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Favored Child? School Choice within the Family ^{*}

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Abstract

We study school choice within the family, analyzing how birth order, gender, innate talent, and family financial restrictions impact the parents' decision to prioritize the education of one or more of the children over the rest. We find that parents, particularly from lower income homes, are more likely to select more prestigious, higher cost schools for their eldest child, male children and the most talented children. This behavior may explain part of the positive "male bias" in learning and may have a relevant impact on income distribution among family members.

Keywords: School Choice, Siblings, Chile.

JEL Classification: C25, D13.

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1 Introduction

Educational decisions can be analyzed within the theoretical framework of human capital, which views education to be an investment influencing productivity and salaries (Schultz, 1960; Becker, 1964; Mincer, 1974). Deciding to be a student, at what intensity to study, and with what level of quality, impacts lifelong salary projections. The decision families make regarding school choice for their children therefore has a lifelong impact.

Human capital theory derives a set of predictions, including that most education occurs when a person is young; that education will decline as the cost of education increases; and that it will drop as the gap between the income levels of people with and without education is reduced.

The theory of human capital suggests that families will make the optimal decision regarding their children's education so as to maximize total income. These decisions may coincide with increasing or reducing the gap in personal income distribution inside the household. The human capital theory competes with theories which suggest discrimination (positive or negative) on behalf of the parents and that these biases may not be related to return on investment. Furthermore, people cannot give their human capital as collateral, so liquidity restrictions may be particularly severe and limit access to education.

This paper analyzes empirically family school choice decisions related to the quality of the schools, using two different measures: academic test scores, and tuition costs. Our objective is to determine school and family factors that make parents differentiate the schooling selected for their children. This topic is important because i) some of the existing literature cast doubts on the parents' ability to select complex aspects related to school quality; ii) the existence of a gender bias in learning favoring males could be explained in part if families favor males, and iii) favoring some children in the family would have a direct impact on earning ability and future personal income distribution.

When evaluating schooling decisions in households with more than one child, it is possible to discern if the household follows a selection process which drives parents to give preferential treatment to specific children so they can attend better

quality schools. If these decisions are based on an economic rationale derived from a distribution of innate abilities, these decisions could accentuate inequities in the distribution of personal income. If this is the case, it is likely that households will create mechanisms for income transfer in the future. These considerations are critically important, and should be considered when creating social policies, for example.

This article is structured in four sections, in addition to this introduction. Section 2 outlines a brief description of Chile's situation, and a discussion of international literature on the topic. Section 3 provides a simple theoretical motivation for the empirical estimations. Section 4 includes a brief discussion of the databases used. Section 5 includes the results and finally Section 6 holds the conclusion.

2 Background

2.1 The Case of Chile

In 1981, Chile implemented an important reform of its educational system, when State run educational schools were transferred to the municipalities. Likewise, the system of financing was modified; it was originally based on historical costs, but it then changed to financing with a subsidy based on student enrollment, and students now having complete freedom of choice as to which school they want to attend (Paredes & Ugarte, 2011). These reforms created an increase in school coverage, but have had little impact on the quality of education.

There are many who have criticized the decentralization process (Muñoz and Raczynski, 2007), who suggests that the process was too limited. On the other side, Beyer (2009) argues that the decentralization was not complete, since the establishments stopped reporting to the central government, but the municipalities were not provided with the necessary capabilities to be able to administer them. Also, in response to the economic crisis which started in 1981, the budget for public education was sharply reduced; between 1982 and 1990, public spending in education fell by 29%.

Prior to 1988, Chile had no system in place to evaluate the quality of education. In that year, the System for the Measurement of Quality of Education, referred to as the SIMCE test, was created and it is still being used. At first, the results of these tests were not publically available, but they began to be published in 1995 (Gomez, Chumacero, and Paredes, 2011).

In 1990, the National Education Law was implemented, establishing minimum wages for teachers and a set of controls for educational entities regarding the transfer and firing of teachers. In 1991, schools with public financing were allowed to complement their State funding with tuition paid by parents. This became an important source of income for private schools, something that drastically reduced the enrollment in public schools (see Paredes and Pinto, 2009). In 2008 there were 11,905 educational establishments, of which 49% were public, 44% were subsidized private school, and 6% were private schools (Educational Statistics 2008, MINEDUC).

