“The dynamics of the schooling dropout in Peru: a framework using duration models”

Pablo Lavado       José Gallegos

\footnote{We thank the magnificent assistance in the development of this project from Alejandro Ortiz de Zevallos. Likewise, we thank the commentaries from Lorena Alcázar, Luis Crouch and Santiago Cueto, as well as of the participants of the Session “Family Schooling Decisions” in the Annual Conference 2005 of the RES (Royal Economic Society) carried out in the University of Nottingham in England and the Workshop of Discussion in the Research Center of the Universidad del Pacífico. Version prepared for the Annual Conference of the Latin American and Caribbean Economic Association (LACEA) 2005.}
Abstract

Despite the fact that in Peru was observed an improvement in enrollment during the nineties, even performing better than the rest of the Latin American countries, dropout and schooling delay persist avoiding a substantial increase in the society’s education level. This research analyzes the dynamics of dropout during the school cycle and, at the same time, characterizes those children that are more prone to leave the school. The results show that economic constraints, mainly in the rural zones and for the urban boys, and non-economic problems, basically in the case of urban girls, are the main determinants of the interruption of the education. Likewise, simulation of a cash transfer program was performed. The results induce to think that the program would have an effect over the dropout, reducing it between 14% and 36%. Finally, if the program is supported by the reduction of the first year school delay, the dropout rate will diminish between 50% and 78%.
I. Introduction

During the nineties, the gross enrollment rates in Peru increased as a consequence of the universalization of the education, process that began in the eighties. Likewise, the greater economic stability brought increases in the household income, recovery of the education public budget, and a supply shock characterized basically by the construction of numerous public schools, factors that helped to consolidate the greatest school attendance. Nevertheless, in contrast to the positive performance shown by the mentioned indicators, even though Peru did better than its Latin American peers, the repetition rates and the school dropout did not follow the same path. On one hand, the greater educative supply was not accompanied by its quality. A sample of it is that Peru was relegated to the last places of Latin America according to the latest PISA exam. On the other hand, the requirements and credit restrictions of the poorest families induce parents to withdraw their children from school in order to help supporting household economy.

In this context, since literature about school achievement exists, by exploring supply and demand aspects, the present study pretends to focus its effort on the analysis of the school dropout in Peru, understanding it as an optimization process of the parents.

---


7 Peru obtained the last place in the International Student Evaluation Program promoted by the OECD, where the 80% of the students was qualified with less than 1 (the worst level). OECD and UNESCO (2003). Literacy skills for the World of tomorrow. Further results from PISA 2000.


subject to the existing economic restrictions in the environment where they perform. Even when the performance, the repetition, the delay, and the dropout are narrowly related phenomena, dropout dynamics has been little studied in Peru. If the fact of students staying at school, independently from their performance, the fact that some children truncate their education in a certain moment of their scholastic life and never return should take more attention than those who finish it.

The situation is aggravated when considering that the children that require more education are the most prone to leave school. That is, those who come from families with a low productivity, as a result of a low educational level, present economic and credit constraints impeding them staying in the school and, as consequence, developing some kind of intergenerational transmission of restrictions and exclusion (See Figure No. 1)

Figure No. 1. Cumulative Distribution of the dropouts by their parents Education Level

![Cumulative Distribution of the dropouts by their parents Education Level](image-url)


---

13 This doesn’t mean that policies against dropout in detriment of the quality or the students’ performance would be privileged. On the contrary, what is sought is to compare the attention in the first and in the lasts.
15 Castañeda, T. and E. Aldaz-Carrol (1999). The intergenerational transmission of poverty: some causes and policy implications. Inter-American Development Bank, Washington, D.C. Likewise, in a study by the INEI (2000b), validation hypothesis tests stand that children in school age who belong to low income families reproduce the poverty conditions in which their parents live generating a vicious circle, determined by their low educative level and the low home income.
According to the Department of Education, the net subscriptions rates for 2003 were 93% and 70% for primary and secondary education, respectively. Likewise, 3.9% of students’ dropout from primary, the 6.8% in secondary and only the 24% returns the next year. Approximately, the 80% of the dropouts belong to homes whose parents reached as a maximum level the complete primary education.

However, the economic restriction is one of the most recognized factors that determine a child to leave school. That event obliges the children to work since younger ages with the objective of supporting their family. The decision taken by the parents about removing their children from school with the objective of making them to generate income is based on their conception of education as a substitute of work or present income.

According to the information extracted from the National Household Survey (2002), the dropout rate reaches the 6.6% of the children between 5 and 17 years old. Also, the survival rate of the scholar system is of 80%, where the 20% are the children who leave school at any time of their school life. It can be observed that from 100 children that register in first grade, 96 of them completes until the sixth grade of education. The pass through the secondary education is more dramatic, since from the 96 that completed the primary school, 80 complete the secondary.

The main objective of the present study is to characterize those students who are more prone to dropout. Likewise, it would be important to identify supply and demand factors that affect the decision of leaving the school for, based on those results, raise policy recommendations. The previous stops being trivial given that up to now the educational policies have paid greater attention to supply aspects (although only in the provision of schools, uniforms, books, aliments, among others), but not in the quality nor in the demand aspects, like the opportunity costs faced by the families.

Thus, the present document is organized in the following way in order to comply with the main objective. The second section presents the literature review and the studies about dropout in the national and international context. The third section an overview about the dropout in Latin America is presented. Then, in the fourth section the theoretical framework and the methodology that will be used for the estimation are presented. It is assumed that the parents subscribe their children based on a benefit-cost analysis. This sequential decision model would allow us to determine the dropout probability of a child given the grade that it is coursing. The fifth section shows the estimations’ results, not only at the country level, but also taking into account the gender and the area of residence. Then, based on the constructed model, the effect of the conditional cash transfer program (called JUNTOS) that the Peruvian Government is being implemented is simulated. Finally, in the seventh section the conclusions and policy recommendations are presented.

17 Calculated by the authors using the National Household Survey2002 of the National Institute of Statistics and Data Processing.
18 Ibid.
20 Becker (1965) and Rosenzweig y Evenson (1977) op. cit.
21 Decreto Supremo No. 032-2005-PCM. Creation of the National Direct Support to the Most Needed.
II. Literature Review

The literature about the school dropout presents two similar discussions, which differentiate the analysis in each study. The first one refers to the definition of dropout. Distinct conceptions have been found in the literature review without reaching a consensus that satisfies everyone.22

A first definition found is the stated by Bachean, Green and Wirtanen (1971).23 Those authors point that the dropouts are originated by those students who interrupted their attendance to school for several weeks due to different reasons, without considering sickness among those causes. Morrow (1986) makes the definition more rigorous: considers dropout as an event that occurs when the student who was previously subscripted at school, leaves it for an extended period of time and do not register in another school.24 However, those students who were ill or passed away were excluded. Nonetheless, this definition presents a problem because of the lack of objectivity in defining the period of absence, therefore, it becomes arbitrary and subjective.

On the other hand, Fitzpatrick and Yoels (1982) raised a gross definition for dropout. According to those authors, the dropout occurs when students leave school without graduating, independently if they return or receive an equivalent diploma.25 Such conception has static characteristics since it does not contemplate the option of returning to school. Likewise, the fact that a student chooses another diploma, maybe not a humanistic or a scientific one which are the ones that predominates in school, but for a more technical preparation is debatable.

Then, Franklin and Kochan (2000) narrow the concept. They identify a dropout as a student who: registered in some moment of the previous year and did not register at the beginning of the current year, without concluding its preparation and without being transferred to another school.26 Like Morrow, they excluded those who were suspended, ill or passed away. This definition considers a school year as the period of time that has to be considered to indicate that a student is a dropout. This conception is coherent with the idea of a mandatory and sequential uninterrupted education. Bun (2002) described dropout in a similar way but in addition he accepts, as a formal way of education and a substitute of school, the tutorial system taught by the parents or privates.27

The present study will consider as dropouts those people who having attended to school during the previous year, are not enrolled in the current year, excluding those who are not attending because they have completed the secondary studies, are studying in a pre tertiary school, are sick or had an accident, or are in active duty. However, the limitation of this focus is that it does not consider that a dropout can return to school later.

The second aspect related to the dropout research, and that at the same time differentiates the studies, is the applied methodology. Just as it happens with each correlation, the models used would depend on the topic of the study, its objectives and the development of the sciences on which the analysis is being done. Therefore, the most common techniques used for the estimations are ordinary least squares and the binary models, as well as duration models (parametric and non-parametric).

Fobih (1987) gave a first approximation. He applied a chi square analysis with the purpose of testing the unequal proportion of dropouts between men and women in Ghana.\textsuperscript{28} According to his results, there was no significant difference by gender that makes some more susceptible to dropout than the others. However, household situation, economic and non-economic, was the most correlated with the school dropout.

