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An Economic Explanation of the Effect of Birth Order on Educational Achievement

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Abstract

The relationship between birth order and child's human capital is studied in this paper. A Microeconomic model is designed to analyze the intrahousehold behavior on resource allocation and its outcomes for children. Since adding up a child changes the method of intrahousehold resource allocation, the expenditures of investment in child's human capital has been changed too. The aim of this paper is to investigate the effect of birth order on educational achievement which measured by average of scores and score of math as two measures of educational quality and by years of schooling as a measure of quantity of education. In general, five samples from Tehran are used: the first includes primary students in grade 4 and the second and third samples cover single persons (male and female) who are at least 20 years old. The fourth and fifth samples include married persons (male and female) who are at least 35 years old. According to these data, the regression analysis is used to present evidence and test hypothesis. Results suggest that the increase of birth order reduces both the quantity and quality of children's education in the sense that the latest children have lower level of education than the earliest ones.
Keywords: Family, Child, Birth Order, Human Capital, Education.
JEL Classification: I20, J13.

1. Introduction

In discussions on the trade-off between quantity and quality of children, it is implicitly assumed that all children (within a family) have identical quality. That is, each of children is identically affected by household size and there is no difference between them. But a child as a product of family formation has special discrepancies than any other product in economy and even household which decreases the equal formation possibility of quality.

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The focus of this paper is to investigate the relationship between birth order and quality of children. The idea is that birth order is a determinant of child's human capital accumulation and so its quality.

It is not important in birth order discussions how many children are there in family but the matter is the order of representative child among offsprings. In other words, it is only important that a child belongs to what order regardless the total number of children in the family. For instance, the difference between the first and second children is examined whether the family includes two or five children. Supposedly, all of families within a sample have the same size (number of children). Hence, the relationship between quantity and quality cannot be analyzed because of the same quantity of children. But on the other hand, the birth order of each selected child within sample can be different. Therefore, birth order and number of children are two separate notions. Knowing this consideration helps to the decision making about family size and has prominent implication for couples in determination of quantity of their children.

Since the latest child has been born in a more crowded family than the former child and family's resources per person have been narrowed, the hypothesis is as follows: birth order has negative effect on educational performance of children. Testing this hypothesis in a developing society has important policy implications with respect to demographic policy making. The reason of importance is that Iranian policy makers have recently encouraged families to increase fertility while so many youths are unemployed and general unemployment rate is relatively high.

Some researchers have studied the effects of birth order and represented evidence (Lindert, 1977; Velandia et al., 1978; Hauser and Sewell, 1985; Behrman and Taubman, 1986; Kessler, 1991; Spiker et al., 2001; Zajonc and Sulloway, 2007; Black et al., 2011). Those evidence represent various results which some of them were in contradiction to the others. Current paper can add to the existent evidence, especially that it covers samples including people with different characteristics.

The remainder of paper is as follows. Theoretical literature is viewed in section 2 and then, the model is analyzed in a microeconomic framework in section 3 that is an extension of the

model of Behrman and Taubman (1986). The sample and data are introduced in section 4. Section 5 concludes.

2. Theoretical Literature

Different discussions and reasoning have been proposed to explain the effect of birth order or the position of a child among other children in the family on the abilities of that child. One of explanations in this area is called "confluence model" that is attributed to Zajonc (1976). The main idea of this model is that the mental growth of any member of the family depends on mental ability of all members and the extent of this growth is dependent on family configuration. In general, a child's genius and maturity depends on family climate as a whole. Different family configurations bring about different intellectual environments while the "intellectual environment" can be understood as a function of the average of absolute intellectual levels of all members of family (Zajonc, 1976: 227). Using an example that is shown in table 1, the idea of model can be clearly explained.