As a result, Chile in 2011 has an educational system with the largest coverage of students with vouchers, making the analysis of school choice particularly relevant, as well as offering increased possibilities for empirical analysis.

2.2 School Choice

The literature regarding school choice is closely tied to the idea that competition would impact school management, given that it would drive academic performance in order to capture “clients.” Studies regarding school choice have been focused on counties and cities in the United States (Hastings et al., 2006; Hastings and Weinstein, 2007) and only recently have captured experiences of less developed countries, such as Chile which is particularly relevant due to the coverage of the voucher system (Gertler and Glewwe, 1989 for Peru; Alderman et al. 2001 for Pakistan; Gallego and Hernando, 2008 and Chumacero, Gomez and Paredes, 2011 for Chile).

In the end, the question is about the impact that school choice have on academic performance. In the case of the United States, Hoxby (1994) found that

greater private school competition significantly raised the quality of public schools, as measured by the educational achievement, wages, and high school graduation rates of public school students. Hoxby (2000) finds that areas with greater opportunities for choice among public schools have lower per-pupil spending, lower teacher salaries, and larger classes. The same areas have better average student performance, as measured by students' educational achievement, teachers' wages, and test scores.

Rouse (1998), referring only to Milwaukee, suggested that the Parental Choice Program seems to have had a positive effect on math achievement in attending a private school, but had no benefits for reading scores. Bayer and McMillan (2005) measure competition as an elasticity which represents how a reduction in quality would affect school demand. They find a significantly positive relationship between competition and scores with data of an urban area in the USA (see, Braun-Munzinger, 2005, for a review). With an emphasis on theory, Epple and Romano (1998, 2002) developed a model of competition between private and public schools in a system based on vouchers. They concluded that this system promotes the growth of private schools, increases sorting, and tends to benefit high-ability students.

Regarding the Chilean case, Hsieh and Urquiola (2003) compared changes of rural and urban schools, assuming that competition, measured by the entrance of the new voucher-funded private schools, was less intense in rural than in urban areas. They concluded that the voucher system did not improve school performance and that, in turn, it produced sorting. They also argued that competition may not have had an effect on performance because of the way parents choose schools. Gallego and Hernando (2008) tested the existence of a positive relationship between competition and school performance, and whether this relationship is more important for private voucher schools than for public schools. Using cross-section regressions to explain SIMCE scores with a national competition index measured as the proportion of students in each county who attend private schools, as well as other socioeconomic variables, and he found support for both hypotheses. Auguste and Valenzuela (2004) also found a positive effect of competition on schools' results and concluded that competition increased the sorting of students between public

and private schools, based on students' family income. More recently, Chumacero, Gallegos and Paredes (2011) through a critical review of the literature, proposed a different methodology to define market scope and found a strong impact of competition on the results of private and public schools.

2.3 Literature on family choice

Literature regarding economic decisions within the family started with Becker (1964). Since then, an extensive list of papers has focused on studying how families allocate their efforts and resources among different family members. According to Becker (1982), we can assume that parents are altruistic regarding their children, though theory and evidence show that they do not necessarily allocate the same investment to each of them. This is explained in part by the differences in capabilities and needs of the children, as well as characteristics of the home, or both.

A theoretical model which explains inter-family investments based on economic theory is Horowitz and Wang (2004). The results suggest that parents maximize the total value of the investment in their children's education up to the point where marginal growth in human capital is equal among them. Therefore, the investment could be concentrated in the most capable. Then, after maximizing the combined product, the family redistributes the income among those with more and less education.

In case that there were not transferences among family members once each of the members has received his/her education, then economic theory predicts that parents will equalize the marginal utility of the returns on investment of their children. In this case, the family would exert an "equalizing" or compensating effect for the different abilities, and the children in the household would be equally educated, even when it is inefficient since the most capable will study less. Even when children are equally capable, there are economic reasons that can explain why, under certain circumstances, parents would provide differentiated education for their children. Dahan and Gaviria (1998) developed a model which, as a result of income restrictions, poor parents do not educate all of their children, while rich

parents educate all of them, and middle class parents educate some of them at the expense of all of the other children.

