00373)
AGE	1.72e-05	8.15e-05	0.000168	0.000616***	0.000180***
	(9.07e-05)	(9.36e-05)	(0.000134)	(0.000197)	(6.37e-05)
EMP	0.00117	−0.00149	−0.00128	0.00937**	0.00138
	(0.00209)	(0.00239)	(0.00327)	(0.00423)	(0.00149)
HHS	−0.00246***	−0.00270***	−0.00361***	−0.00564***	−0.00387***
	(0.000685)	(0.000612)	(0.000692)	(0.00113)	(0.000400)
SHRPS	−0.00142	−0.00200	−0.00255	−0.00171	−0.00145
	(0.00239)	(0.00224)	(0.00231)	(0.00407)	(0.00147)
RURAL	−0.000761	−0.00136	0.00136	−0.00873	−0.00251
	(0.00237)	(0.00245)	(0.00297)	(0.00781)	(0.00159)
SHRFS	0.00315	0.00427**	0.00259	0.00172	0.00265*
	(0.00239)	(0.00199)	(0.00212)	(0.00377)	(0.00137)
RURALF	−2.71e-05	0.00108	−0.00213	0.000558	0.000706
	(0.00190)	(0.00152)	(0.00236)	(0.00475)	(0.00125)
NS	0.00457***	0.00465***	0.00509***	0.0110***	0.00628***
	(0.00123)	(0.00113)	(0.00130)	(0.00241)	(0.000781)
Observations	990	1111	1146	1091	4,341

Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

several developing countries display increasingly higher shares of private enrollments, rendering non-government schooling a norm rather than an exception (Heyneman and Stern, 2014) In their study on urban China where private schools have developed rapidly since the 1990s, Qian and Smyth (2011) find that households in the bottom income quintile spend significantly less on education than those at the higher income levels in 2003. This result is in line with our finding from both double logarithmic and

Table 10
The expenditure elasticities calculated from the Working-Leser regressions.

	Bottom 25	Second 25	Third 25	Top 25	Total
2003	0.833014	2.187573	1.785381	0.89423	1.582751
2007	0.946136	2.137624	1.63874	1.03547	1.59106
2012	1.284547	2.358224	1.961002	1.521586	1.697813

Working-Leser estimations. In Greece, although there is an emphasis on free education in the Greek Constitution, out-of-pocket education expenditures by households constitute 1.5% of the gross national product, a figure close to 1.9% of Turkey in 2006. Using 1988 data, Kanellopoulos and Psacharopoulos (1997) find that education is a luxury good in Greece. This result is similar to our findings for the overall sample for all years in Working-Leser estimations and for 2012 in double logarithmic form estimations. The income elasticity that the authors find, however, is much greater (3.18) than the estimates reported in this study. In Bolivia, a relatively poor country, 20% of the cost of public education was financed by households in 2005, and the cost of private education is approximately 70% higher than that of public education (UNICEF, 2008). Using data from 1990 and 1992, Psacharopoulos et al. (1997) find that education is a necessity item in Bolivian households' budget, a finding similar to that obtained for the poorest income group in our study for the double logarithmic specification in 2003 and 2007. In Egypt, where poor quality of public basic education has generated substantial demand for private supplements or substitutes, Assaad and Krafft (2015) report that children from wealthier families have much higher chances of receiving private education, which contributes to further inequality of opportunity to learn and succeed.

6. Conclusion

The implementation of compulsory education act of 1997 has successfully increased schooling rates in Turkey though there are still problems regarding the quality of education. The net schooling rates in primary and secondary education increased respectively from 84.7 and 37.9% in the 1997–1998 academic year to 98.7 and 67.4% in the 2011–2012 academic year. Turkey's per capita income nearly quadrupled in real terms during the period 2001–2012. Accordingly, both the share of education expenditures in Turkey's total government spending and the share of private schools have increased substantially during the same period. Parallel to these developments, families have started to spend more on education, and educational expenditures have become one of the major items contributing to the economic burden on families. The number of households that can afford the cost of private education increased substantially in this period as well. Using data from Turkish Household Budget Surveys of the years 2003, 2007 and 2012, this paper estimates household educational expenditures by income groups and seeks to answer whether or not the determinants of educational expenditures differ by income groups; how much, and in which direction, income elasticities of educational expenditures have evolved over time; or whether children from middle-class and poor families were able to benefit enough from the expansion of educational opportunities. To this end, we employ two functional specifications of Engel curves: the double logarithmic form and the Working-Leser form.