On the other hand, Hill (1979) used ordinary least squares and generalized least squares to calculate the factors by which the individuals of different racial condition between 16 and 19 years dropout.\textsuperscript{29} The factors by which the estimation was controlled were the socioeconomic condition of the student, the ability of the school to generate benefits, the quality of the school and the knowledge that the students have about the labor market. One of the most important results that the author found was that while the parents had a higher education level, the dropout probability was lower. Like Hill, Fitzpatrick and Yoels (1992) used ordinary least squares to analyze the effects of the state policy over the structure of the school and the State dropout rate.\textsuperscript{30} The main variables considered were the total expenditure by student, the frequency of the attendance to school and the family socioeconomic structure. The main finding was that the schools which receive more resources are the ones that present lower dropout rates.

Another method used to identify the determinants of the dropout is the analysis through estimations of dependent binary variables. This methodology was applied by Alexander, Entwisle and Horsey (1997). The main factors found by the study that showed a significantly positive relation with dropout were: emotional changes within the family, attitude of the parents, performance at school and behavior of the children.\textsuperscript{31} In the same way, Ensminger and Slusarcick (1992) estimated the probability of dropout of

A separate regression by gender was estimated and the authors found that for both males and females the performance at school, the aggressive conduct of the child (because helps with confrontations, which counter rests a poor academic performance) and the family socioeconomic context are important factors to reduce the probability of dropout.

Then, Rumberger and Thomas (2000) used multilevel models, also known as hierarchy lineal models. Such methodology is appropriate given that it allows estimating for the same school at the student level and identifying the differences among schools with a separate model. The most important result was that schools which have a most powerful influence in their students achievement and, in consequence, attributes them almost half of the dropouts. Other researchers (Denegais, Montmarquette and Viennnot-Briot, 2002) used an ordered probit model to analyze the factors that affect the decisions of the dropouts, the academic achievement and the work while studying. For that purpose, the students were divided in two groups: some who decided to stay at school and others who preferred to enter to the labor market at an early age. One of the most remarkable conclusions of the research is that the legal age to access to the labor market is important in the dropout decision, as well as the minimum wage and the unemployment rates in the region. Assaad, Levison and Zibani (2000) used an standard model of the home production for the analysis. The objective of such study is to estimate the effects of the work on the school enrollment. The obtained results show that the impact of a child entering to the labor market is direct and detrimental over its school attendance.

In turn, Ahlburg, McCall and Assaad (2001) used a duration model with the purpose of explaining the impact of the delayed enrollment to school and the effect of being working over the school assistance. The results show that the children who combine work and school are the most prone to dropout. Likewise, they found that children who delay their enrollment to school tend to leave it at early ages and finally, the education of parents (equally for both) affects the decisions about their children education.

The dropout has also been analyzed in Peru. Alarcon (1995) and Fernandez and Rosales (1990) developed an important first approach in the nineties. Alarcon (1995), based on the National Census of 1993 realized a descriptive and multivariate analysis of the dropout in Peru. Using the dropout rate of children between 6 and 14 years in 188 provinces as a dependent variable, the author found that the most important variables for explaining the problem were: the proportion of people who leave in rural

---

34 Dagenais, M., C. Montmatrquette and N. Viennnot-Briot (2002), Dropout, school performance and working while school: an econometric model with heterogeneous groups. Department of Economics of Montreal University, Canada.
areas, the proportion of children between 6 and 12 that were registered, the proportion of children between 5 and 14 years that did not have Spanish as their native language and the proportion of mothers that had not completed certain level of education. On the other hand, Fernandez and Rosales (1990) also analyzed in a descriptive way the problem in each one of the 24 provinces.  

As well, Jacoby (1994) found that the children from low income households, with lower durable assets, that have younger brothers and sisters, and responsibilities in their home show a higher probability of leaving school at an early age. Likewise, Cueto and Chinen (2000) found that for a sample of rural schools in the high Andes in Peru, the program of “Desayunos Escolares” (School Breakfasts) have contributed to the reduction of the dropout rates between 1995 and 1998. The research refers to the relation between better nourish conditions and the reduction in the children morbidity, which is translated into greater attendance of them to school. However, as abovementioned, the dropout phenomenon is not a temporary event, like for example a disease, but rather a chronic event. For that reason the children who get temporarily sick should not be considered as dropouts. Instead, it would be possible to think that the reduction of the dropout rates due to that families which are benefited from the program of “Desayunos Escolares” perceive it as a transfer that contributes reducing household costs.

Alcazar et. al. (2001), based on surveys, analyzes the determinants of school attendance and of the decision of working for children in rural zones of Latin American countries. The authors found that the highest proportion of young people who work, independently from combining work with school, reside in rural zones, while in the urban zones, young people working are less, but work for more hours and thus, have less opportunities to combine it with school. The reason why children from rural zones substitute school for work is that rural families suffer from financial restrictions and the cost of sending their children to school increases especially in agricultural zones during the seasons of crop and sowing. Likewise, Alcazar and Valdivia (2005) based on a qualitative analysis found that the 50% of the polled, in the National Household Survey2003 and in their own survey, take the decision of leaving school because of the lack of money and the necessity of a job. 

Rodriguez (1999) refers to the gender of dropouts and found that the attendance rates do not present any difference, while by area of residence the gaps are aggravated, being the most damaged the children who live in rural areas. Such differences are explained in part by the lack of supply at the secondary level, as well as by the increase of the opportunity costs of the families for sending their children to school. Also indicates that the delay increases in the upper grades, in the rural environment.

---

41 Alcázar, L. et. al. (2001), op. cit.  
and in public education centers. Therefore, with the increase of the opportunity cost of maintaining a child in school and a lower performance, the partial or total retire of the children appears as an alternative, increasing the dropout rate. Finally, and above all in a context where Peru has been applying supply policies, Cueto and Rodriguez (2003) verify the importance of the demand factors to the schools, among which some cannot be exclusively modified with educational policies (for example, the family socioeconomic level, the availability of an adequate study environment and the presence of the mother, among others).  

As mentioned before, the main objective of the present research is to characterize the students who are more prone to dropout and identify the crucial moments in which this risk increases. Likewise, it would be interesting to simulate the effect of the conditional cash transfer program over dropout. To comply with the proposed objectives, duration or survival models, which are useful to model the time that the children remain at school, have been chosen.

III. Dropout in Latin America and the Caribbean

In the previous section the criteria to consider in order to identify those children that dropout from school was defined. Nevertheless, it is necessary to add two ways of measuring the school dropout. The first of them, and the most simple, is the ratio of dropouts over the total students registered in the previous year. The second way gives dynamics to the calculation because it takes into account the entrance of a cohort in the school system, and observes it from that point until the end of the school cycle. The objective is to identify those that were leaving school during school age. Thus, there will be two estimators. One of them will refer to the dropout by school year, which will approach to the global rate; the latter is a weighted average of the former calculated rates. The second estimator will be the system’s Survival Rate. This last one will have as a complement the ratio of the total children who left school over the total of children who enrolled in the first school grade. The survival rate in the system is more accurate since it has a complete overview of the dynamics of the education system, but not a static nor aggregated, which could hide the real magnitude of the school dropout.

Therefore, for international comparisons the survival rate of the scholar system or its complement will be used. According to the figures, Peru is at the average in the case of the survival in primary education system with respect to the other Latin American

---

45 See CEPAL (2002). Deserción Escolar: un obstáculo para el logro de los objetivos del milenio. En Panorama Social de América Latina 2001-2002. The calculation of the second way refers to the accumulate process of dropout of the young people that compose that group. Generally, the dropout rates associated with this type of measure are much higher that the first ones, because they include every dropout event, independently of the moment in which they occurred. Besides indicating the extension of the problem to reckon the future needs of education and training for a better labor insertion for dropouts.
46 This Survival Rate could be considered at the end of primary and secondary as a gross rate of completing the primary or secondary, respectively. Of course, it doesn’t consider it was an official period or not.
In 12 of the 29 observed countries, the survival rate is higher than the 90%, lower than the enrollment rates. This means that the enrollment rates would be hiding the accumulate children who decide to leave school at some moment of their scholar life.

The dropout of the whole educative system (primary and secondary) in Chile is 17%, while in Honduras that is in the last place, is 61%. Considering the area of residence, it can be observed that in the urban areas the rate is lower: while Chile and Peru show the lowest (14%), the average in Latin America is around 27%. In the case of rural areas, Dominican Republic has a dropout rate of 28%, followed by Chile (32%) and Peru (35%). The difference among the urban zones and the rural zones is dramatic and can reach the 41 percentage points, as in the case of Bolivia.

Source: ECLAC, NCES, ENAHO 2002 IV Quarter (for Peru). These rates are measured as complement of the survival.

In relation to the differences by gender, Peru shows a rate of 19% for boys and 22% for girls, inside the Latin American average (See Figure No. 2). On the other hand, Chile does not show differences by gender and, besides, shows the lowest dropout rate of the region (14%). However, a curious fact is that the Caribbean countries, Uruguay and Venezuela show higher dropout rates for boys. If the gaps by gender and by area of residence are compared, two important aspects could be observed. The first of them shows that in the urban areas, the dropout rates are always lower than in the rural ones. The bad results for rural areas could be attributed to the geography (dispersed and distant population) or to the fact that children have obstacles to their school progress, which is translated into repetition and dropout. The second aspect is that where the gaps by area of residence are lower, the dropout rates for boys are greater than the rate for girls (See Figure No. 3). According to ECLAC, with exception of Chile, Mexico, Bolivia, Guatemala and Peru, the other countries show an unfavorable

47 The survival rate was considered as a proportion of students that have entered to the educational system and will continue until they obtain a determined grade. Source: ECLAC, (2005). Education as a pillar of human development. Chapter 3 in The Millennium Development Goals: A Latin American and Caribbean Perspective.