It is assumed that the parent's level of mental ability is individually equal to 30 while the recently born child's level is zero. Therefore, at state A in table 1, average of mental ability of the family without child is equal to 30 and at B in which there is a new born child, the average equals 20. After passing time, second child is born with mental ability equal to zero while mental ability of first child reaches to 4 (state C). The average in this situation equals 16, and this is the environment that second child enters to it. Some next years, third child is born and family size increases to five persons (state D). Meanwhile, the first and second child's mental ability increases to 7 and 3 respectively. It is observed that intellectual environment of the family decreases to 14. This is the atmosphere that welcomes third child.

Table 1: Family Configuration and Intellectual Environment in a Hypothetical Family

state	family size	level of mental ability					
		father	mother	1st child	2nd child	3rd child	average
A	2	30	30	——	——	——	30
B	3	30	30	0	——	——	20
C	4	30	30	4	0	——	16
D	5	30	30	7	3	0	14

Table 1 exemplifies what confluence model predicts. Obviously, the greater birth order, the smaller average of family's mental ability and hence, there is a negative relationship between birth order and child's intellectual ability. But this insight is only one fact of issue because the model and relevant example (table 1) implicitly denote that age difference of children is an important determinant in formation of family's intellectual environment. For example, second child in state C would be born so late which first child reaches to the level of mental ability equal to 24. In this situation, the average of family's mental ability would be 21 and this is the environment that second child enters to it. Recent environment is better than state B which first child had entered to it. Accordingly, we cannot necessarily conclude the negative relationship between birth order and mental ability according to confluence model.

Zajonc proposed a psychological explanation according to confluence model but many discussions have been suggested by specialists in other scientific areas. In the following, it is viewed the pros and cons of negative effect of birth order on child's quality.

Proponent reasons of positive effect of birth order on quality accentuate predominantly the economic and noneconomic dimensions. Since adding to quantity of children in the family is time-intensive and realizes during years, needless to say that parents meanwhile augment their experiences in raising the child. They learn somethings from rearing the older siblings which benefit the younger ones (Behrman and Taubman, 1986: S125; Kessler, 1991: 414; Black et al., 2011: 116). Hence, siblings who have higher birth order (younger ones) acquire advantages that increase their quality. Additionally, if earning flow is upward sloping in age, parents would be financially better able to rear children (Kessler, 1991: 415; Collin, 2006: 3) and therefore it

is possible that younger siblings have greater quality. Another reason in favor of better quality of later siblings is that older children serve as teachers of younger siblings and instruct different skills to them while this possibility is weak for older siblings to learn from younger ones (Zajonc, 1976). Some researchers invoke to recent argument to analyze alone children and first or last children independently. The first offspring is deprived to have a brother or sister as a teacher. Consequently, it is possible that the mental ability or educational achievement of the last child to be better than the first one.

By contrast, broader spectrum of reasons exists in favor of negative relationship. The first or maybe the important determinant that affects negatively on later children is age of mother. Birth defects increase with mother's age at birth. Therefore, there is a tendency for later-born sibs to start life with lower genetic endowments (Behrman and Taubman, 1986: S123) and are also more susceptible to birth defects and low-birth weight (Collin, 2006: 4). Evidence confirms this thought. For instance, Laskov et al. (2009) used a sample consisting of 312 women who aged 45 and older, found that the rate of preterm delivery (less than 32 weeks) and very low birth weight (less than 1500g) were very high in study group than the control group 6.4% versus 0.8% and 7% versus 1.1% respectively. These birth defects will affect prospective quality of child. For example, in Down's syndrome, the mental retardation of mongolism results from a chromosomal defect that depends on the age of the mother (Page and Grandon, 1979: 269). Furthermore, aging maternal tissues reduces ability to transfer amino acids through membranes which affects nerve development (ibid: 270). It is also possible that mycoplasmas might negatively influence some kinds of tissues more than others. Since mycoplasmas increase with age, the older woman is subject to more hazards. All in all, higher birth order which is equivalent to higher age of mother, harms later child than older one.