In a society which discriminates by gender, parents may decide to invest more in their male children. Behrman (1988) developed a model to analyze differences in health among children within a family. The model considered that parents will maximize utility subject to budget restrictions and to restrictions associated with a production function reflecting health. He found a pro-male bias, that could reflect a bias toward male children as well as a difference in health care returns favoring male children.

Alisjahbana (1998) also found evidence of biases within the home, favoring male children in the case of student enrollment. This study used information from Indonesia, showing that families are more likely to choose to provide more years of public school education and higher education for their male children. Ejrnaes and Portner (2004), in a similar study, used birth order to analyze differences in parental decisions regarding their children's educational level.

Afridi (2005) analyzed intra-family negotiation processes using data from India, and found that the economic autonomy of the mother had a significant impact on the resulting gap between boys and girls. The mother's level of education also had particular impact on girls' education, versus the impact of the father's educational level.

Khanam (2008) used a multinomial logit model to analyze reasons for only attending school, only working, combining both or doing neither. Controlling for social demographic variables, he found that girls are more likely to attend school than boys, and children who arrive into a family, versus biological children, are more likely to work.

Thomas (1990) developed a model based on Becker (1964) and evaluated the impact of subsidies in the hands of fathers and mothers on the investment in their children, measured by nutritional results. The study found that mothers favored their daughter's nutrition, while fathers favored their sons. Emerson and Portela (2007) used a multiprobit model where the dependent variable was if the child works or not, and studies or not. They found that the educational levels of the fathers and mothers had a measurable impact on the probabilities. Contreras and

Rubalcava (2000) found evidence of specialization by gender regarding nutritional results. They found that mothers provided more resources for their daughters and fathers for their sons, and that in total, the father’s education is less relevant than the mother’s education in explaining the family health situation.

While the literature suggests that there is a bias in the investment of human capital toward male children and the eldest child, there are no studies that have approached the topic of school choice and specifically the choice on quality of school with the context of family decisions. Chile is particularly relevant for a study of this type because, as said above, since 1981 there has been a widespread system of educational *vouchers*. Likewise, the debate regarding income distribution, where Chile is one of the most unequal in the world, has focused on the role of public policy, with little emphasis thus far on decisions at the family level.

3 A simple model

As discussed above, decisions regarding the use of scarce resources within the household depend on the interaction of preferences and technology. In particular, egalitarian or differentiated provision of education to siblings in a household will depend on whether or not inter-personal transfers are likely to occur.

This section presents a simple theoretical model that highlights most of the features of the empirical model presented in Section 5. Although more elements could be added, the model developed here derives the main implications of the relevant literature, and provides explanations for the empirical results found.

Consider a household that has two siblings (denoted by 1 and 2) and that is interested in maximizing the utility function:

$$u(y_1, y_2), \tag{1}$$

where y_i corresponds to the income generated by sibling i , which is determined by:¹

$$y_i = f(a_i, x_i, s_i), \tag{2}$$

¹ The utility function could also depend on the consumption of the parents, but the main results derived will not be affected by ignoring this choice.

where a denotes the level of innate ability, s is the level of expenditure in education, and x is a vector of other characteristics that determine the income. It is assumed that f is increasing in a and s .

The household's budget constraint is given by:

$$m = 2\bar{s} \geq s_1 + s_2, \quad (3)$$

where m is the maximum amount of income that the household intends to spend on education of both siblings, with \bar{s} being the average maximum expenditure on education.

Furthermore, for reasons that will be made apparent briefly, assume that the minimum level of spending on the education each sibling (\underline{s}) must satisfy:

$$s_i \geq \underline{s}, \quad (4)$$

with \underline{s} being non-negative.

The household has to choose the amounts of s_1 and s_2 that maximize (1) subject to (2)-(5).