48 ECLAC, (2005), op. cit. According to the report, it would be useful, in the primary stage, to use scholar alimentary programs, given that the nutritional problems are the main reasons by which children from low income homes develop difficulties for their school performance.
situation for boys. This is because the second millennium development goal related to closing the gender gap is a reality in Latin America increasing enrollment rates for girls. Additionally, in secondary education, boys, especially from low income households, dropout more often because, given market and customs reasons, are the ones that search for a job to support their family. For that reason, in secondary years the policies to implement must be focused on giving incentives to cover such opportunity cost of entering to the labor force conditioning the parents to send their children to school and a good performance.\textsuperscript{49}

Figure No. 3. Relation of gaps by gender and by area of residency

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3.png}
\caption{Relation of gaps by gender and by area of residency}
\end{figure}

Source: ECLAC

IV. An optimization behavior of the parents

Raymond and Sadoulet (2003) analyzed the survival in the Mexican school system and the impact of the conditional cash transfer program (“Oportunidades”) based on a household optimization scheme. Such scheme is based on the fact that the decisions of the parents to subscribe their children in a given scholar grade \( g \), are determined by the following benefit-cost analysis:

\[
B_g - C_g = 0
\]

where:
- \( B_g \) is the transfer that has as condition that parents send their children to school,
- \( C_g \) is the cost of the grade \( g \),
- \( V(g) \) is the value function of having obtained a grade \( g \), in other words, the “attendance to an additional year gives access to a higher education to a child over its present success.”.
- \( \beta \) is the discount rate,
- \( c_g \) is the cost of the grade \( g \),
- \( w(g-1,z) \) is the weight function of the grade \( g \),
- \( z \) is the number of years of schooling.

\[
B_g = T_g + \beta V(g)
\]

\[
C_g = c_g + \frac{w(g-1,z)}{1-\beta}
\]

49 Ibid.,
\( z \) is a vector of the socioeconomic characteristics of a child and,
\[
\frac{w(g - 1, z)}{1 - \beta}
\]
is the present value of the life earnings (the benefits of not enrolling a child, having completed the grade g-1)

What this scheme is trying to represent is the fact that the parents analyze the costs and benefits of their decision before enrolling their children. Likewise, it is important to observe the implications of this scheme especially in the context of a future conditional cash transfer program in Peru and if it has impact on family decisions. Having stated this, we have that the parents enroll their children in the grade \( g \) if:

\[
T_g + \beta V(g) - c_g \geq \frac{w(g - 1, z)}{1 - \beta}
\]

this is, simply, that the present value of enrolling from subscribing a child are higher that the present value of the benefits of not enrolling him/her. According to Raymond and Sadoulet (2003), the Bellman equation which expresses the value function over the enrollment decision is:

\[
V(g - 1) = \max \left\{ T_g - c_g + \beta V(g), \frac{w(g - 1, z)}{1 - \beta} \right\}
\]

Defining \( E_{g+1} \) if \( T_g - c_g + \beta V(g) > \frac{w(g - 1, z)}{1 - \beta} \), we can express the probability of not enrolling a child in the grade \( g+1 \), given that the child completed its education until the grade \( g \) like:

\[
P[E_{g+1} = 0 / E_k = 1 \forall k = 1, ..., g] = \frac{\Pr(G = g)}{\Pr(G \geq g)} = \lambda(g + 1)
\]

The preceding expression is consistent with the specification of the survival models being:

\[
\lambda(g + 1) = \frac{f(g + 1)}{1 - F(g + 1)} = \frac{f(g + 1)}{S(g + 1)}
\]

where: \( f(g + 1) \) is the density function (marginal) for this variable (assumed strictly positive).\(^{50}\) This function tells us the number of children who leave school in the grade \( g+1 \).

\( F(g + 1) = \int_{0}^{g+1} f(u)du \) is the corresponding cumulative distribution function. This function shows that the percentage of children who left school since the grade 1 and the grade \( g+1 \)

\(^{50}\) Of course, we are talking about the number of students.
\begin{align*}
S(g+1) &= 1 - F(g+1) = \int_{g+1}^{\infty} f(u)du \\
is the survival function until the grade g+1.
\end{align*}

This function shows us the percentage of survivals until the grade g+1.

Based on the previous specification, this investigation will estimate the probability of leaving school given the assumption that children was studying until the previous year. To achieve this goal the risk probabilities (dropout) and the school survival would be estimated, in a non-parametric and in a parametric way with duration models. The first method consists in the estimation of empirical survival function by the Kaplan-Meir Estimator.\footnote{It is important to mention that this empirical estimator must be applied with non parametric, non correlated and identically distributed data, and thus, it doesn’t include explanatory variables nor heterogeneity. Additionally, the censored problem is presented. This problem is originated from the fact that we are taking people that are actually in school and therefore, the final result of the survival for it is not known. For example, we can observe if a child dropout at the end of 6\textsuperscript{th} grade of primary school. However, we can’t know if a child that id actually studying in the 2\textsuperscript{nd} grade of secondary will dropout in the future.}

Formally:

\[ n_g = \sum_{i \geq g} (m_i + d_i) \]

where: \(d_i\) is the number of dropouts in the i-th school grade. Where i are the periods higher or equal than g, until \(K\).

\(K\) is the total number of periods.

\(m_i\) is the number of observations correctly polled. In other words: all of those who never dropout.

\(n_g\) is the number of students who never dropout (m) plus the number of dropouts that have not occurred yet (h) until the period g.

Then, the risk rate (h) is defined as the probability of dropout for a child in the grade g given that it stayed in school until the period g-1:

\[ h(g) = \frac{d_g}{n_g} \]

This ratio refers to the proportion of dropouts in the year g over the total of dropouts who are staying at school until the year g plus a total number of kids who would never dropout. Then, the survival function (S) for the grade g is:

\[ S(g) = \prod_{i=1}^{g} \left( n_i - h_i \right) / n_i = \prod_{i=1}^{g} \left( 1 - \lambda_i \right) \]

On the other hand, in order to estimate parametrically the school dropout, it is necessary to choose a type of distribution. In contrast of Raymond and Sadoulet (2003) who decided to estimate using the proportional Cox method, for the present study the failure accelerated time models were chosen, specifically with a logistic distribution. The previous obeys to two motives. The first one of them states that the chosen distribution must approximate to the empirical evolution of the dropout through the
grades and school years. Given that the dropout risk is not monotonically increasing or decreasing, a distribution that reflects the observed was chosen: first increasing and then decreasing. The second motive by which the use of proportional models was discarded is that one of the requisites to apply the proportional models is that the variables to be used must pass through a proportionality test. In many estimations that assumption was not hold and by forcing it we withdrew variables. As a result, the models became little explanatory. Because of that, a model based on the log logistic distribution, which defines the survival and risk of the j-th individual at the moment g, was used. The following expression defines it:

\[
\hat{\lambda}(g) = \exp(-z\beta) \ldots \text{parametric section of the model}
\]

\[
S(g) = \frac{1}{1 + (\hat{\lambda}(g))^{1/\gamma}} \ldots \text{survival rate}
\]

\[
h(g) = \frac{\hat{\lambda}(g)^{1-1/\gamma}}{\gamma(1 + (\hat{\lambda}(g))^{1/\gamma})} \ldots \text{density function or risk rate}
\]

Then, the belonging to a certain grade determines an intrinsic probability of dropout for a student (non parametric estimation). However, the individual characteristics of the children and time affect such probability, increasing or decreasing it. The estimation of each one of the parameters is developed by maximum likelihood. Finally, the advantage of that kind of duration models is that they provide an efficient way of estimating sequential decisions based on a density function that is built from empirical information, without the necessity of eliminating information.

The data corresponds to the fourth Quarter of the National Household Survey 2002. The selected sample was of boys and girls between 6 and 17 years old, who reach the 22,967 observations. For each one of them, the latest year of studies was considered. As defined earlier, every child who was not attending to school in 2002, excluding those who were sick, in active duty, had completed their education or were in a pre tertiary school were considered dropouts. This way of estimating dropout presents three disadvantages. The first of them is that it does not take into account the period that the child stayed out of school. Some studies consider the dropout if the child have been out of school for more than one year. Likewise, it does not consider the fact that the actual dropout could return to school in the future. Nonetheless, the main objective is that the child does not dropout and stays in a normative way at school. Because of it, it is not relevant for the present study to know if the dropout returns or not to school. The second refers to the use of the use of cross-sectional analysis and not a panel, which impedes to observe the same child through its school life. However, the use of every child in school age allows simulating the evolution of a cohort through the time. Finally, the last disadvantage is that it is impossible to assure if a boy or a girl who

---


have not completed its education, would dropout or not in the future. As balance, the duration in the system is defined as the last school grade reached until the dropout.

