Three options is better than one: the art of being a wise parent

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Abstract

The governments of nearly all countries are major providers of primary and secondary education to their citizens. However, down the ages people are interested in private schooling. Moreover, recently there is a rapid growth in the number of homeschoolers all over the world. In this study, I ask why different people make different choices regarding the study process of their children. I develop a theory which integrates the possibility of teaching a child at home, at public and in private school as well as check it in practice. Overall there is a tendency of decreasing the probability of the child to go to public school with the increase of income, increasing probability to go to private school for all groups of people and increase in the interest in homeschooling for highly educated people with the increase of income.

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Contents

1 Introduction

A classic economic dispute is considered with the dilemma between public versus private education. However, the recent econometric study vividly shows that no school type robustly dominates another type when controlling for the school environment and taking equity into account (Cherchye et al., 2010).

Looking backwards, the researchers tried to estimate the difference in return between public and private investment in human capital. Glomm and Rabikumar (1992) found that income inequality declines quickly under public education. On the other hand, private education yields greater per capita incomes unless the initial income inequality is sufficiently high. They also found that societies will choose public education if a majority of agents have below average. The estimation of the efficiency between private and public education in different political regimes was conducted by De la Croix and Doepke (2009) who concluded that in a given political environment, high income inequality leads to more private education, as rich people opt out of the public system. More private education, in turn, results in an improved quality of public education, because public spending can be concentrated on fewer students. They also found that when political power is evenly distributed, a unique political equilibrium exists. Parents decide to send their children to a private school if they would like to endow their children with an education of a much higher quality than what is provided by the public system. In a society with little inequality, the preferred education level varies little in the population, so that all parents use public schooling. For increasing levels of inequality, an increasing share of richer people chooses private education for their children.

As it has been showed there is a wide-ranging debate about both private and public education, however a new trend is coming up: it's homeschooling. By the measurement of the National Center for Education Statistics (the USA) approximately 3 percent of the school-age population was homeschooled in the 2011–12 school year. To better understand the magnitude of the recent events it's necessary to mention that in 1999 the US had only 850,000 children while in 2007 it reached 1.5 million children. [2]. As for the reasons parents gave a number of those for homeschooling their children, they are as follows. In the 2011–12 school year, 91 percent of homeschooled students had parents who said that a concern about the environment of other schools was an important reason for homeschooling their child, which was a higher percentage than other reasons listed. To the best of my knowledge there are still no studies which try to compare the pros and cons of the homeschooling in comparison with the private education. I do hope that this paper will contribute to the understanding of this not easy choice.

Finally, it's necessary to mention that the methodology of the model is based on the one presented in the paper of Doepke and Tertilt (2008). The authors of the study showed that men face a tradeoff between the rights they want for their own wives (namely none) and the rights of other women in the economy. They found that men prefer other men's wives to have rights

[2] https://nces.ed.gov/pubs2009/2009030.pdf

because men care about their own daughters and because an expansion of women's rights increases educational investments in children.

The paper is organized as follows. Section 2 presents the theoretical model which tries to explain the intricacies of the choice. Section 3 presents the data and shows some empirical evidence behind the results. Section 4 concludes.

2 Model

In the model it is assumed that the parents have 3 options: whether to send their children to the public school, to the private school or to choose home-schooling. The utility function of each parent incorporates her own consumption c_i, consumption of her spouse c_{-i}, utility from the quantity of children n_i and from the quality of children h_i. The main trade-off is connected with the quality: in order to increase it parents should spend extra money to send children to the private school or to choose homeschooling.

$$U_f = logc_f + \sigma logc_m + \delta logn + \gamma logh_i \rightarrow max_{c_f;e_f}$$

$$U_m = logc_m + \sigma logc_f + \delta logn + \gamma logh_i \rightarrow max_{c_m;e_m}$$

K is a money-measured «value of knowledge» a child could obtain in the public school, while K1 is the amount of money by which they evaluate extra knowledge that a child can obtain in the private rather than public school (βK_1). The third option - homeschooling will cost parents part of their time e_i rather than money. In this case the children will benefit from the sum of parents' efforts ($e_f + e_m$) as well as from their human capital which is weighted by the amount of time each of them spent with a child and which as a consequence had a larger effect.