The first order conditions of the problem lead to:

$$\frac{\partial u}{\partial y_1} \frac{\partial y_1}{\partial e_1} + \lambda_1 = \frac{\partial u}{\partial y_2} \frac{\partial y_2}{\partial e_2} + \lambda_2, \quad (5)$$

where λ_i is the Lagrange multiplier associated with each constraint in (4).

To determine the optimal amounts of education for each sibling and how they are affected by the exogenous variables, one has to impose more structure. The most relevant of which has to do with how households value efficiency versus equality.

First consider the case in which the household values efficiency.² For that purpose, let the utility function be of the form:

$$u(y_1, y_2) = g(z); \quad z = \frac{y_1 + y_2}{2},$$

where g is increasing in z . In this case, households maximize a function of the total income generated by both siblings.

As a stylized example, and to arrive to analytical solutions for the optimal level of expenditures on education, let $g(z) = z$. Furthermore, consider the following functional form for f in (2):

² As stressed above, this does not preclude inter-personal arrangements among household members afterwards.

$$y_i = f(a_i, x_i, s_i) = a_i x_i s_i^\alpha, \quad 0 < \alpha \leq 1.$$

Assuming interior solutions, the optimal levels of expenditure for each sibling are:

$$s_1 = \frac{Am}{A+1}, \quad s_2 = \frac{m}{A+1}, \quad A = \left[\frac{a_2 x_2}{a_1 x_1} \right]^{\frac{1}{\alpha-1}}.$$

Thus, the level of expenditure on a child is increasing in the total income of the household, increasing in its own ability and decreasing in the ability of the sibling. The same holds for the other characteristics (x). That is, if the siblings are (for example) male and female, and the household considers that there is a wage premium for the male, it would “pay” the invest more on the education of the male child. On the other hand, other things equal, as the older child could presumably enter the labor market earlier, if the household has a discount factor that is less than unity, it would privilege the expenditure on the older sibling.

This simple model leads to a linear relationship between expenditure and income (m). However, nonlinearities are easily introduced in this same framework. For example, consider the case in which one of the constraints in (4) is binding. In such case, the household would invest the minimum amount of the education of the sibling that has the lower $a_i x_i$, being independent of m . On the other hand, an upper bound on the level of expenditure of both siblings would also generate the nonlinearity. Needless to say, if preferences were not linear (as presented in this example) and/or the technologies in (2) were different among siblings, a non-monotonic relationship would also arise.

For completeness, consider a polar case in which the household solely cares about the equality of incomes of the siblings and let the utility function could be of the form:

$$u(y_1, y_2) = g(z); \quad z = \frac{(y_1 - y_2)^2}{2},$$

where now g is decreasing in z . In this case, households minimize a function that penalizes the disparities of income among siblings.

Assuming the same technology as before, and letting $g(z) = -z$, it is trivial to verify that now expenditures on one sibling are non-increasing in their ability and increasing on the ability of the other siblings. Thus, the household uses the

education as a means to compensate for lower ability or lower expected earnings due to other characteristics. In this polar example, as the households cares only about inequality it may be optimal to provide the minimum amount of education to the child with higher $a_i x_i$ and spend on education of the other sibling until the incomes are equated.

Although several additions to the model would render it to be more realistic, simple as it is, it provides a clear means to evaluate the determinants of schooling among siblings. If parents care more about efficiency (with inter personal transfers not precluded), they will tend to invest more on the education of the child with more ability and higher expect returns due to other factors. The next sections use a novel data base to evaluate this hypothesis empirically.

4 Data

There has not been an analysis of the interaction of family characteristics, family school choice decisions within the family and school performance. The CASEN database [National Socioeconomic Survey] allowed us to identify decisions regarding the type of school chosen for children, since it identifies siblings. However it does not have information regarding the children's performance on standardized tests. On the other hand, the SIMCE database allowed us to identify performance and household characteristics of each student, but it is not connected to school choice between siblings.

To relate both aspects, we created a database starting with university entrance exams (Spanish acronym PSU) for the years 2004, 2005 and 2006. These databases have the student's national identification number (Spanish acronym RUT) as well as the mother's RUT. Using the three PSU databases, we could identify if two or more children of the same mother took the university entrance exam between the years of 2004 and 2006.