V. Results

**Comparisons between the National Household Survey and the School Census of the Department of Education**

The estimation of the dropouts of the school system using the Kaplan Meier statistic based on the figures of the Department of Education shows an approximate of 19%. This number is really close to the estimation made with the National Household Survey (19.57%). Other important aspect is that the observed tendencies by scholar year show two critical points: the first year (first grade of school) and the seventh year (the first grade of secondary education), different from the National Household Survey, which only shows a peak in the last one (See Figure No. 4). Nevertheless, the peak shown in the first grade of primary can be explained by the methodology that the Census is using, because it considers as a dropout a child who was enrolled during the previous year to the census and is not enrolled during the current year. For that reason, the first year dropout counts for those who were enrolled in kindergarten and didn’t enter to primary school. This result seems surprising by the fact that the enrollment rate in primary is above 90% and 73% of the population between 11 and 13 years completes it while in the case of the children from 14 to 16 years the same rate is of 91%. It can be thought that the children who have not even started school, because they do not even present incomplete primary, which could be more related to a delayed entrance to primary, reaches the 20% of that cohort. Nonetheless, as rate, that peak does not present a significant difference from the estimation with the National Survey of Homes. An additional fact that seems curious is that the sustained fall in the number of dropouts since 1998 until the year 2000 was interrupted by a substantial increase in 2001, which wasn’t recovered in 2002.

**Figure No. 4. Dropouts in the Peruvian Education System, 1998-2002**


Taking the year 2002 with the objective of comparing the results by school year between the figures of the Department of Education and the National Household Survey

---

55 Ibíd.
Survey, two significant points would be observed. In the first place, the dropout rates calculated by the Kaplan-Meier method show very similar results, 18.96% for the Department of Education and 19.57 for the National Household Survey (See Figure No. 5). However, differences in the estimations by gender can be appreciated. While with the figures of the Department of Education the boys show a higher dropout rate than the girls, the National Household Survey shows the opposite result. The difference between those results become more dramatic when realizing that the gap shown by the data of the Department of Education is of 0.74 percentage points and the gap of the National Household Survey is 2.84 percentage points, although it could be thought that the last one could be losing significance at that level. In second place, the rates shown for the primary education are similar. Nevertheless, the figures in the case of the secondary school differ substantially in two periods: in the first and fifth year. In the case of the first grade of secondary, the National Household Survey gives a higher rate than the survey of Department of Education in approximately 4 percentage points. On the contrary, for the fifth grade of secondary the figures of the Department of Education show higher rates than the National Household Survey in approximately 5.8%. It seems that the figures of the National Household Survey are not taking into account those students who left the formal school and enter to active duty or to pre tertiary school. At the end, as a result, these differences cancel with each other at the moment of calculating the global rate, for that reason, if the mentioned before was corrected, the rates of the National Household Survey would be higher than the ones of the Department of Education. However, the evolution of higher dropout between the end of the primary education and the beginning of secondary education is observed in both data bases.

Figure No. 5. Dropout rates: Department of Education and National Survey of Homes, 2002

Non-parametric Estimations

The empirical risk and survival functions have been calculated using the information of the National Household Survey 2002 in four levels: i) national, ii) by gender, iii) by area of residence (urban and rural) and iv) by poverty level.

The results show that in the national level 19.57% of the children between 6 and 17 years old dropout from school (See Figure No. 6). According to the evolution of the empirical functions of risk and survival, it is observed that the highest dropout risk occurs in the seventh grade (first grade of secondary). Likewise, it can be seen that the probability increases between the ninth and tenth grade. A probable cause for that increase in the risk is the high opportunity cost faced by the parents for maintaining their children at school during the secondary years, because in that moment they are more capable of helping to support household economy. These results are considered given that they do not only affect the future household income, but also of the whole society. According to ECLAC, in the Latin American countries that have reached the highest enrollment rates in secondary, there is an increase in the wages of the adult population in approximately 30%.

![Figure No. 6. Empirical Survival and Risk Functions](image)

Source: National Household Survey 2002 IV Quarter
Elaboration: Own.

In relation to gender, even when the empirical results are unfavorable for women, this difference is not significant (See Figure No. 7). According to what can be seen, the 18.8% of the boys between 6 and 17 years old dropout, while in the case of the girls of the same age, this number increases up to 21.5%. In spite of the fact that the dynamic remains, the difference is that the girls’ posses a slightly higher probability to dropout than boys. However, for both, the highest risk of dropout is in the seventh grade (first grade of secondary): 6% for the boys and 7% in the case of the girls.

According to Theiton (1999), the main problem is not the enrollment, but how to avoid the dropouts. Even when knowing that the causes are factors related to low household income, also it is consequence of the generalized devaluation educating women,

---

56 ECLAC (2002b, capítulo III).
especially in the rural areas and the poor homes.\textsuperscript{57} Likewise, in the rural zones it is expected that the girls work since early ages at home, even at an earlier age than the expected for boys to help in the farms.\textsuperscript{58}

**Figure No. 7. Empirical Survival and Risk Functions by Gender**

![Empirical Survival Function](image)

![Empirical Risk Function](image)

Source: National Household Survey 2002 IV Quarter
Elaboration: Own.

According to the results by area of residence it can be observed that the 14.4\% of the children between 6 and 17 years old dropout from school in the urban sector (See Figure No. 8). On the contrary, for children from rural zones, the risk of dropout more than doubles it (35\%). The effect of living in rural areas increases, in average, in 74\% the probability of leaving school, while living in urban areas reduces it in 30\%.

There are basically two important aspects which could explain these results:

- The first of them is about the shape of both curves. The probability of dropout is always increasing in the urban sector, while in the rural it grows until the seventh grade and then decreases. This can be coherent because of the fact that the urban areas present a higher supply of low ability exigency labor than the rural zones while the education increases. On the contrary, the dynamic observed in the rural zones can be explained by two factors: i) the lack of supply of secondary education and ii) the existence of this distant supply implies a higher relative cost for the poor families which decide to send their children to secondary education.

- The second difference refers to the magnitudes: the probability of dropout in urban areas is always lower than for the rural areas. This is coherent due to the relative opportunity costs, which are higher in the rural zones, because of the costs of transportation and what is not earned by studying instead of working, everything as proportion of the families’ own income.


\textsuperscript{58} Contreras, D. and D. Zapata (2004). *Child labor in Bolivia: schooling, gender and ethnic groups*. Economic Department of the Universidad de Chile.
Taking into account the poverty level, it is observed that the 35.6% of the children between 6 and 17 years old who live in extreme poor households tend to leave school (See Figure No. 9). In the case of those who live in not-extreme poverty, this rate falls to 20.9%, while in the case of those in non-poor households it is far less: 11.1%. Between those children who are extremely poor, the highest probability shows when they are in the seventh grade, the same thing happens in the not-extreme poor children. In the case of the kids who are not poor this happens in the ninth grade, maybe because this group is composed basically by urban population. The notorious differences are observed when considering the magnitudes: in the case of extremely poor children the probability reaches 14%, while in the case of the not-extremely poor and not-poor, this value falls to 6% and 3%, respectively. These numbers are reinforced by the fact that the opportunity cost, relative to the average income of each of these population groups, of sending the children to school among the extremely poor is much higher than non-extreme poor and the not-poor.  

With the purpose of proving the differences among the observed dynamics, in the following table the equality tests of the survival functions are shown. The null hypothesis refers to the not rejection of the survival functions being the same. The tests reject the equality of the empirical survival and risk functions for each of the analyzed levels: gender, area of residence and poverty levels. Nevertheless, survival models by gender, area of residence, but not by poverty level would be estimated.

<table>
<thead>
<tr>
<th></th>
<th>Test</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Área de residencia</td>
<td>723.35</td>
<td>0.000</td>
</tr>
<tr>
<td>Gender</td>
<td>26.84</td>
<td>0.000</td>
</tr>
<tr>
<td>Poverty Level</td>
<td>544.12</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The latest attends to two observations. The first of them obeys to that there is no significant difference between boys and girls, the equality hypothesis test of the survival functions is rejected and also, there are hypothesis that factors influencing dropout and their magnitudes are different. The second observation is that even though the empirical survival functions by poverty levels are significantly different, when observing their form, they do not present a significant difference as the one that can be seen in the case of the test by area of residence. The difference, though, refers more to the magnitudes (as if they were multiplied by a scalar). For that reason, it was decided to use the household per-capita expenditure as an explanatory variable in the models as a proxy of wealth. Also, this explanatory variable would accomplish an additional role in order to develop simulations of the effect of the conditional cash transfers of the family decisions about sending or not the children to school.