s.t.

$$h_i = max\Big(K; K + \beta K_1; B(e_f + e_m)^{\theta} H_m^{\frac{e_m}{e_m+e_f}} H_f^{\frac{e_f}{e_m+e_f}}\Big);$$

The time constraint represents the trade-off between working t_i and investing time in children e_i:

$$t_i + e_i \cdot n = 1;$$

Finally, the labor effort of men and women is combined by a Cobb-Douglas household production function to produce the consumption good. For a family where the husband and the wife have human capital H_m and H_f , respectively, the budget constraint for consumption is given by:

$$K_1 + c_m + c_f = A\Big(t_f \cdot H_f\Big)^{\alpha}\Big(t_m \cdot H_m\Big)^{1-\alpha}$$

The model presented above is fairly solvable in the general case (the attempts to tackle this problem are presented in the attachment). The main take-away message that one may have from this model in the particular case (the husband only works and $\alpha = 0.5$) is that:

If human capital approaches infinity by either man or woman, then the time they devoted to their children converges to constant. Which actually tells us that even highly educated people will prefer homoschooling only up to the certain level.

3 Empirical Evidence

3.1 Data

Data is retrieved from the surveys of the National Center for Education Statistics[3] of the US. The sample covers the following years: 2001, 2003, 2005, 2007, 2012 and is obtained as a representative of the US citizens over all 50 states. The main variables of interest are the dummy ones which represent the fact of being *homeschooled*, *public* or a *private* school respectively. The main dependent variables are HINCOME which measures the total income of the household and varies from 0 to more than 100000$ and is divided into 9 levels. The basic pooled regression made in the analysis is

$$\text{type of schooling} = \beta_0 + \beta_1 HINCOME + \beta_2 HINCOME(2 - educ)educ + \beta_3 HINCOME\frac{1}{2}educ(educ - 1),$$

where *educ* is the highest level of the education in the household, which is divided into three levels: less than high school, high school or some college, graduate and higher. The regression was conducted in such a way for easier interpretation of the coefficients of a particular interest: β_1 represents the increase of the probability of a particular type of schooling with the increase in income for people with the degree less than high school, $\beta_1 + \beta_2$ for high school graduates and $\beta_1 + \beta_3$ for graduates of universities and higher.

Some control variables were used throughout the analysis. They are

- *NUMSIBS*- number of siblings;
- *ZIPURBAN* (*ZIPLOCL* for a wider class)-code classification by community type (rural or urban);
- *CENREG*-region where child lives (Northeast, South, Widwest, West)[4]
- *HHTOTALX* -total people in household

[3] https://nces.ed.gov/nhes/dataproducts.asp#2012dp

[4] this and the previous variable were used as a proxy for the state because of the restricted data use

	(1) public1	(2) public1	(3) private1	(4) private1	(5) homeschool1	(6) homeschool1
HINCOME	0.00412	0.00497*	0.00537**	0.00496**	-0.00949***	-0.00993***
	(0.00269)	(0.00269)	(0.00247)	(0.00246)	(0.00124)	(0.00124)
interone	-0.0134***	-0.0152***	0.00607***	0.00671***	0.00731***	0.00847***
	(0.00240)	(0.00241)	(0.00220)	(0.00221)	(0.00111)	(0.00111)
intertwo	-0.0244***	-0.0257***	0.0168***	0.0168***	0.00760***	0.00896***
	(0.00243)	(0.00243)	(0.00222)	(0.00223)	(0.00112)	(0.00112)
NUMSIBS		-0.0245***		0.00737***		0.0171***
		(0.00213)		(0.00195)		(0.000980)
ZIPURBAN		0.0428***		-0.0591***		0.0163***
		(0.00471)		(0.00432)		(0.00217)
CENREG		0.0156***		-0.0162***		0.000630
		(0.00178)		(0.00163)		(0.000820)
Constant	0.947***	0.899***	0.0123**	0.114***	0.0410***	-0.0131***
	(0.00566)	(0.0104)	(0.00519)	(0.00950)	(0.00260)	(0.00477)
Observations	35,642	35,642	35,642	35,642	35,642	35,642
R-squared	0.032	0.039	0.039	0.047	0.002	0.012