Nearly without exception, students who took the PSU exam in a given year, for example 2006, were in 10th grade two years prior (in the year 2004), and therefore they took the standardized tests during that school year. Using the national ID number, we combined the PSU and SIMCE databases for all students

who were identified as children of the same mother, or “siblings.” More specifically, we combined the information of students who took the PSU exam between 2004 and 2006 with standardized SIMCE test results for students who were in 10th grade between 2001 and 2003, and SIMCE test results taken by 8th grade students in 2000.³

5 Results

As indicated in sections 2 and 3, there are different theoretical models which provide predictions regarding household behavior with respect to school choice for children. These models typically combine assumptions regarding how parents value the future of their children (altruism), with evaluations the parents make regarding the innate “talents” of their children, their ability to transform education into future income (for example through school choice) and the interpersonal arrangements done within the family (for example, the distribution of inheritance or future wealth transferences between siblings). This section includes an empirical estimation of the factors determining school choice in households where there are two siblings.

One important decision in this empirical approach was the choice of the dependent variable which described the parent’s preference associated with school choice. We evaluated multiple options for this variable that can characterize the family’s choice to send siblings to significantly different schools in regards to dimensions which will impact the human capital investment. We considered two dimensions: i) the tuition paid by the parents to the school, and ii) the performance of the school. If a difference in any of these variables favoring one of the siblings exists, it would indicate the family favors him or her.

We find interesting to analyze both variables, since it is possible that tuition may not perfectly correlate with the quality of the school, or at least not the quality that is the goal of public policy. Furthermore, parents may consider

³ Since the student must have taken the PSU in order to link the databases, by design, the database excludes individuals who dropped out of school or finished school but did not take the PSU exam, which could imply under representation of lower income groups, but that doesn’t necessarily skew the results.

performance in their school choice for their children (an explicitly important variable in policy design for vouchers), but they also may take into consideration sports facilities, English instruction, and possibly other factors that are not necessarily a priority for the public policy decision maker. In fact, some of the latter variables that parents may favor could actually have the opposite impact on performance or be directly opposed to the some public policy objectives (ie. social selectivity).

Specifically, we considered that for household i , with two children who took the university entrance exam during the specified period, the variable of interest is defined as:

$$y_i = \begin{cases} 1 & \text{if } |s_i^1 - s_i^2| > \delta \\ 0 & \text{if } |s_i^1 - s_i^2| \leq \delta \end{cases} \quad (6)$$

where s_i^j is tuition or the average SIMCE score of the school where student j , from household i , attends, and δ is the value of the difference between these variables where the schools where each sibling attends are of substantially different quality. Specifically, for each pair of siblings, we arranged the tuition and the SIMCE score associated with the school they attended, so as to always create a non negative difference.⁴ Then, we considered different values for the threshold δ which define the minimum significant difference. This parameter has a conceptual and empirical justification in the absence of statistical controls and switching costs (see Chumacero, Gallegos, and Paredes 2011b). Therefore, we defined a variable where the family chooses or does not choose to send the siblings to schools that are different in terms of the quality.

As discussed above, there are several theories regarding school choice. For example, some of the literature indicates the possible presence of a bias favoring males, where the family prefers that the son attend the best school, which is particularly relevant in cases where there is a binding family budget restriction. When a difference between siblings is detected, it may not be due to an overt bias; it may also be the result of the idea that women have access to other means of

⁴ Of course, if both siblings attend the same school, this variable would take the value of 0, regardless of the person's characteristics.

obtaining future income. To define the impact of the gender of the student who attends the best school, we created a dummy variable Dh , which is valued at 1 when the child attending the best school is a boy.

There are also studies in the literature that indicate the possible existence of a bias toward the eldest son of the household. This would mean that, independently of other characteristics, the eldest son would attend the best school. Therefore, we defined a dummy variable named *Eldest*, which is valued at 1 when the eldest son attends the best school or the most expensive school.

The literature regarding household choice also emphasizes the importance of income. We expect that high incomes families are not restricted in their choice of schools, so it would be feasible that they would not differentiate between children and would send them to similar quality schools. We also used ranges of household income provided by the survey of households of students who took the SIMCE.