**Parametric Estimations**

As mentioned before, a log-logistic distribution will be used in order to carry out the estimations. Subsequently, the risk rates for each one of the explanatory variables used in the models are presented.\(^{60}\)

---

\(^{60}\) It should be recalled that a ratio higher than 1 means that the explanatory variable raises the probability of dropout, while a ratio lower than 1, reduces it. These risk ratios are evaluated in the measures of each variable for each group.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Rural Boys</th>
<th>Urban Boys</th>
<th>Rural Girls</th>
<th>Urban Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs ((C(g+1)))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the way of main access to the district is a trail or path</td>
<td>1.001 **</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students by teacher in the district</td>
<td></td>
<td>1.150 ***</td>
<td></td>
<td>1.231 ***</td>
</tr>
<tr>
<td>Earnings ((w(g,z)))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stratus(^61)</td>
<td>0.922 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income and job opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of brothers younger than 6 years</td>
<td>1.020 *</td>
<td></td>
<td>1.036 ***</td>
<td></td>
</tr>
<tr>
<td>Child’s ability ((Z))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of delay</td>
<td>1.188 ***</td>
<td>1.138 ***</td>
<td>1.180 ***</td>
<td>1.129 ***</td>
</tr>
<tr>
<td>Human Capital of the Parents ((Z))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father’s Educative Level(^62)</td>
<td>0.939 *</td>
<td>0.930 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s Educative Level</td>
<td>0.844 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Characteristics of the Child ((Z))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the Household chief is a woman</td>
<td>0.991 ***</td>
<td></td>
<td>1.012 *</td>
<td></td>
</tr>
<tr>
<td>If the Child lives in Lima</td>
<td></td>
<td></td>
<td>1.048 ***</td>
<td></td>
</tr>
<tr>
<td>If the Child lives in the Andes</td>
<td>0.968 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the Child lives in the Amazon</td>
<td>1.014 ***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the child is not the Household chief neither the partner, nor child of the family boss</td>
<td>1.007 **</td>
<td></td>
<td>1.033 ***</td>
<td></td>
</tr>
<tr>
<td>If the child is the partner of the Household chief</td>
<td>1.000 **</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discount Factor ((B))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of sisters in age for primary school</td>
<td>0.946 ***</td>
<td></td>
<td>0.979 ***</td>
<td></td>
</tr>
<tr>
<td>Number of brothers in age for Secondary school</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of sisters in age for Secondary school</td>
<td>0.985 *</td>
<td>0.924 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wealth and Potential Treatment ((T))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure for the 5(^{th}) grade of primary</td>
<td>0.968 **</td>
<td>0.983 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure for the 6(^{th}) grade of primary</td>
<td>0.984 ***</td>
<td>0.959 ***</td>
<td>0.980 ***</td>
<td></td>
</tr>
<tr>
<td>Expenditure for the 1(^{st}) grade of secondary</td>
<td>0.984 ***</td>
<td>0.942 ***</td>
<td>0.976 ***</td>
<td>0.984 ***</td>
</tr>
<tr>
<td>Expenditure for the 2(^{nd}) grade of secondary</td>
<td>0.960 ***</td>
<td>0.942 ***</td>
<td>0.973 ***</td>
<td>0.973 ***</td>
</tr>
<tr>
<td>Expenditure for the 3(^{rd}) grade of secondary</td>
<td>0.973 ***</td>
<td>0.940 ***</td>
<td>0.972 ***</td>
<td>0.977 ***</td>
</tr>
<tr>
<td>Expenditure for the 4(^{th}) grade of secondary</td>
<td>0.977 ***</td>
<td>0.936 ***</td>
<td>0.982 ***</td>
<td>0.976 ***</td>
</tr>
<tr>
<td>Expenditure for the 5(^{th}) grade of secondary</td>
<td>0.982 ***</td>
<td>0.949 ***</td>
<td>0.972 ***</td>
<td>0.965 ***</td>
</tr>
<tr>
<td>Per capita expenditure of extreme poverty</td>
<td>0.972 **</td>
<td>0.979 ***</td>
<td>0.957 ***</td>
<td>0.986 **</td>
</tr>
<tr>
<td>Per capita expenditure of poverty</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.109 ***</td>
<td>0.114 ***</td>
<td>0.126 ***</td>
<td>0.053 ***</td>
</tr>
<tr>
<td>Gamma</td>
<td>0.161 ***</td>
<td>0.155 ***</td>
<td>0.141 ***</td>
<td>0.160 ***</td>
</tr>
</tbody>
</table>

\(^{61}\) The stratus is defined in the following way: 1 = greater than 100,000 houses, 2 = from 20,001 until 100,000 houses, 3 = from 10,001 to 20,000 houses, 4 = from 4,001 to 10,000 houses, 5 = from 401 to 4,000, 6 = less than or equal to 400, 7 = Rural Composed Census Area and 8 = Rural Composed Census Area.

\(^{62}\) The educative level of the parent and mother is defined as: 1 = no level, 2 = initial, 3 = incomplete primary, 4 = complete primary, 5 = incomplete secondary, 6 = complete secondary, 7 = non university tertiary incomplete, 8 = non university tertiary completed, 9 = university incomplete, 10 = university completed, 11 = postgraduate.
The results by gender and area of residence of the estimated duration models are presented in table No. 2. In the case of the education supply, its importance is only observed in the case of girls. According to the model, in the case of a greater presence of students by teacher, the girls show a higher dropout probability, independently if they live in urban or rural zones. In relation to the school achievement, the school delay was taken as a proxy for this variable. This variable has a positive impact, being the boys and girls of over age the ones with a higher probability to dropout.\textsuperscript{63} The education of the parents has a negative effect over the dropout probability. However, it can be observed that the father’s education is important in rural zones, while for boys who live in urban zones only the education of the mother is significant. On the contrary, for urban girls the parents’ education is not a determinant factor to stay at school. Apparently, the education of the parents is highly correlated to the socioeconomic level. Nevertheless, the effect of the per-capita expenditure is stronger, because of that, the economic and credit constrains are the most important factors which increase the school dropout.

In the case of the socioeconomic level of the family, two strategies were used. The first of them was the interaction between the per-capita expenditure and the poverty situation of the family. Therefore, the dropout is observed as a characteristic event of extreme poor households. Additionally, for urban girls, to belong to a poor family also increases the dropout probability. At the same time, we used the interaction between per-capita expenditure and the last school year approved. The results agree with the observed in the empirical survival functions. The economic restrictions are important since the last years of primary until the last year of secondary. In first place, a predominance of the economic restrictions, of the own income and credit, over the parents’ education is observed. It seems that the importance of the education is perceived by the parents; however, this is affected by the present absence and necessity of resources. In second place, in a context where cash transfers will be used in order to incentive the demand, the interactions of the expenditure show in what population is the greatest effect. Thus, the transfer program must be directed exclusively to the extremely poor households and, only for the case of urban girls, to the non-extreme poor.

Now, when observing the results related to the geographic location, the rural boys of the Amazon and the girls of Metropolitan Lima show the highest dropout probability. On the other hand, the urban boys of the Andes are those who show the lowest probability to leave school before competing the school cycle.

In the case of household composition, three important factors that determine dropout are observed. The first of them refers to the households where a woman is the chief. In relation to this variable, two interesting results are shown. On one side, the continuity of the studies of girls who live in the rural zones is attended by those women who are household chief. Given that result, it can be thought that in rural areas, a gap generated by the traditional machismo is disappearing. On the contrary, for girls from urban areas, households leaded by a woman have a higher dropout probability. This is

\textsuperscript{63} As mentioned in the introduction, the school delay is strictly related with the repetition and the scholar achievement. For that reason, a higher repetition in the median term will be traduced in a higher probability of school dropout. ECLAC (2002). See also Cortez, R. (2001). \textit{El atraso escolar: lecciones para una agenda de política pública}. Consorcio de Investigación Económica y Social, CIES, Lima, Peru.

24
because women that are household chief lead a home with children, mainly without the assistance of their partner, and count with a smaller source of income.

A second interesting factor in relation to the household composition is referred to brothers and sisters. In this case three results are worth to mention. In first place, students who have brothers in secondary education age present a smaller probability to dropout, contrary to those students with brothers in age for primary school. In second place, it is preferred to keep in school the sons than the daughters, except in the case of girls from rural zones, who show a higher probability to stay at school than their brothers in secondary education ages. Finally, rural boys and urban girls with brothers younger than 6 years old are prone to leave school. Possibly, this result is related to the fact that the older have the duty to take care of their younger brothers. However, it is curious that in the rural zones it is a responsibility of the boys: while in the urban zones it is an obligation of the girls, possibly because it is considered as home task and must be realized by women.

Finally, the third factor related to the household composition is referred to the relationship between the child and the household chief. The results are interesting. On one hand, the children from rural zones present a higher dropout probability if they do not belong to the family core. On the other hand, the girls in the urban zones have higher probability of leaving school if they do not belong to the family core. Additionally, if the last ones are wives of the household chief they have a higher dropout probability. This result is highly related to the adolescent pregnancy, which precisely seems to be an event which predominates in the urban zones.

Two interesting results that affect the children are presented. On one side, those who live in rural zones, in which the main access is by a trail or path, the probability of attendance decreases. On the other side, for those children who live in urban zones, larger the population center, higher the dropout probability, given that there are higher opportunities to find job, especially at a young age.