Standard errors in parentheses

Motes:*** p<0.01, ** p<0.05, * p<0.1

Table 1: 2 parents and siblings

3.2 Discussion of the results

In order to better understand the behaviour of households which by intuition will vary greatly the whole data set was splited by 4 subsamples which vary by the number of parents and the availability of siblings. They are 2 parents and siblings, 2 parents and no siblings, 1 parent and siblings, 1 parent and no siblings. From table 1 it may be retrieved that with the increase of income by 1 level, all types of citizens will be less willing to choose homeschooling, will be more favorable towards privates schools. Citizens with the degree equal or higher than school one will decrease the probability of sending their children to public school while, surprisingly, the citizens less than high school degree will increase this probability.

Table 2 is devoted to the families with two parents and no siblings. Here we see the same trends as in the previous table while the significance has fallen a little bit.

Table 3 is connected with the families with 1 parent and siblings. Here we still see that all groups with the increase of income increase their children's participation in private schools, decrease in the public schools, while for these families the increase in income leads to the increase of households which have chosen homeschooling. The basic hypothesis which can not be checked in this data set is that these parents are moms which either have a large government support to sit at home or vice a versa are successful ladies who can afford to find private tutors while working. However, it is still true that in magnitude with the increase of income highly educated people still

	(1) public2	(2) public2	(3) private2	(4) private2	(5) homeschool2	(6) homeschool2
HINCOME	0.00199	0.00269	0.00687	0.00585	-0.00887***	-0.00854***
	(0.00703)	(0.00703)	(0.00662)	(0.00660)	(0.00281)	(0.00281)
interone	-0.0121*	-0.0130**	0.00688	0.00815	0.00521**	0.00484*
	(0.00652)	(0.00652)	(0.00613)	(0.00612)	(0.00260)	(0.00260)
intertwo	-0.0234***	-0.0236***	0.0174***	0.0178***	0.00602**	0.00581**
	(0.00656)	(0.00655)	(0.00617)	(0.00615)	(0.00262)	(0.00262)
ZIPURBAN		0.0520***		-0.0644***		0.0124***
		(0.00987)		(0.00927)		(0.00394)
CENREG		0.0102**		-0.00991***		-0.000338
		(0.00401)		(0.00377)		(0.00160)
Constant	0.938***	0.848***	0.0187	0.124***	0.0431***	0.0283***
	(0.0126)	(0.0208)	(0.0118)	(0.0195)	(0.00501)	(0.00830)
Observations	8,048	8,048	8,048	8,048	8,048	8,048
R-squared	0.029	0.033	0.036	0.043	0.003	0.004

Standard errors in parentheses

Motes: *** p<0.01, ** p<0.05, * p<0.1

Table 2: 2 parents and no siblings

prefer private schools in comparison with the homeschooling.

Table 4 is associated with the families with 1 parent and no siblings. Here the results are qualitatively the same as in the first 2 cases.

Table 5 tries to capture the idea how the maximum difference in the years between this child and all her siblings influences parents' wish to sent them to this or that type of school. It may be seen that the larger the difference between the siblings, the lower is the probability that highly educated citizens will choose public schools, that higher that all groups will choose private schools and the higher that the very top of the educated as citizens as well as educated citizens will choose homeschooling. It may be the case that the larger difference in the age between siblings tells us that their parents are older and wiser and have experience with their elder children so that these highly educated parents want to use all their knowledge and experience for the dearest and nearest.

Finally, table 6 challenges the following question: «How can it be the case that parents choose different types of schools for their children?». Because of the specific characteristics of the data it was only possible to test this on 2012 sample. It can be noticed that the probability to choose the same type of school for siblings decreases with the increase of income for highly educated citizens while not taking into consideration the total number of people in the household. Once we considering this effect the significance for highly educated people decreases while increases for the low educated.