It has been previously explained that younger offsprings face higher income of family. But it is possible that the former children earn family's saving and then, parents invest fewer resources on younger children. Moreover, time endowment also matters. The time spent on a child is an important determinant in extending his/her capabilities and acquiring more education. But the problem is that

time cannot be saved and is not transferable between years. Time-budget studies indicated that time spent per child decreases as number of children increases (Hill and Stafford, 1974; Leibowitz, 1974). By juxtaposing these two considerations, saving and time, it is revealed that there is a weak competition between children with lower birth order on intrafamily resources. That is, older children obtain more resources relatively. Finally, diminishing marginal utility argument implies that parents invest more in their older children (Black et al., 2011: 116). Optimal stopping models suggest that parents continue to have more children until they have a child with poor quality. At which point, parents may opt to discontinue childbearing. This argument says that last-born children will have unpleasant outcomes.

3. Model

Behrman et al. (1982) introduced a primitive model on parents' preference (utility maximization) that contained child's birth order. Maybe, it can be said that their model was the first systematic and economic theorization upon birth order. Later on, Behrman and Taubman (1986) extended former model and specified it on the framework of a one-period problem. They generally considered a sub-set of parents' utility function merely as a function of children's income and then maximized it. The prominent point is that not only in their latter model but also in the former, the endowments of children was initially considered different and then some reasons proposed to indicate that the child who has higher income what birth order he/she has. In latter model of Behrman and Taubman, the initial endowment and educational level of any child determine his/her future income. Inasmuch as initial endowments are not adventitious and are transferred by genes, child's level of education is the only decision variable in model and initial endowments are given.

Currently, it is specified an alternative model that is somewhat more developed than the former model provided by Behrman and Taubman. Our model allowed us to recognize the difference of children's quality with respect to birth order. Accordingly, current analysis follows an approach in reverse direction of previous models.

Parents' utility function includes their consumption on two periods. The first is consumption in period of being young (C_y) which is the

first period of life that parents earn labor income and other income resources (y). The latter is consumption in old age (C_o) which is financed by income of children who have grown up and are income earners. In other words, it is assumed that there is no formal social security but there is an intrafamily intergenerational social security system whereat children finance their retired and elderly parents. Following functions explain these behaviors:

$$U = U(C_y, C_o) \quad (1)$$

$$C_o = C_o(I_1,...,I_n) \quad (2)$$

where n is the total quantity of children in the family and I_k is the income of k's child (when he/she is income earner). Since parents' consumption in first period does not enter to the discussion, the problem is specified as follows:

$$\max.\ U = U(I_1,...,I_n) \quad (3)$$

$$s.t.\ I_k = I_k(Q_k), \qquad I'_k \rangle \cdot \quad (4)$$

$$Q_k = Q_k(S_k, E_k) \quad (5)$$

$$\sum_{k=1}^{n} p_k^s S_k + C_o \le I_y + \sum_{k=1}^{n} v_k^s S_k \quad (6)$$

where p_k^s is the gross price of education for k's child. This is an index for prices of all educational services and goods purchased by parents. v_k^s is a coefficient for the importance of k's child education in view point of parents. Considering this coefficient is another different of current model to that of Behrman and Taubman.

It is fairly needed to explain constraints of model. Equation (4) is influenced by human capital theory and indicates that child's quality determine his/her future earnings. Equation (5) refers to production of quality in the sense that child's education and endowment are determinants of his/her quality. Inequality (6) elucidates the total income and expenditure of parents. The left hand side of (6) is the total expenditures of parents spend for investment in children's quality in period 1 (when parents are young) and for their own consumption

in old age. The right hand side of (6) comprises the principal part of parents' total lifetime income. It is shown that the product of children's education by v defines a part of parents' income. The reason is referred to determining parents' consumption in old age. In other words, the expenditures that parents spend on quality of their children will provide the consumption of them in old age because the parents' expenditures on quality of children in young age (first period) are typically an investment which its gaining returns to parents at the end of life. Accordingly, Lagrangian function is specified as follows:

$$L = U(I_1,...,I_n) + \lambda\left[I_y - C_o - \sum_k \left(p_k^s - v_k^s \right) S_k \right]$$