The aforementioned variables do not directly involve the relative aptitude of the children. When the capabilities of siblings are different, households face an important decision. For example, households may use school choice as a mechanism to level the potential heterogeneity of future income between siblings. In this case, they would send the less capable child to the best school. On the other hand, if there are inter-personal transferences within the family, additional efficiency would drive a different choice, sending the most capable child to the best school.

The operational definition and measurement of capability is complex, particularly in the absence of information, such as the case we researched. The absolute results on standardized tests present a problem since they not only solely reflect student ability but also the interaction of the innate ability with the contribution of the school for the resulting achievement of the student. Therefore, students with identical abilities who go to different schools will have different results due to the school they attended. A substantially better approximation is to consider the situation of each child in the result of the standardized test (SIMCE) compared with the students in his/her grade. However, the relative position measured by the SIMCE has a problem since it is also influenced by the socio-economical level of the class. Two siblings attending schools with different socio economic background are expected to be in different ranking places. To isolate this

effect, we first estimated the parameters of a traditional school performance equation, with independent variables such as family income, parent's level of education, gender of child (these results are presented in the Appendix). From the residuals, which reflect deviations of the student performance (not explained by social-demographic variables), we built a class ranking more proper to obtain innate capacities. More precisely, the variable we used as relative ability is the ratio between the percentile of the sibling attending the best school and the sibling attending the worst school.

In summary, the model for calculations is defined as:

$$Y_i = f\left(Dh_j, M_j, \frac{PR_j}{PR_k}, I_i\right) + u_i$$

where Y_i is a dummy variable which is valued as 1 when the family has two siblings, and where sibling j , attends a school which is substantially better than sibling k ; Dh_j is a dummy variable which is valued as 1 if sibling j is male. M is a dummy that is valued as 1 if the sibling is the oldest, PR_j/PR_k is the ratio of the relative positions in school of children j and k . I_i is family income and u_i is a measurement error.

Table 1
Descriptive Statistics (H1 favored child)

	H1		H2	
	Mean	Standard Error	Mean	Standard Error
Since	290.2	56.15	284.1	56.65
Payment US\$	121	126,9	66.4	105.6
Ranking*	47.1%	29.0%	45.2%	28.8%
% Male	47.1%		44.5%	
% Eldest	49.9%		41.2%	

* % superior in cohort

Table 1 presents some descriptive statistics, first considering differences in tuition (column 1) and then differences in performance (column 2). The size of the sample varies, depending on the loss of data related to the dependent variables.

Our database includes 8500 households so we counted twice as many children. H1 indicates the school which is more costly or has higher performance, and H2 is the least expensive or with the worst performance. Therefore, H1 is the “most privileged sibling” within the family, and we observe that the “most privileged sibling” has the highest SIMCE score, is ranked better within his grade level and is likely to be male and the eldest child.

The probit model estimates allow us to isolate the impact of each of the variables on the probability that a family chooses to send their children to different schools, with results considering resources spent on school (column 2) and the performance results of standardized tests (column 1) are shown in table 2 .

Table 2
Probability that the Family Favors one Sibling (marginal coefficients)
(Probit model, 1 Differences by type)

Variable	Diference in Simce		Difference in Payment	
Male	0.04	(0.011)	0.224	(0.011)
Eldest	0.454	(0.013)	0.422	(0.014)
Income	0.0006	(0.0003)	0.002	(0.0003)
Income ²	-0.0000027	(0.000001)	-0.0000077	(0.000001)
Relatively most capable	0.0022	(0.00082)	0.0021	(0.0009)
Observations	8,499		8,614	
F (6,8604)	144.7		223.7	
Pseudo R ²	0.07		0.071	

Notes: Standard deviation in parentheses.

These results indicate that whilst the model accounts for a small percentage of the variance, in accordance with the hypothesis from human capital theories all the variables are statistically significant and show the expected sign. Specifically, it is more likely that a male child or the eldest child attends the best school and it is likely that the most “talented” children go to the best schools. We also found that income had a non-linear effect on the probability that a family would favor one of the siblings. The “bias” effect is significant only in the middle income range and

disappears in the higher income range. Finally, it is worthy to note that the two measurements of quality – tuition and performance – show similar results, which suggests that the family’s understanding of quality is consistent with the definition used by decision makers of public policy.