Additionally, variables as the prediction of children wages at a determinate age, school level and their present values were built. Such variable was predicted using the estimators of a mincerian equation, where only the gender, the age, the education, the area of residence and their multiplicative were used. The sample corresponded to every person between 14 and 65 years. However, the results were not sufficiently significant to accept them in the models. That does not mean that those variables should not be taken into account at the moment of deciding whether send a child to school or not: on the contrary, given that it is an out of the sample prediction, it is believed, that with the considered information it is difficult to develop any determinant inference.

Likewise, variables referred to transfers in species (uniforms, shoes, books, among others) were not used, given that such benefits are only perceived by those children who assist to school and not by those who stop attending, which are the group of interest. For the same reason, neither the school result of the previous year nor the associated costs to it (pensions, transportation, books, school material, among others). Nevertheless, an endogeneity problem with the costs appeared: while more expensive

---

64 Only the 24% of the dropouts return after a year of leaving school.
the pensions, school material or books, the families are wealthier and in consequence the children showed a lower dropout probability. For that reason, in many cases the correlation showed the inverse sign. However, it was decided to work with the average transport cost by stratus and province. Nonetheless, in the rural zones the transport cost can be low, but the school can be far away. Because of it, it would have been better to use the cost by unit of time taken until the arrival to school, but that information is not available. Finally, the hypothesis that the children that belong to families whose native language is not Spanish dropout more could not be proven, given that the National Household Survey does not have such information.

In spite of the existing limitations for the calculation of some variables and to achieve a better approximation of the mechanism by which the families decided to send their children to school, the models that were obtained responded in explanatory capacity (See Figure No. 10). So, when observing the risk functions for one of the groups and comparing them with the estimations, it can be appreciated that both show the same evolution for the school year (the same maximums and minimums), but different magnitudes.

**Figure No. 10. Risk Rates by Scholar Year: Empirical and Estimated**

- **Rural Boys**
- **Rural Girls**
- **Urban Boys**
- **Urban Girls**

Elaboration: Own.

---

65 It was thought to use the transport cost as a Proxy of the distance between the children and the school.
Also, the Cox-Snell residuals were used. In the meantime, the residuals of the estimated model compared with the empirical residuals approximate to a straight line with slope equal to 1, the estimated model would be explaining the empirical information in the correct way. For the four estimated models, this is the case (See Figure No. 11). We do not observe any dramatic difference between both residuals. Therefore, it can be said that the obtained models explain reality quite well.

![Figure No. 11. Residuals of the Estimated Models](image)

VI. Policy Implications: Condicional Cash Transfers

Actually the topic of the cash transfers to families has taken greater importance. Given the successful experience of those programs in Mexico (“Oportunidades”) and Brazil (“Bolza Escola”), the government has decided to implement a program to transfer money to the poorest households with the condition that they compromise to send their children to school and increase the use of basic health services. In particular, such program, denominated JUNTOS, will offer monthly 100 Nuevos Soles (approximately 30 Dollars) for beneficiary.

66 The Cox-Snell (1968) residuals for an observation i in the grade g is defined as a cumulative risk function of the estimated model: \[ \hat{H}_i(g_i) = -\ln \hat{S}_i(g_i). \] Cox and Snell mention that if the estimated model approximates the empirical information in a correct way, the residuals are as many observations as individuals from the exponential distribution with mean equal to 1. For that reason, when plotting the cumulative risk rate of the residuals on one axis and the empirical results in the other, the result must be a line with slope equal to 1. See Cox, D. and J. Snell (1968). A general definition of residuals (with discussion). Journal of Royal Statistical Society, Vol. 30, pp. 248-275.
Even though it is not an objective of the present study to deal with an extensive discussion about the way in which this program should be implemented. Nevertheless, given that such cash transfer imply does not condition the decision about what to purchase and we know that, based on the obtained results, the household per-capita expenditure influences the decision of taking out the children of school, we performed simulations with the purpose of observing the changes in the survival rate of the educational system when the expenditure increases.

Then, for the four groups, we made simulations for changes in the survival rate of an average individual for each school year given changes in the average per-capita expenditure.

The results of the carried simulations are shown below. For each of them, the amount of money that the government decided to give to each family is taken as reference. Likewise, it was adjusted for the average number of boys and girls in school age that a household has and for each of the four groups in order to quantify the total transfer received by a family. The simulations show important results (See Figure No. 12). The first of them is that the transfers have greater impact in the rural sector than in urban areas, and even higher for girls than for boys. In this sense, it is observed that in the rural areas, the impact of the transfers is a decrease in the dropout rate of 35% for girls and 23% for boys, while in the urban areas this reduction is near the 28% for boys and 14% for girls.\(^{67}\)

The second result worth to note is the relation between the school delay and the school dropout. In order to observe the effect of a reduction in the school delay over the dropout, the enrollment rate for the first school year (the first grade of primary) at regulatory age was taken like reference. The total delay is of 45% of the registered children. The 20% of the students are above the age because of a delayed entrance to the first grade. Among 19% and 25% of the students are over the age because of repetition or retreat from the school year in primary. For that reason, it can be stated that approximately the 50% of the school delay is explained by a delayed entrance to the first year of primary education, the delay could be reduced in a 50% of the actual levels. Taking the above mentioned as a reference, the results show that, besides the monetary transfer, the reduction of the scholar delay results in a greater reduction of the dropout.

Therefore, in addition to the effect of the transfers, the reduction in the delay causes a significant reduction in the dropout rate of the urban areas. Such impact is greater in the boys (additional 38% over the effect of the transfers). Additionally, total monthly amount transferred to the families would be of 6 millions of Nuevos Soles. It is worth to mention that this amount considers that money is given to the families which have a child who have left school, therefore, it is focalized and there would be no filtrations, and no administrative costs are considered. It is necessary to mention that this is a lower limit.

\(^{67}\) It is important to remark that Gertler and Glewwe (1990) found that the rural families world accept to pay more than the cost of construction and operation of a school with the objective of reducing the time that their children spent in arriving to it from 2 hours to 0. This result is important, because if there were no economic or credit constrains, eventually, the rural families World pay. Gertler, P. and P. Glewwe (1990). The willingness to pay for education: Evidence from Rural Peru. Journal of Public Economics 42, 251-275.
From the non-parametric estimations: have been identified. Subsequently the main conclusions of this investigation are presented:

VII. Conclusions and Policy Recommendations

The factor by which a boy or a girl would dropout from school has been analyzed in this research. Also, the critical school years in which a higher probability of dropout exists have been identified. Subsequently the main conclusions of this investigation are presented:

From the non-parametric estimations:
- The figures from the Department of Education and the National Household Survey are similar. While the dropout (understood as leaving the system) rate for the first one is of 19%, the second shows a 19.6%. Likewise, both show the highest risk probability in the first high school year, although the National Household Survey show a rate 6% higher than the one of the Department of Education. However, the figures of the Department of Education also present a high dropout rate for the 5th grade of secondary school. Nevertheless, it seems that there is a mistake, given that those students who left school to enter to active duty or a pre tertiary school are considered as dropouts.
- Other difference among the figures of both surveys is that the ones of the Department of Education show a higher dropout in the case of males (0.7% above females), while with the National Survey of Homes, the dropout rate for women is the highest (in 2.8%). It is thought that the National Household Survey would be losing

Elaboration: Own.

29
significance at that inference level and thus, the figures of the Department of Education are more trustful. For that reason, there is no significance among between both rates.

- On the contrary, by area of residence, the dropout rates by school year evolve systematically differently: it can be observed from the National Household Survey that while in the rural zones the pass through secondary is critical, in the urban zones, the probability of leaving school increases permanently during secondary. Likewise, the estimations by poverty level show that the pass through secondary is the most critical period and the rates become higher while poorer the family. The last thing would be considered as a first indication that the economic restrictions are an important determinant by which the children to leave school.

From the parametric estimations:

- From the parametric estimations, the lack of supply or its distance is taken as a factor that only influences the decision of sending girls to school, in rural as in urban zones. Likewise, if the geographic location is considered, boys from rural areas of the Amazon are those who would show a higher dropout probability, also, by the lack of supply or the distance from it. In the same way, it shows that for rural boys, the fact that a path or trial is the main way to access to school of their town center reduces the probability to assist to school. Though, this is a characteristic of the poor rural town centers, where the educative supply is scarce and concentrated, mainly, in primary.

- On the contrary, the urban boys of the Andes are those who present a lower probability to dropout.

- Likewise, school delay and, in consequence, repetition, increase, independently of gender, the dropout probability. The traditional educative system based on maintaining a child in a determined school grade due to bad performance could be more prejudicial than the beneficial it is believed to be.

- An interesting result is that the educational level of the father is important for reducing dropout in rural zones. On the other hand, even though in urban zones for boys their mothers’ educational level is the most important; it does not seem to affect girls’ education. The latest is counter intuitive finding, nevertheless, it is believed that, the parents’ educative levels are highly correlated to the household income level; however, given the results, the latter is much more correlated than the former.