Differentiating this function with respect to S_i and S_j by Kuhn-Tucker method yields the following first order conditions:

$$\frac{\partial L}{\partial S_i} = \frac{\partial U}{\partial I_i} \cdot \frac{\partial I_i}{\partial Q_i} \cdot \frac{\partial Q_i}{\partial S_i} - \lambda\left(p_i^s - v_i^s\right) \leq 0 \qquad (7)$$

$$\frac{\partial L}{\partial S_j} = \frac{\partial U}{\partial I_j} \cdot \frac{\partial I_j}{\partial Q_j} \cdot \frac{\partial Q_j}{\partial S_j} - \lambda\left(p_j^s - v_j^s\right) \leq 0 \qquad (8)$$

According to (7) and (8), equilibrium condition arises as follows:

$$\frac{\frac{\partial U}{\partial I_i} \cdot \frac{\partial I_i}{\partial Q_i} \cdot \frac{\partial Q_i}{\partial S_i}}{\frac{\partial U}{\partial I_j} \cdot \frac{\partial I_j}{\partial Q_j} \cdot \frac{\partial Q_j}{\partial S_j}} = \frac{\rho_i^s}{\rho_j^s}, \qquad \rho^s = p^s - v^s \qquad (9)$$

In equation (9), ρ^s is the net price of education that is the importance of child's education influences the price of education. For instance, the increase of parents' knowledge about child's education (greater v^s) reduces the net price of education in view point of parents.

It is useful to note that the left hand of equation (9) is the educational marginal rate of substitution of child i and j while the right hand is the marginal rate of transformation.

In this model, indeed, there are two inputs such as education and intrinsic endowment which produce two outputs: the quality of i^{th} child (Q_i) and the quality of j^{th} child (Q_j) such that $i \leq j$. The state $i = j$ relates to twins who are the same birth order. Transferring Pareto efficient points from production of quality to framework of children's quality (Q_i and Q_j) yields the production possibility curve of quality. Since parents' utility is a function of their children's income and child's income also depends to quality, hence parent's indifference curve is depicted in space of children's quality.[1] These two curves can be shown in figure 1.

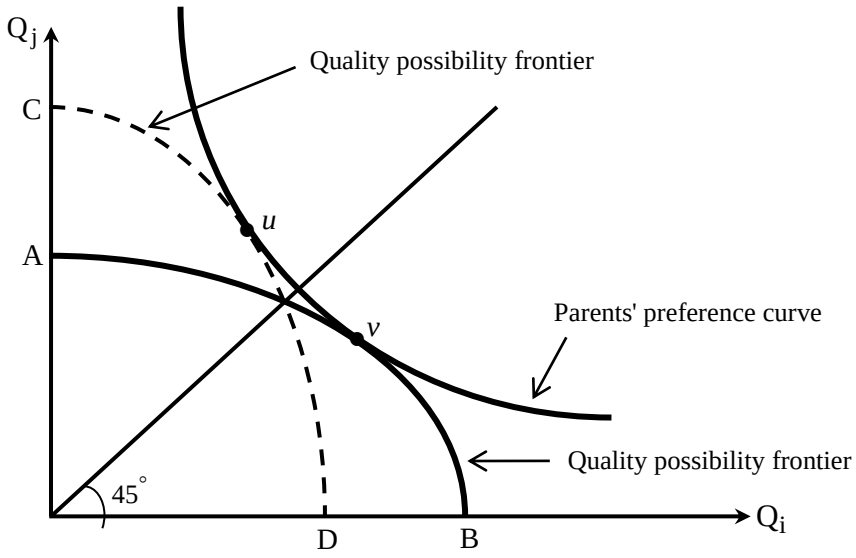

Figure 1: Intrahousehold Resource Allocation, Birth Order and Child's Quality

Above parents' indifference curve is quite symmetric to both axes which demonstrates the similar preferences of parents to their children with different birth order. In other words, parents have no discrimination with respect to children. We can now depict a comparative static analysis for the effect of birth order whereon there

[1]. It is noted that the parent's indifference curve emerges when the family has more than one child.

is supposedly a wholly symmetric quality possibility curve which of course has not illustrated in figure 1.