6 Conclusions

We built a database which allowed us to obtain information regarding intra-family decisions with respect to school choice for pairs of siblings. The literature indicates that there are important trade-offs in the decision to invest in the human capital of children, measured as more years of education and nutrition; our results concurred, however they provide some additional information. Decisions regarding school quality, beyond just coverage or years of schooling, are also considered to be an investment in human capital which will impact the ability of individual members to generate income. The results suggest that there are biases which favor the education of males and the eldest child, which is consistent with a view of efficiency. These differences may be explaining at least part of the gender bias in learning. Finally, regarding the effect family choice has on income distribution, we found that families favor the education of the most capable children within the family, which may increase the differences in future income generated by each of the family members.

References

- Afridi, F. (2005) "Intra-household Bargaining, Birth Order and the Gender Gap in Schooling in India", Chapter 3, PhD Thesis, Intra-household Decision-making, Child Welfare and Gender in India:University of Michigan.
- Alderman, H., Orazem, P. & Paterno, E. (2001), "School Quality, School Cost, and the Public/Private School Choices of Low-Income Households in Pakistan", *Journal of Human Resources* 36 (Spring 2001):304-326.
- Auguste, S. & Valenzuela, J. (2004): "Do Students Benefit from School Competition? The Chilean Experience"
- Bayer, P. & McMillan, R. (2005): "Choice and Competition in Local Educational Markets", National Bureau of Economic Research Working Paper No. 11802.
- Becker, G. (1964), "Human Capital: A theoretical and empirical analysis, with special reference to education." National Bureau of Economic Research, New York.
- Becker, G. (1982): "Report of the Commission on Graduate Education." *University of Chicago Record* 16, no. 2 (May 3, 1982): 67-180.
- Behrman, J. R. (1988): "Nutrition, Health, Birth Order and Seasonality: Intrahousehold Allocation Among Children in Rural India," *Journal of Development Economics*, 28(1), 43–62.
- Birdsall, N. (1979): "Siblings and Schooling in Urban Colombia," Unpublished PhD Thesis, Yale University.
- Birdsall, N. (1991): "Birth Order Effects and Time Allocation," in *Research in Population Economics. A Research Annual.*, ed. by T. P. Schultz, vol. 7, pp. 191–213. JAI Press, Greenwich, Conn and London.
- Booth, A. & Joo Kee, H. (2006): "Birth Order Matters: The Effect of Family Size and Birth Order on Educational Attainment", CEPR Discussion Paper

No. 5453, Australian National University - Research School of Social Sciences.

Braun-Munzinger, C. (2005): "Education Vouchers: An International Comparison", Centre for Civil Society Working Paper, CCS: New Delhi, 2005.

Brownstone, D.; Train, K. (1998), "Forecasting New Product Penetration with flexible Substitution Patterns", *Journal of Econometrics*, 28, forthcoming.

Butler, T., Hamnett, C., Ramsden, M. & Webber R. (2007), "The best, the worst and the average: secondary school choice and education performance in East London", *Journal of Education Policy*..

Chumacero, R., J. Gallegos, and R. Paredes (2011): "Entry, Competition and Academic Performance in a Context of Vouchers", Working Paper, Department of Industrial Engineering, Universidad Católica de Chile.

Chumacero, Gomez, and Paredes (2011) "I would walk 500 miles (if paid)", *Economics of Education Review*, accepted.

Contreras, D. and L. Rubalcava (2000): "Does gender and birth order matter when parent specialize in child's nutrition? Evidence from Chile". *Journal of Applied Economics*. Vol. III, N°2.

Dahan, M. and A. Gaviria (1999): "Sibling correlations and social mobility in Latin America", Inter American Development Bank, Working Paper 395.

Ejrnaes, M. and C. Portner (2004): "Birth Order and the Intrahousehold Allocation of Time and Education," *The Review of Economics and Statistics* 86 (4), s. 1008-1019.