	(1) public3	(2) public3	(3) private3	(4) private3	(5) homeschool3	(6) homeschool3
HINCOME	0.00111	0.00116	0.000654	0.000697	-0.00176	-0.00185*
	(0.00272)	(0.00273)	(0.00253)	(0.00253)	(0.00109)	(0.00110)
interone	-0.0103***	-0.0106***	0.00819***	0.00836***	0.00210**	0.00224**
	(0.00248)	(0.00249)	(0.00230)	(0.00231)	(0.000997)	(0.00100)
intertwo	-0.0186***	-0.0184***	0.0170***	0.0165***	0.00155	0.00187*
	(0.00257)	(0.00258)	(0.00239)	(0.00240)	(0.00103)	(0.00104)
NUMSIBS		0.00387		-0.00826***		0.00438***
		(0.00306)		(0.00284)		(0.00123)
ZIPURBAN		0.0404***		-0.0513***		0.0109***
		(0.00760)		(0.00705)		(0.00306)
CENREG		0.00597**		-0.00727***		0.00130
		(0.00261)		(0.00242)		(0.00105)
Constant	0.959***	0.892***	0.0286***	0.119***	0.0125***	-0.0106**
	(0.00538)	(0.0134)	(0.00500)	(0.0124)	(0.00216)	(0.00539)
Observations	10,285	10,285	10,285	10,285	10,285	10,285
R-squared	0.024	0.027	0.027	0.033	0.000	0.003

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Motes: *** p<0.01, ** p<0.05, * p<0.1

Table 3: 1 parent and siblings

	(1) public4	(2) public4	(3) private4	(4) private4	(5) homeschool4	(6) homeschool4
HINCOME	-0.00264	-0.00245	0.00104	0.000737	0.00160	0.00171
	(0.00485)	(0.00485)	(0.00457)	(0.00457)	(0.00179)	(0.00179)
interone	-0.00524	-0.00549	0.00771*	0.00814*	-0.00247	-0.00265
	(0.00453)	(0.00453)	(0.00428)	(0.00427)	(0.00168)	(0.00168)
intertwo	-0.0198***	-0.0199***	0.0214***	0.0215***	-0.00164	-0.00169
	(0.00461)	(0.00461)	(0.00434)	(0.00434)	(0.00170)	(0.00170)
ZIPURBAN		0.0190*		-0.0294***		0.0103**
		(0.0109)		(0.0103)		(0.00402)
CENREG		0.00350		-0.00704*		0.00355**
		(0.00397)		(0.00374)		(0.00147)
Constant	0.949***	0.918***	0.0367***	0.0885***	0.0148***	-0.00603
	(0.00853)	(0.0187)	(0.00805)	(0.0176)	(0.00316)	(0.00691)
Observations	5,625	5,625	5,625	5,625	5,625	5,625
R-squared	0.033	0.033	0.036	0.038	0.001	0.003

Motes: *** p<0.01, ** p<0.05, * p<0.1

Table 4: 1 parent and no siblings

	(1) public	(2) public	(3) private	(4) private	(5) homeschool	(6) homeschool
max	-0.00234***	-0.00223***	0.000385	0.000198	0.00196***	0.00203***
	(0.000600)	(0.000600)	(0.000550)	(0.000549)	(0.000273)	(0.000273)
HINCOME	0.00119	0.000776	0.00461**	0.00489**	-0.00579***	-0.00567***
	(0.00227)	(0.00227)	(0.00208)	(0.00208)	(0.00104)	(0.00104)
interone	-0.0116***	-0.0115***	0.00607***	0.00627***	0.00549***	0.00522***
	(0.00205)	(0.00205)	(0.00188)	(0.00187)	(0.000933)	(0.000934)
intertwo	-0.0228***	-0.0222***	0.0170***	0.0165***	0.00579***	0.00571***
	(0.00207)	(0.00207)	(0.00190)	(0.00190)	(0.000944)	(0.000945)
CENREG		0.0119***		-0.0129***		0.00102
		(0.00172)		(0.00157)		(0.000784)
ZIPURBAN		0.0380***		-0.0555***		0.0175***
		(0.00459)		(0.00420)		(0.00209)
Constant	0.970***	0.895***	0.0138***	0.113***	0.0159***	-0.00772*
	(0.00577)	(0.00928)	(0.00529)	(0.00850)	(0.00263)	(0.00423)
Observations	34,587	34,587	34,587	34,587	34,587	34,587
R-squared	0.038	0.041	0.043	0.050	0.002	0.004