An imaginable case of parents' decision making is hypothetically that because of inflationary circumstances, the gross price of education increases. Because adding to the number of children is realized in the length of time, when parents purchase education for child with higher birth order (j^{th} child), they confront higher price ($p_j^s > p_i^s$) while all other things (such as earning and importance of education in parents' viewpoint) being equal. That is, the ratio of prices at the right of equation (9) declines which this means the education for j^{th} child is more expensive than i^{th} child. The outcome is the less purchasing education for j^{th} than i^{th} child, as demand theory predicts. Accordingly, the accumulation of human capital and quality for j^{th} child would be less than i^{th} child and the marginal utility of prospective earning for j^{th} child would be greater than i^{th} child ultimately. Then, the left hand of equation (9) falls and equilibrium returns once again. These changes lead to point *v* in figure 1 because equilibrium on indifference curve would be on such point that has absolutely smaller slope. To do this, the production possibility curve of quality would be like AB because the slope of this curve is (absolutely) less than a symmetric one at any point. This is equivalence to reduction of MRT. It is observed that in this situation, the quality of child with higher birth order would be less than the child with lower order.

The different quality of children who have various birth orders does not necessarily depend to the change of gross price of education. For instance, it is possible that gross price of education to be fixed but parents give more attention to the education of the child with higher birth order because they have experienced child-rearing. This is a case of learning by doing and refers to the increase of v_j^s in equation (9) that causes the net price of child j's education to be less than child i. Therefore, the right hand of (9) increases that its outcome is more (or better) education (or quality) of j^{th} than i^{th} child. This is considered by curve CD and point *u* in figure 1.

Another case of parents' decision making is presentable without children. That is, no child has been born as yet and couple on the allocation of resources between their prospective children. If couple

suppose that their two children would simultaneously born -that is, children would be twins-, they expect that their children would fall in equal situations of family and economy and then, would face to the same prices of quality inputs. As a result, the right hand of equation (9) would be equal to unity. Consequently, maximization of parents' utility would be realized in such a point that two children (twins) have the same quality.

By contrast, it is possible that two offsprings to be born over a span of some years. Now, couple anticipate that owing to inflationary conditions, they would confront higher prices of quality inputs (education) to invest on the child with higher birth order (child j), whereupon the right hand of equation (9) decreases. A couple, who wants to maximize utility, decides such that the result is reaching to point *v* in figure 1. The outcome of this decision making about the allocation of resources between two offsprings is the less quality of the child with higher birth order than to the child with lower birth order.

4. Samples and Results

To test hypothesis, five samples are used which all of them are restricted to Tehran- the capital, the biggest and the most crowded city of Iran. The first sample includes 1294 students in grade 4 who study in public primary schools. Since the scores of these students are quantitative but not qualitative, we have chosen them as a sample. Additionally, two other samples consist of single persons who are at least 20 years old. The former includes 414 single boys and the latter comprises 410 single girls. In addition to these, two other samples contain 415 married men and 409 married women who are at least 35 years old. Data have been gathered only by questionnaire in 2011. The scope of empirical study is all districts of Tehran. Accordingly, the empirical model is specified as follows:

$$EDU = C + \alpha(\overrightarrow{BO}) + \beta(\overrightarrow{CH}) + \gamma(\vec{D}) + \varepsilon \qquad (10)$$

In equation (10), EDU is education as a dependent variable, BO is symbol of birth order, CH is a vector of variables which are relevant to birth order but differ from it. In addition, D is a vector of some independent variables that reflect the socio-economic circumstances

of family or child. In other words, vector D contains the control variables. C and ε are constant and error terms respectively.

