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Family structure and children's education outcome: Evidence from Uruguay

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Family structure and children's education outcome: Evidence from Uruguay

Abstract

As the developed world has experienced a shift away from the traditional two-biological parent family, scholars have sought to understand how children are faring in non-traditional homes. Debate has arisen over assertions that children from non-traditional families do less well in school. Concerns about selection issues as well as a paucity of cross-cultural evidence, have led some scholars to question the influence of family structure on educational attainment. Using data from the 2006 Uruguayan household survey, we evaluate the relationship of family structure with children's education using two different methods to deal with selection problems, an instrumental variables approach and propensity score matching. Both approaches yield evidence that growing up in non-traditional family structures seems to be negative related with the schooling of Uruguayan boys, with more muted results for girls. Interestingly, Uruguay is a developing country with two peculiarities, that is, a culture that experienced fairly rapid modernization in terms of institutions –including family transition-, especially compared with other South American nations, and meanwhile an intriguing high level of school drop-out, unusually high for Uruguay's overall level of development. (*JEL: I2, J1*)

Key Words: academic achievement, family structure, instrumental variables, propensity score, selection effects.

Introduction

Over the past fifty years much of the world has experienced dramatic changes in the organization of families (e.g., Lundberg and Pollak 2007). Among the important family changes is an increase in the proportion of children raised outside of two-biological-parent homes¹. While some scientists have lauded family transformations as a triumph of human freedom, others have expressed concerns that family change has adversely affected the most vulnerable members of society, especially children (McLanahan 1985).

Much of empirical evidence fuelling the debate comes from data of the developed world. In this paper, we move the discussion forward studying the relationship between family structure and children's education outcomes in a developing country with two peculiarities, that is, a culture that experienced fairly rapid modernization in terms of institutions – including family transition-, especially compared with other South American nations, and meanwhile an intriguing high level of school drop-out, unusually high for Uruguay's overall level of development.

One important way in which family changes may impact the well-being of children is by affecting children's access to or success in school. Previous studies have uncovered a clear association between family structure and educational attainment, with children raised by both biological parents faring better than their counterparts in non-traditional families. At the heart of the debate about this association between family structure and educational outcomes is the contention that family structure itself is not to blame for children's school performance but rather that society fails to support alternative family forms, rendering them fraught with instability.

Uruguay is an interesting Latin American case for examining the link between family structure and education. For readers less familiar with Uruguay, we offer a brief description here. Uruguay is the second-smallest South American country, located between Argentina, Brazil and the South Atlantic Ocean, with a population of approximately 3,400,000 (INE 2010). Population growth is slow and the population is aging; 23 percent of Uruguayans are under 15 years old, while 13 percent are over 65 years old (INE 2010). Racially, Uruguay is dominated by white ethnic groups (88 percent white, 8 percent mestizo, 4 percent African-origin, and very few Native Americans –INE 2009), mostly descended from Spanish colonial days along with some more recent immigrants from Spain and Italy (Maiztegui 2005; Paredes 2003). Heavily urban, nearly 93 percent of Uruguay's people live in cities, with nearly half of the entire population living in the capital city of Montevideo (INE 2010).

Uruguay experienced fairly rapid development and modernization especially compared with other South American nations (Díaz 2003). In the 1980s, Uruguay emerged from a period of dictatorship to renew the democracy it had forged

¹ We avoid using the controversial term, "intact" to describe two-biological-parent homes (an unwieldy term!) and opt instead to use the somewhat less problematic "traditional."

when it won its independence. With this new democratic regime came a host of modern and progressive ideals (Paredes 2003). Additionally, Uruguay has an unusually secular population compared with the rest of Catholic-dominated Latin American (Guigou 2006). Thus, Uruguay experienced several family transitions before its neighbours. The marriage rate has declined even as divorce has become common, birth rates are among the lowest in South America and about a quarter of children live with only one biological parent (Observatorio de la Familia 2010).

In addition to, and perhaps related to, family change, Uruguay is also experiencing some negative trends related to its educational system. Most troubling is the high level of school drop-out, unusually high for Uruguay's overall level of development (Manacorda 2006). Drop-out rates differ importantly by gender, with boys much more likely to drop out than girls (Cid and Ferrés 2008).