Emerson, P. and A. Portela (2007): "Child Labor, School Attendance, and Intrahousehold Gender Bias in Brazil," *The World Bank Economic Review*, Vol. 21, NO. 2, pp. 301-316.

Epple, D. & Romano, R. (1998): "Competition Between Private and Public Schools, Vouchers and Peer-Group Effects", *American Economic Review*, vol 88(1), pág. 33-62

- Epple, D. & Romano, R. (2002): “Educational Vouchers and Cream Skimming”, National Bureau of Economic Research Working Paper No. 9354.
- Gallego, F. & Hernando, A. (2008): “On the Determinants and Implications of School Choice: Semi-Structural Simulations for Chile”, Documento de Trabajo N° 343.
- Gallegos, J., R. Chumacero and R. Paredes (2011), “Switching Costs and School Choice”, Working Paper, Department of Industrial Engineering, Universidad Católica de Chile.
- Gentler, P. & Glewwe, P. (1989): “The Willingness to pay for education in developing countries: Evidence from rural Peru”, World Bank.
- Gomez, D., R. Chumacero, and R. Paredes (2011): “School Choice and Information”, Working Paper, Department of Industrial Engineering, Universidad Católica de Chile.
- Hastings, Justine S., Thomas J. Kane, and Douglas O. Staiger. (2006), “Parental Preferences and School Competition: Evidence from a Public School Choice Program,” National Bureau of Economic Research Working Paper #11805.
- Hastings, J. & Weinstein, J. (2007): “Preferences, Information and Parental Choice Behavior in Public School Choice”, National Bureau of Economic Research Working Paper No. 12995
- Horowitz, A W. and J. Wang (2004). “Favorite son? Specialized child laborers and students in poor LDC households,” *Journal of Development Economics*, Elsevier, vol. 73(2), pages 631-642, April.
- Hoxby, C. (1994): “Does Private Schools Provide Competition for Public Schools” National Bureau of Economic Research Working Paper No. 4979.
- Hoxby, C. (2000), “Does Competition Among Public Schools Benefit Students and Taxpayers?” *American Economic Review* 90 (5): 1209-1238.

- Hsieh, C. and Urquiola M. (2003), "When Schools Compete, How Do They Compete? An Assessment of Chile's Nationwide School Voucher Program," *Working Paper* 10008, NBER.
- Khanam, R. (2008): "Child labour and school attendance: Evidence from Bangladesh", [http://mpra.ub.uni-muenchen.de/6990/MPRA Paper No.6990](http://mpra.ub.uni-muenchen.de/6990/MPRA_Paper_No.6990).
- Mincer, J. (1974), "Schooling, experience and earnings" New York: National Bureau of Economic Research.
- Paredes, R. y J. I. Pinto (2009): "¿El fin de la educación pública en Chile?" *Estudios de Economía*, Vol. 36, N1, June.
- Paredes, R. & G. Ugarte (2011): "Should Students be Allowed to Miss?," *Journal of Educational Research*, 104: 1-8.
- Raczynski, D. & Muñoz, G. (2007): "Reforma Educacional Chilena: El Difícil Equilibrio Entre la Macro y la Micropolítica".
- Rouse, C. (1998): "Private School Vouchers and Student Achievement: An Evaluation of the Milwaukee Parental Choice Program" *Quarterly Journal of Economics*.
- Schultz, T. (1960), "Capital formation by education" *Journal of Political Economy*, Vol. 68, N° 6, 571-583.
- Thomas, D. (1990): "Intra-Household Resource Allocation: An Inferential Approach", *The Journal of Human Resources*, Vol. 25, No. 4. (Autumn), pp. 635-664.

Appendix

Academic Performance (OLS)

	Coefficient	Standard Error
Constant	192.1	.3211232
Income	.0000436	7.53e-07
Income2	-1.27e-11	3.05e-13
Father schooling	1.606174	.0330804
Mother Schooling	2.343936	.0334885
Private School	32.11371	.4693188
Private Subsidized	8.410537	.1952176
R2 0.23; number of observations: 241,796		