Table 2: Birth Order and Educational Quality of Child. Dependent Variable is Average of Scores

	Regressions					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)†
Birth order	-0.2* (4.8)	-0.06*** (1.6)	-0.14* (3.2)			
Alone child				0.38** (2.3)	0.19 (1.2)	0.37** (2.02)
First child				0.39** (2.5)	0.21 (1.3)	0.35***(1.8)
Last child				0.17 (1.04)	0.14 (0.8)	0.23 (1.2)
Alive father		0.36* (2.7)	0.17 (1.04)		0.38* (2.8)	0.2 (1.1)
Dead father		-0.56* (2.8)	-0.74** (2.1)		-0.56* (2.8)	-0.77** (2.4)
Gender		-0.005 (0.08)	0.05 (0.7)		-0.002 (0.03)	0.05 (0.7)
Parents' education		0.04* (7.9)			0.03* (8.02)	
Employment of mother (hours)		-0.001 (1.2)	-0.001 (0.8)		-0.001 (1.2)	-0.001 (0.7)
Breastfeeding			0.008*** (1.85)			0.007*** (1.7)
Family income			0.0002* (4.8)			0.0002* (4.8)
Constant	19.7* (289.2)	18.3* (88.1)	19.1* (86.8)	19.09* (126.1)	18.01* (76.5)	18.6* (75.1)
R^2	0.027	0.177	0.079	0.015	0.176	0.073
Number of observations	1187	1156	927	1179	1149	924

Note: Numbers in parentheses at the right of coefficients are the absolute value of *t* ratios. *,** and *** indicate the statistically significant at 1%, 5% and 10% respectively. †: regression is estimated by standardized variance-covariance matrix with White method.

Table 3: Birth Order and Educational Quality of Child. Dependent Variable is Score of Math

	Regressions					
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Birth order	-0.38* (4.8)	0.003 (0.04)	-0.21** (2.3)			
Alone child				0.47*** (1.8)	-0.12 (0.4)	0.28 (1.02)
First child				0.47** (1.96)	-0.12 (0.4)	0.23 (0.91)
Last child				0.05 (0.2)	-0.02 (0.1)	0.14 (0.5)
Alive father		0.73* (2.8)	0.25 (0.8)		0.74* (2.8)	0.28 (0.9)
Dead father		-1.4* (2.9)	-2.2* (2.8)		-1.4* (2.9)	-2.3* (2.9)
Age of mother		-0.02 (1.6)	-0.01 (0.8)		-0.031** (2.02)	-0.03*** (1.6)
Employment of mother (years)		0.01 (1.1)	0.02* (2.8)		0.01 (1.3)	0.03* (3.1)
Parents' education		0.08* (7.4)			0.081* (7.5)	
Breastfeeding			0.02* (3.1)			0.025* (3.1)
Family income			0.0004* (3.5)			0.0004* (3.7)
Constant	19.2* (146.7)	17* (27.2)	18.5* (29.4)	18.3* (82.6)	17.3* (24.3)	18.5* (24.8)
R^2	0.023	0.189	0.099	0.009	0.188	0.096
Number of observations	1193	1164	932	1185	1157	929

Note: Numbers in parentheses at the right of coefficients are the absolute value of *t* ratios. *,** and *** indicate the statistically significant at 1%, 5% and 10% respectively.

Table 4: Birth Order and Education Level of Adults. Dependent Variable is Years of Schooling