- On the contrary, household economic situation is a very important factor, especially for the extremely poor families. Likewise, we controlled by the school grade where the children is found, it is observed that the economic restrictions become more important in the last years of primary and for the whole secondary education.

- A result that reinforces the abovementioned is that for urban girls that are not daughters of the household chief and, mainly, the ones that are wives of the household chief, have a greater probability of leaving school. At the same time, taking into account the geographic location, girls from Lima are the most prone to leave school. It seems that the conformation of families by girls younger than 18 years old is a common event in the urban zones, especially, in Lima, relating it with the adolescent pregnancy.

- In the same way, rural boys that do not belong to the family core present a higher dropout rate.

- A variable that shows opposite results is the one of the households where a woman is the family chief. On one hand, this event is important only in the case of girls. On the other hand, it represents a higher probability of leaving school in the rural zones.
The opposition among the results could be explained by the valorization of the current education and, above all, for women, even higher in homes where a woman is the household chief. On the contrary, in urban zones, the fact of a woman being the household chief in the majority of the cases means that she does not have a permanent partner and a source of income less, especially crucial in the cities where the relative costs are higher.

- With respect to the brothers and sisters of the students, three results were found. In the first place, the students who have brothers and sisters in secondary education ages show a lower probability to dropout, while the students with brothers and sisters in primary education ages showed a higher probability to stay in school. In second place, keeping sons at school is preferred to keeping daughters in it. Its exception is the case of the girls in rural zones, who show a higher probability to stay at school than their brothers in secondary education ages, as mentioned before, rural boys and urban girls with brothers with less than 6 years old are prone to leave school. This is a curious case, because while in the rural zones the boys are in charge of taking care of their younger brothers because physical strength is requires, in the urban zones it is considered as a home task and, thus, a responsibility of the girls.

- Finally, urban boys who live in the larger town centers show a higher probability of leaving school, probably because of the existence of the existence of greater job opportunities for children.

From the simulations:

- From the simulations of the cash transfer program it can be observed that it can decrease the dropout rate between 14% and 36%, with a greater effect in the rural zones, and most importantly for girls. On the contrary, in urban zones the effect is greater on the boys.

- If the enrollment to the first primary school year at the regulatory age is encouraged, the school delay would be reduced in approximately 50% and, thus, the dropout rate will fall between a 50% and 78%. The effect of the reduction of the school delay over the dropout rate is similar in the four groups that were studied.

- The impact over the dropout would be greater if the cash transfers were focalized to the secondary years (especially in the case of the first year) and followed the transfer scheme in species for the primary education (ECLAC, 2005).

- The remaining dropout would be explained by the family and community influences.68

Based on the results, it can be observed that the lack of supply is determinant over the absenteeism and the dropout in rural zones. However, it can be confronted by a conditional cash transfer program. This would be important in rural zones and, especially, for girls. Likewise, it can be seen that for urban girls, the non-economic problems are the most important, given the low effect in the transfers simulations and the existence of variables such as if a woman is the household chief or if a girl is wife of the household chief, which is strictly related to the adolescent pregnancy.

With respect to boys, the economic restriction is an evident determinant for the dropout. In the case of rural zones, children of the Amazon and from far away population centers must be the objective population of the transfer program. On the contrary, an increasing valorization of education for children who live in urban zones of the Andes can be seen. This is important and encouraging, and something on which

---

68 Alcázar, L. and N. Valdivia (2005), op. cit.
much attention should be taken especially in a context in which the decentralization of educational responsibilities is being given. Therefore, it would not seem strange that the cities of the Andes present improvements in the educational indexes for the next 10 years. Finally, the program must, at the same time, focus on those homes which contain a large quantity of children in school age, which are found in constant competence for the family resources.

In sum, given that the economic constraints are a significant determinant of the dropout in rural zones and for urban boys, we believe that there is a space to work with the conditional cash transfer program. The simulated effects are optimistic, however, it is worth to stand out that this is a first approximation to the topic and the requirement of further studies considering this intervention component. While for urban families, intervention policies focused on the family component would be required. In the same way, the policies directed to the reduction of the delayed entrance to the first grade of primary school would be determinant in increasing the attendance and completeness of the primary school and, as a consequence, of secondary education. According to the results of Alcazar and Valdivia (2005), the urban problematic is more complex for being solved only by the conditional cash transfers. This is reflected on the simulations’ results: family and social relations become more important and non-investment supply policies are required. For that reason, ECLAC (2001) and Alcazar and Valdivia (2005) propose policies focused on urban sector schools related to a greater monitoring of the student and development of a curriculum which responds to the requirements of the boys and girls. In conclusion, while the dropout phenomenon should be faced by demand side in rural sectors, in urban zones it has to be faced by giving a better quality of education and response to the social requirements of the children.

The treatment of school delay as an endogenous variable is pendent for further research. Cortez (2001) did it with the Living Standard Measurement Study Household Survey, nonetheless, it would be important to retort it with the National Household Survey and incorporate it in an equation of school dropout. Likewise, linking performance measurement tests from the Department of Education, which for 2004 would have representation at the province level, would be important to test whether performance is linked to dropout. In the same way, pick up, based on the School Census, the time that each student take in reaching the school and the age in which it entered to the first grade of primary would help to have a base of current costs that households have to pay in order to send their children to school. Likewise, it would be important to collect information about the native language of the child in the National Household Survey, especially when knowing that the dropout is higher in the rural zones, in which there is a generalized bilingualism. Finally, it would be important to have quantitative information about enrollments and exits from the school system based on panel data.

69 However, it is important to take into account the findings in Alcázar and Valdivia (2005). The authors found that the low economic income isn’t the only determinant for the dropout, the deficient life conditions, the family disintegration and the precariousness of the family affective relations.
VIII. Bibliography


Cueto, S. (2004). *Factores predictivos del rendimiento escolar, deserción e ingreso a educación secundaria en una muestra de estudiantes de zonas rurales del Perú*. Grupo de Análisis para el Desarrollo, GRADE.

Cueto, S. and M. Chinen (2000). *Impacto educativo de un programa de desayunos escolares en escuelas rurales del Perú*. Documento de trabajo No. 34. Grupo de Análisis para el Desarrollo, GRADE.


Dagenais, M., C. Montmatrquette and N. Viennot-Briot (2002), *Dropout, school performance and working while school: an econometric model with heterogeneous groups*. Economics Department of Montreal University, Canada.


of young immigrants’ progress in the educational system. Instituto para el Estudio del Trabajo (IZA), Germany.


IX. Appendixes

Table No. A.1. Dropout in public and private institutions of primary and secondary education for children by grade, 1998-2002

<table>
<thead>
<tr>
<th>Level / School Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary for Children</td>
<td>156,518</td>
<td>147,237</td>
<td>132,257</td>
<td>174,089</td>
<td>159,190</td>
</tr>
<tr>
<td>1º grade</td>
<td>43,660</td>
<td>44,626</td>
<td>27,253</td>
<td>33,128</td>
<td>35,293</td>
</tr>
<tr>
<td>2º grade</td>
<td>21,656</td>
<td>24,832</td>
<td>18,248</td>
<td>30,437</td>
<td>26,988</td>
</tr>
<tr>
<td>3º grade</td>
<td>22,789</td>
<td>18,178</td>
<td>19,249</td>
<td>31,914</td>
<td>23,802</td>
</tr>
<tr>
<td>4º grade</td>
<td>20,245</td>
<td>15,540</td>
<td>19,095</td>
<td>26,453</td>
<td>22,935</td>
</tr>
<tr>
<td>5º grade</td>
<td>23,950</td>
<td>20,510</td>
<td>23,736</td>
<td>28,371</td>
<td>26,333</td>
</tr>
<tr>
<td>6º grade</td>
<td>24,218</td>
<td>23,551</td>
<td>24,876</td>
<td>23,786</td>
<td>23,839</td>
</tr>
<tr>
<td>Secondary for Children</td>
<td>131,603</td>
<td>118,164</td>
<td>120,511</td>
<td>169,654</td>
<td>146,382</td>
</tr>
<tr>
<td>1º grade</td>
<td>39,978</td>
<td>31,452</td>
<td>29,152</td>
<td>42,431</td>
<td>41,707</td>
</tr>
<tr>
<td>2º grade</td>
<td>26,034</td>
<td>21,889</td>
<td>19,266</td>
<td>34,656</td>
<td>28,816</td>
</tr>
<tr>
<td>3º grade</td>
<td>24,876</td>
<td>21,490</td>
<td>16,741</td>
<td>23,704</td>
<td>25,823</td>
</tr>
<tr>
<td>4º grade</td>
<td>15,460</td>
<td>17,405</td>
<td>36,244</td>
<td>45,983</td>
<td>19,264</td>
</tr>
<tr>
<td>5º grade</td>
<td>25,255</td>
<td>25,928</td>
<td>19,108</td>
<td>22,880</td>
<td>30,772</td>
</tr>
</tbody>
</table>

Note: Doesn’t include the information about dropout in educative institutions omitted in the corresponding year

Source: Censo Escolar 1998-2002 from the Department of Education.