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Motes: *** p<0.01, ** p<0.05, * p<0.1

Table 5: Maximum difference in years between siblings

	(1) same	(2) same	(3) same	(4) same	(5) same
HINCOME	-0.00187***	0.000677	0.000639	-0.00300***	-0.00297***
	(0.000284)	(0.000968)	(0.000969)	(0.000943)	(0.000944)
interone		-0.00246***	-0.00244***	0.000380	0.000304
		(0.000887)	(0.000890)	(0.000863)	(0.000866)
intertwo		-0.00244***	-0.00240***	0.000651	0.000599
		(0.000889)	(0.000891)	(0.000866)	(0.000868)
CENREG			0.00102		-0.000157
			(0.000791)		(0.000766)
ZIPLOCL			3.31e-05		8.12e-05
			(7.41e-05)		(7.17e-05)
HHTOTALX				0.0212***	0.0212***
				(0.000632)	(0.000633)
Constant	0.0228***	0.0216***	0.0183***	-0.0603***	-0.0618***
	(0.00190)	(0.00203)	(0.00333)	(0.00313)	(0.00401)
Observations	16,802	16,802	16,802	16,802	16,802
R-squared	0.003	0.003	0.003	0.066	0.066

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Motes: *** p<0.01, ** p<0.05, * p<0.1

Table 6: Change of the type of school for another children

4 Conclusion

The paper presents both the theoretical model and the empirical evidence of how parents make their choice between private schooling, private schooling and home-schooling. Overall, it seems that there are two major trends: first, with the increase of income all groups of people independently of their education decrease their willing to choose public schools for children and increase their willing to choose private schools. With homeschooling the picture is not that clear but there is an interesting fact that it is a popular idea among families with 1 parent and no siblings to choose homeschooling with the increase of the income. Moreover, the larger is the difference in age between siblings the higher is the probability to choose homeschooling or private schools for highly educated people. Finally, the probability to choose the same type of school for siblings decreases with the increase of income for highly educated people disregarding the total number of people in the household. Once they have been taken into consideration the significance for highly educated people decreases while increases for the low educated. As the extensions for future research I think of remodelling the situation by not allowing yield to be determined by human capital. Moreover, more research is needed by checking the interesting fact of 1 parent families with a lot siblings which prefer homoschooling: like proxy for obtaining financial support or being a highly successful lady with a high wage.

References

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5 Appendix

$$U_f = logc_f + \sigma logc_m + \delta logn + \gamma logh_i \rightarrow max_{c_f;e_f}$$

$$U_m = logc_m + \sigma logc_f + \delta logn + \gamma logh_i \rightarrow max_{c_m;e_m}$$

s.t.

$$h_i = max\Big(K; K + \beta K_1; B(e_f + e_m)^\theta H_m^{\frac{e_m}{e_m+e_f}} H_f^{\frac{e_f}{e_m+e_f}}\Big);$$

$$t_i + e_i \cdot n = 1;$$

$$K_1 + c_m + c_f = A\Big(t_f \cdot H_f\Big)^\alpha \Big(t_m \cdot H_m\Big)^{1-\alpha}$$