	Single persons (at least 20 years old)				Married persons (at least 35 years old)				
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Birth order	-0.158**	-0.196*	-0.17*	-0.14**	-0.04	-0.04	0.16**	0.162**	0.12
	(2.2)	(2.7)	(2.7)	(2.25)	(0.54)	(0.55)	(1.96)	(2.001)	(1.5)
Age		0.121*	0.103*	0.11*		-0.14*	-0.089*	-0.093*	-0.092*
		(4.9)	(4.3)	(4.6)		(6.01)	(4.3)	(4.5)	(4.9)
Parents' education							0.265*	0.266*	0.235*
							(14.3)	(14.2)	(12.8)
Gender			-1.68*	-1.52*				0.77**	1.18*
			(7.8)	(7.3)				(2.12)	(3.3)
Middle class				-0.64*					-0.59
				(3.1)					(1.09)
Lower class				-1.84*					-3.02*
				(4.8)					(4.8)
Constant	14.8*	12.07*	13.3*	13.6*	12*	18.9*	13.3*	13.1*	14.3*
	(75.1)	(20.9)	(24.01)	(23.1)	(33.5)	(16.4)	(12.9)	(12.5)	(13.04)
R^2	0.011	0.052	0.166	0.198	0.0003	0.083	0.308	0.314	0.358
Number of observations	817	814	814	814	817	817	807	807	807

Note: Numbers in parentheses at the beneath coefficients are the absolute value of *t* ratios. *,** and *** indicate the statistically significant at 1%, 5% and 10% respectively.

All aforesaid samples are used to estimate the effect of birth order on educational quality and quantity with regard to equation (10). At first, we utilize the average of scores and score of math as two measure of pupils' educational quality for dependent variables in tables 2 and 3. Then, table 4 presents estimated regressions by using total sample of single and married persons separately which contain years of schooling as a measure of educational quantity for dependent variable. The reason of adopting this tack is that since a person at lower ages has not completed schooling yet, it is suitable to consider the educational quality but at higher ages, quantity of education can be a better measure for capturing educational performance.

To reach the consistent and efficient estimations, the standardized variance-covariance matrix is used in Newey-West method because data are cross-section and therefore, heteroscedasticity would be a principle not an exception.

In addition to birth order and some relevant variables, other explanatory variables are also placed in regression equations. These variables such as: father's circumstances, parents' education, and physiological and nutritional factors like gender and breastfeeding, are extracted from relevant studies which elucidate those socioeconomic situations of family that affect educational performance of children.

Alive father and dead father are two dummy variables. If father lives with his family, the first mentioned variable is equal to one and otherwise is zero. If father is dead, the second variable equals to one and otherwise is zero. Gender is also a dummy variable where is equal to one (zero) if the child to be male (female). Parents' education is measured by the sum of schooling years of father and mother. Maternal employment is measured in two ways: once as hours of work in week and years of employment as well. Family income is the sum of monthly earnings of parents and family's other sources of income such as rent. Breastfeeding that is a (possible) determinant of child's mental ability is computed on the basis of months that child had nourished by mother's milk. Since the quantity of education is used in studying adults' educational performance and, moreover, family background can be an important determinant, we can apply class status of family in studying educational achievement. To consider this, three socioeconomic classes are taken into account as dummy

variables that are as follows: upper class, middle class and lower class. The criterion in determining class status is own persons' subjective intuition with respect to their socioeconomic position. If a person belongs to a certain class, the variable would be equal to one and otherwise would be zero.

In order to consider the effect of birth order on quality accurately, three dummy variables are also used in addition to birth order variable that record children's position as alone child, first child and last child. If a child is alone, the relevant variable would be equal to one and otherwise would be zero. If family has more than one child, then the relevant variable would be equal to one if the considered child is the first and otherwise equals to zero. In this case, if the considered child is the last, unity is given to the last child variable and otherwise zero. This procedure is followed up in tables 2 and 3.

The resulted evidence from regressions in tables 2 and 3 indicates that birth order has negative and statistically significant effect on average of scores and math score of students. Furthermore, the positive effect of single and first child confirms implicitly the negative effect of birth order. This means that first child has better educational performance in comparison to children with higher birth order.