The findings from the paper suggest that the estimated expenditure elasticities have lower values for the top- and the bottom-income quartiles while they have larger values for the middle-income quartiles. This result is confirmed in all estimations. The estimates of the double logarithmic specification evidence that the expenditure elasticity is significantly less than one in years 2003 and 2007 for the lowest income quartile, implying that education is a necessity item in these households' budget. It also suggests that the quality of education is of less importance in these families. However, this result is not robust and appears to break down in the Working-Leser estimations. For the two middle-income quartiles (the second and the third quartiles), the estimated elasticity is significantly greater than one for all years and for both specifications. This result provides evidence that the families in these income groups seem to be more concerned about the quality of their children's education, and education is a luxury good for them; as income increases, educational expenditures rise more rapidly than their income. Contrary to expectations, the estimated elasticity is significantly greater than one for the highest income group in all of the Working-Leser regressions and in the double logarithmic form estimations for 2012.

What is immediately noticeable in our findings is that for all income groups the expenditure elasticity of education increases over time. This result is robust to functional form specification. Together with the observation that the growth rates of number of private schools students and the number of students receiving private tutoring greatly surpassed that of the total number of students during the period under investigation, this finding is likely to indicate that households in Turkey have allocated greater share of their budgets to education expenditures through spending on private schools and private tutoring.

The results for the other variables are qualitatively very similar under the two alternative functional form specifications. The household head's level of education has an increasingly positive effect on the children's educational expenditures. The household heads in the upper middle income and the top income groups who receive high-school and university education generally spend more than those heads in the same groups who did not get any education qualifications. The results also demonstrate that for the lower middle income group in 2007, all households with heads having a formal school education spend significantly more than households whose heads lack a diploma; and in all income quartiles in the year 2012, the household heads with a high-school degree invest more in their children's education than those heads without any educational background.

Household size is found to be another important determinant of educational expenditures. The negative coefficient on this variable implies that crowded households may not afford spending more on education, as demand for resources for alternative purposes increases. The coefficient on rural dummy is negative and significant in year 2003 in most of the estimations. This suggests that households in the urban areas spend more on education than those in the rural areas. This finding is expected since in rural areas, where most of the population works in the agricultural sector, education is often considered a luxury. The negative relationship, however, weakens over time and eventually disappears. This might be a mere reflection of the changing attitudes towards education in the rural areas.

The results of this study offer some evidence that education is a necessity item for the Turkish households at the lowest end of the income distribution. For the poorest group, the estimated expenditure elasticity of education stands generally between zero and one, though not always significantly different from one. In other words, the budget share on education would go up only less than one percent in response to a one percent increase in household income. Departing from these findings, we can argue that a public policy solely relying on general increases in income to stimulate greater expenditures on education will not work effectively for poor households. As the burden for financing education is disproportionately heavier for poorer than richer households, public investment should be increased and more public resources should be committed to the poor to ensure the

equality of educational opportunity. For example, a recent public policy instrument called school voucher programs can be considered. In these voucher systems, the government issues a certificate of funding to parents to cover their children's tuition expenses for the public or private school of their choice. The system has been applied in countries including Chile, Ireland, Hong Kong, Pakistan, and found to improve the equity in educational opportunity. Secondly, the government initiatives to distribute textbooks and tablets free of charge to all students, despite having good intentions, may also have a disruptive effect in terms of equity. The system may be revised in the way that those families who can afford these costs can be asked to pay for them, and these funds can be used for further supporting of the disadvantaged households.

It is obvious that equality could not be achieved unless the education policy takes the potential inequalities among students caused by regional disparities and differences in socio-economic status into account. In this respect, the government has to take measures to enable its citizens to benefit from the schools in line with the needs of higher levels of education and labor market, and therefore to seize their highest potential and thrive. Hence, it is crucial to design and implement a more inclusive education system, which provides a better space for everyone, and enable students to benefit from a diversified environment in which a wide range of human qualities and socio-economic status is welcomed.

For further research, one can analyze the educational outcomes of the children, especially of the low-income households, attending public schools versus those studying in private schools. If indeed the outcomes of those students in private schools compared to those in public schools are found to be better, policy makers may consider extending the promotion of private education. At the one extreme end, all education system can be privatized which is not feasible due to obvious legal and technical reasons. However, at least understanding what private schools offer or do better can be investigated in detail. The public education expenditure per student is another subject of further study, if it is found to be similar to or higher than private schools tuition fees, then there exists an inefficiency problem.

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