Case 1

Consider $h_i = K$, then $e_i = t_i = K1 = 0$. Hence the budget constraint contracts to $c_m + c_f = A(H_f)^\alpha (H_m)^{1-\alpha}$. Substituting it to the utility function yields the following solution:

$$c_m = \frac{\sigma}{1+\sigma} A(H_f)^\alpha (H_m)^{1-\alpha}$$

$$c_f = \frac{1}{1+\sigma} A(H_f)^\alpha (H_m)^{1-\alpha}$$

Case 2

Consider $h_i = K + \beta K_1$, then $e_i = t_i = 0$. The solution is the same with the difference by constant K_1. Namely,

$$c_m = \frac{\sigma}{1+\sigma} (A(H_f)^\alpha (H_m)^{1-\alpha} - K_1)$$

$$c_f = \frac{1}{1+\sigma} (A(H_f)^\alpha (H_m)^{1-\alpha} - K_1)$$

Case 3:

Consider, $B(e_f + e_m)^\theta H_m^{\frac{e_m}{e_m+e_f}} H_f^{\frac{e_f}{e_m+e_f}}$.

$$U_f = logc_f + \sigma log\Big(A\Big((1-ne_f)\cdot H_f\Big)^\alpha \Big(t_m \cdot H_m\Big)^{1-\alpha} - c_f - K_1\Big) + \delta logn + \gamma log\Big(B(e_f+e_m)^\theta H_m^{\frac{e_m}{e_m+e_f}} H_f^{\frac{e_f}{e_m+e_f}}\Big) \underset{c_f;e_f}{\rightarrow} max$$

$$\frac{\partial U_f}{\partial c_f} = \frac{1}{c_f} - \frac{\sigma}{\Big(A\Big(t_f \cdot H_f\Big)^{\alpha}\Big(t_m \cdot H_m\Big)^{1-\alpha} - c_f - K_1\Big) = 0}$$

$$\frac{\partial U_f}{\partial e_f} = \frac{\gamma\theta}{e_f + e_m} + \frac{\gamma e_m log\Big(\frac{H_f}{H_m}\Big)}{(e_f + e_m)^2} - \frac{\sigma A n H_f (t_m \cdot H_m)^{1-\alpha}\alpha((1-ne_f)H_f)^{\alpha-1}}{\Big(A\Big(t_f \cdot H_f\Big)^{\alpha}\Big(t_m \cdot H_m\Big)^{1-\alpha} - c_f - K_1\Big)} = 0$$

$$U_m = logc_m + \sigma log\Big(A(t_f H_f)^{\alpha}((1-ne_m)H_m)^{1-\alpha} - c_m - K_1\Big) + \delta logn + \gamma log\Big(B(e_f+e_m)^{\theta} H_m^{\frac{e_m}{e_m+e_f}} H_f^{\frac{e_f}{e_m+e_f}}\Big) \underset{c_m;e_m}{\rightarrow} max$$

$$\frac{\partial U_m}{\partial c_m} = \frac{1}{c_m} - \frac{\sigma}{\Big(A(t_f H_f)^{\alpha}((1-ne_m)H_m)^{1-\alpha} - c_m - K_1\Big) = 0}$$

$$\frac{\partial U_m}{\partial e_m} = \frac{\gamma\theta}{e_f + e_m} + \frac{\gamma e_f log\Big(\frac{H_m}{H_f}\Big)}{(e_f + e_m)^2} - \frac{n\sigma H_m (A(t_f H_f)^{\alpha}((1-ne_m)H_m)^{-\alpha}(1-\alpha)}{A\Big(t_f H_f)^{\alpha}((1-ne_m)H_m)^{1-\alpha} - c_m - K_1\Big)} = 0$$

The solution in the general case seems to be tough and I have doubts of its existence (in the general case we had to find the maximum of the utility with solutions from the each case thus restricting the range of possible parameters). Let's make the reasonable simplifying assumption. Namely, $t_m = 1$. So that husband works all the time and the wife spilts her time between home-schooling and job. However, even in this case the taks requires much more specification. One may prove that for $\alpha = 0.5$ the FOC of the woman contracts to the quadratic equation, where the following statements while approaching the infinity are true:

- If human capital approaches infinity by either man or woman, then the time they devoted to their children converges to constant.