The coefficients of father's status show that existence of father in the family enhances the educational quality and the death of father has an opposite effect. Gender is not a determinant of educational quality, so has not exerted as an independent variable in table 3. Age of mother reveals the negative effect only on math score which implies the correctness of the idea says that pregnancy in higher ages has unfavorable outcomes for child. Employment of mother is another variable that refers to mother's characteristics. This variable has not significant impact on average of scores (table 2) but shows the positive and significant effect on math score in some regressions of table 3. The reason is likely that math score reflects child's intelligence and employed women, however, benefit proper educational talent which this feature has been transferred by inheritance to child. The positive effect of breastfeeding reveals that mother's milk helps to improvement of educational quality of a child.

Schooling of parents is a seminal factor of child's educational quality because it shows highly positive and significant effect in tables 2 and 3. This confirms that parents who have higher schooling attach more importance to their children's education and this attention is reflected in greater math and average score.

Income is the last variable that is considered. The coefficient of family income is positive and significant in regressions (3) and (6) of tables 2 and 3, even though is small and negligible. This means that a rich family affords to provide educational requirements and thereby improves educational performance of child.

Researchers have been mainly focused on influencing birth order and family circumstances as a whole on educational outcomes between young children –that is, in the early stage of life– because young children have not independency in decision-making and hence, reflect family environment better. However, evidence from adult persons is not worthless. Therefore, the results of the effect of birth order for at least 20 years old single persons (who are generally youths) and at least 35 years old married persons are reported in table 4 where dependent variable is years of schooling. The coefficients of birth order are negative and statistically significant in regressions (1) to (4) which evidently indicate that the negative impact of birth order on education is sighted even among youths. But when age group goes up (at least 35 years old persons), it is observed that the statistically significant coefficients in regressions (3) and (4) of table 4 have positive signs. The reason is likely that behaviors or decision-making structure within households in last decades have been different those in today. However, the positive effect of birth order in old cohorts cannot reject our hypothesis because adult individuals have independency in their life and live far from their parental family and themselves can determine their educational quality. In spite of this, the positive effect of birth order is disappeared in more complete regression (5).

Age shows different effect between persons who are at least 20 years old and those at least 35 years old. This variable has positive (negative) effect on years of schooling for youths (adults). This finding indicates that schooling has risen to higher levels for the duration of time. That is, youths of the present time tend to more

schooling than previously. Parents' education has positive effect on quantity of education too. In other words, ones who their parents have more schooling, they themselves also embark upon higher levels of schooling.

Though the effect of gender on quality is not statistically significant, its impact on quantity of education is significant. The coefficients of gender in regressions (3) and (4) of table 4 are negative but in regressions (8) and (9) are positive. This shows that girls have higher level of schooling than boys but adult males have experienced education more than females. This implies that gender composition in schooling has been changed in last years. Finally, variables of class status reveal that youth persons who belong to upper class have higher levels of schooling and members of middle and lower classes are farther down (see regression (4) in table 4). Regression (9) shows that only lower class members have lower schooling than other two classes. This confirms that belonging to better socioeconomic circumstances leads to higher levels of education, other things being equal.

5. Conclusion

Development of family economics in some decades has been shown that economics is able to explain intrahousehold behaviors including fertility and other issues related to it. Afterward that some literatures in relation to the effect of family size on children's quality-measured by children's human capital stock- appeared in economic texts, more scrutinizing in this area furthered the existent knowledge. Early arguments discussed that adding up children to the members of a family affects children's quality equally so that an increase of the number of offsprings lowers the quality level of them.

It has been evident that not only the increase of family size decreases the accumulated human capital of all children in a family but also recent (younger) offsprings would have lower quality than preceded (older) ones. In other words, it is expected that first child would be better educated than second child, and in the same way, the second one by comparison to the third, etc. This fact is originated from the pattern of intrahousehold resource allocation which makes

decision-making on family size more sensitive. Findings of current paper indicate that the increase of household size in a developing society where has not reached to high level of education, would not be costless but some costs appear as human capital deficiency of children. This adverse outcome does not help to realization of development goals. It is better that population to be located in more families which have small sizes. Therefore, marriage must be more widespread but the number of children in any family should be more limited.

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