Elaboration: Unidad de Estadística Educativa – Department of Education.
### Table No. A.2. Dropout in public and private institutions of primary and secondary education for children by gender and grade, 1998-2002

<table>
<thead>
<tr>
<th>Level / Grade</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
</tr>
<tr>
<td>Primary for Children</td>
<td>75,919</td>
<td>80,599</td>
<td>65,454</td>
<td>81,783</td>
<td>65,609</td>
</tr>
<tr>
<td>1º grade</td>
<td>23,078</td>
<td>20,582</td>
<td>23,753</td>
<td>20,873</td>
<td>16,553</td>
</tr>
<tr>
<td>2º grade</td>
<td>9,438</td>
<td>12,218</td>
<td>7,232</td>
<td>17,600</td>
<td>8,710</td>
</tr>
<tr>
<td>3º grade</td>
<td>10,286</td>
<td>12,503</td>
<td>5,822</td>
<td>12,356</td>
<td>8,704</td>
</tr>
<tr>
<td>4º grade</td>
<td>9,352</td>
<td>10,893</td>
<td>6,345</td>
<td>9,195</td>
<td>8,476</td>
</tr>
<tr>
<td>5º grade</td>
<td>11,391</td>
<td>12,559</td>
<td>10,217</td>
<td>10,293</td>
<td>10,718</td>
</tr>
<tr>
<td>6º grade</td>
<td>12,374</td>
<td>11,844</td>
<td>12,085</td>
<td>11,466</td>
<td>12,448</td>
</tr>
<tr>
<td>1º grade</td>
<td>23,063</td>
<td>16,915</td>
<td>19,294</td>
<td>12,158</td>
<td>17,024</td>
</tr>
<tr>
<td>2º grade</td>
<td>14,460</td>
<td>11,574</td>
<td>12,988</td>
<td>8,901</td>
<td>10,740</td>
</tr>
<tr>
<td>3º grade</td>
<td>14,278</td>
<td>10,598</td>
<td>12,831</td>
<td>8,659</td>
<td>9,125</td>
</tr>
<tr>
<td>4º grade</td>
<td>8,969</td>
<td>6,491</td>
<td>9,861</td>
<td>7,544</td>
<td>18,727</td>
</tr>
<tr>
<td>5º grade</td>
<td>14,101</td>
<td>11,154</td>
<td>14,388</td>
<td>11,540</td>
<td>10,674</td>
</tr>
</tbody>
</table>

Source: Censo Escolar 1998-2002 from the Department of Education.
Elaboration: Unidad de Estadística Educativa – Department of Education.

Note: In the report of biennial information, as in the case of the students registered in the previous year that can’t register in any grade next year, the only division that can be done is by gender. Divisions by geographic area or by the kind of management of the educative center would erroneously assume that the students of the rural area don’t emigrate to the urban area or that students from public schools don’t transfer to private schools, for example. Note: The dropout from educative institutions that are omitted from the corresponding year are not included.
# Table No. A.3. Descriptive Statistics of the variables employed in the models

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rural Boys</th>
<th></th>
<th>Urban Boys</th>
<th></th>
<th>Rural Girls</th>
<th></th>
<th>Urban Girls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of years of delay</td>
<td>1.48</td>
<td>0.04</td>
<td>0.80</td>
<td>0.02</td>
<td>1.56</td>
<td>0.04</td>
<td>0.79</td>
<td>0.02</td>
</tr>
<tr>
<td>Father’s Educative Level</td>
<td>3.82</td>
<td>0.04</td>
<td>5.57</td>
<td>0.06</td>
<td>3.82</td>
<td>0.04</td>
<td>5.48</td>
<td>0.05</td>
</tr>
<tr>
<td>Mother’s Educative Level</td>
<td>2.92</td>
<td>0.04</td>
<td>4.84</td>
<td>0.06</td>
<td>2.87</td>
<td>0.04</td>
<td>4.73</td>
<td>0.05</td>
</tr>
<tr>
<td>The child lives in Lima</td>
<td>0.00</td>
<td>0.00</td>
<td>0.37</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.36</td>
<td>0.01</td>
</tr>
<tr>
<td>The child lives in the Andes</td>
<td>0.63</td>
<td>0.02</td>
<td>0.24</td>
<td>0.01</td>
<td>0.65</td>
<td>0.02</td>
<td>0.25</td>
<td>0.01</td>
</tr>
<tr>
<td>The child lives in the Amazon</td>
<td>0.23</td>
<td>0.02</td>
<td>0.12</td>
<td>0.01</td>
<td>0.21</td>
<td>0.02</td>
<td>0.13</td>
<td>0.01</td>
</tr>
<tr>
<td>Number of sisters in age for primary school</td>
<td>0.46</td>
<td>0.01</td>
<td>0.32</td>
<td>0.01</td>
<td>0.96</td>
<td>0.02</td>
<td>0.83</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of sisters in age for secondary school</td>
<td>0.45</td>
<td>0.01</td>
<td>0.39</td>
<td>0.01</td>
<td>0.91</td>
<td>0.02</td>
<td>0.90</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of brothers in secondary school</td>
<td>1.03</td>
<td>0.02</td>
<td>0.90</td>
<td>0.02</td>
<td>0.51</td>
<td>0.02</td>
<td>0.38</td>
<td>0.01</td>
</tr>
<tr>
<td>Number of brothers younger than 6 years</td>
<td>0.79</td>
<td>0.02</td>
<td>0.50</td>
<td>0.02</td>
<td>0.80</td>
<td>0.02</td>
<td>0.53</td>
<td>0.02</td>
</tr>
<tr>
<td>The family boss is a woman</td>
<td>0.09</td>
<td>0.01</td>
<td>0.19</td>
<td>0.01</td>
<td>0.11</td>
<td>0.01</td>
<td>0.19</td>
<td>0.01</td>
</tr>
<tr>
<td>If the Child is the partner of the family boss</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>If the child is not the family boss neither the partner, nor child of the family boss</td>
<td>0.10</td>
<td>0.01</td>
<td>0.19</td>
<td>0.01</td>
<td>0.11</td>
<td>0.01</td>
<td>0.21</td>
<td>0.01</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 5th grade of primary school</td>
<td>313.27</td>
<td>10.03</td>
<td>755.07</td>
<td>27.68</td>
<td>314.79</td>
<td>9.84</td>
<td>783.91</td>
<td>38.49</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 6th grade of primary school</td>
<td>316.45</td>
<td>11.44</td>
<td>1003.94</td>
<td>172.27</td>
<td>303.93</td>
<td>8.91</td>
<td>789.63</td>
<td>30.76</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 1st grade of secondary school</td>
<td>341.20</td>
<td>12.59</td>
<td>1050.99</td>
<td>75.85</td>
<td>329.04</td>
<td>10.15</td>
<td>869.52</td>
<td>47.77</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 2nd grade of secondary school</td>
<td>378.32</td>
<td>14.99</td>
<td>896.36</td>
<td>57.38</td>
<td>390.03</td>
<td>23.44</td>
<td>984.34</td>
<td>106.53</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 3rd grade of secondary school</td>
<td>391.11</td>
<td>18.09</td>
<td>1033.70</td>
<td>86.77</td>
<td>453.36</td>
<td>34.67</td>
<td>903.77</td>
<td>51.94</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 4th grade of secondary school</td>
<td>389.90</td>
<td>17.09</td>
<td>954.48</td>
<td>67.45</td>
<td>389.62</td>
<td>18.17</td>
<td>933.18</td>
<td>49.56</td>
</tr>
<tr>
<td>Per capita expenditure of the families that have children in the 5th grade of secondary school</td>
<td>439.86</td>
<td>23.30</td>
<td>1042.28</td>
<td>78.14</td>
<td>515.83</td>
<td>56.72</td>
<td>976.69</td>
<td>64.78</td>
</tr>
<tr>
<td>Per capita expenditure of the extremely poor families</td>
<td>202.93</td>
<td>2.14</td>
<td>263.63</td>
<td>3.98</td>
<td>203.09</td>
<td>2.39</td>
<td>265.26</td>
<td>3.66</td>
</tr>
<tr>
<td>Per capita expenditure of the poor families</td>
<td>380.38</td>
<td>2.64</td>
<td>519.32</td>
<td>4.35</td>
<td>382.66</td>
<td>2.47</td>
<td>521.47</td>
<td>4.49</td>
</tr>
<tr>
<td>The main access to the district is a trail or path</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Stratum</td>
<td>7.23</td>
<td>0.01</td>
<td>2.56</td>
<td>0.04</td>
<td>7.24</td>
<td>0.01</td>
<td>2.52</td>
<td>0.04</td>
</tr>
<tr>
<td>Number of students by teacher in the district</td>
<td>23.07</td>
<td>0.23</td>
<td>20.67</td>
<td>0.12</td>
<td>23.02</td>
<td>0.21</td>
<td>20.66</td>
<td>0.13</td>
</tr>
</tbody>
</table>