In this study, we use nationally representative data from Uruguay to examine the relationship between family structure and education. In particular, we compare results from two different methodologies designed to deal with selection, the instrumental variables approach and propensity score matching.

Mechanisms behind Findings of Previous Studies

Scholars have suggested a number of possible mechanisms to explain the empirical relationship between family structure and educational attainment. All of these mechanisms may apply in Uruguay as well as they did in the contexts in which they were first theorized.

First, children in non-traditional family structures are less likely to grow up with access to pro-educational resources (Garasky and Stewart 2007; McLanahan and Sandefur 1994). This resource deficiency may result because non-traditional family structures are disproportionately found among the poor (selection) or from a lack of present and/or supportive adults to offer supervision, help with homework, give emotional support, etc... (causation). The selection argument finds some support in recent studies, such as Dew's (2009) study examining the mechanisms linking household financial assets and divorce; fewer assets is related to a higher probability of divorce.

In this line of resource deficiencies, one qualitative and cross-section study, examining the perception of childhood parental divorce among young Israeli adults, finds that most of their interviewees described an economic decline following divorce (Eldar-Avidan et al. 2008). A loss of economic resources in the home may directly impact a student's educational fortunes, perhaps most notably when the student feels pressure to generate additional income for the home. Students who are able to work and help provide for their family are likely to do so at a loss to their academic pursuits.

The decline in parental resources after divorce does not appear to be limited to financial assets. In a recent summary of the literature on parental time, Gauthier and Monna (2008) find few differences in the parental time allocation patterns

of cohabitating and married parents, while single or divorced parents spend less time with their children as compared to biological two parent families. The in-school experience of children from non-traditional homes may not be very different from that of their classmates from traditional families, but after school these youth may experience divergent outcomes depending upon the level of parental supervision, exposure to peers, skill-building opportunities, and time with family members that they experience (Astone et al. 2007). The effects of lower levels of parent supervision are likely to be most deleterious to youth in poor, urban areas because of the high prevalence of violence and crime in these areas (Astone et al. 2007).

A second way in which non-traditional family structure may be negatively related to educational outcomes is that non-traditional family structures are more likely to be characterized by instability or conflict. Instability can disrupt a child's schooling success in a number of ways, including causing emotional distress and high residential mobility (Frisco et al. 2005).

Regarding the linkage between family instability and residential mobility, Schramm (2006) shows that the average American child in a two-parent family experiences 1.5 residential moves before age 15, while the average child from a divorced family moves 2.5 times. Residential moves can disrupt peer and student-teacher relationships for youth, resulting in poor educational outcomes (Langenkamp 2009).

Finally, when there has been dissolution of a parental union, non-traditional family structures may be characterized by conflict over both the temporal and financial resources dedicated to the child. For instance, Forry et al. (2010), employing longitudinal data, find that, with higher conflict after separation, both fathers and mothers are less involved in their child's education. Taken together, both the resource and instability explanations suggest that, while some selection is certainly involved, there are also many mechanisms by which non-traditional family structures are related to negative educational outcomes. All of these theoretical mechanisms may also be present for Uruguayan families and students. Thus, especially in light of the concurrent trends of family decline and high student drop-out, it makes sense to examine a possible linkage between family structure and educational attainment in Uruguay.

Methodological Considerations for Studying Causation

Some scholars have suggested that eliminating the social stigmas and adverse socio-economic conditions associated with (most) non-traditional family structures would also reduce the instability and resource deficiencies experienced by children in these homes (e.g., Stacey 1993). Presumably, according to these scholars, children of non-traditional homes would fare better in school in societies with more social support for alternative families. Other scholars are less optimistic and suggest that alternative family forms are inherently unstable (e.g., Popenoe 1993).

Adding to debates about the linkages between family structure and children's education are the many methodological attempts to deal with selection issues associated with family and education. In a review of empirical findings on family structure and children's educational attainment, Ginther and Pollak (2004) conclude that, despite (or perhaps because of) the variety of methodological approaches, there is no consensus in the empirical literature: some studies find no significant educational effect for non-traditional family structures while others find a significant negative effect. Notably, no studies indicate a positive effect of non-traditional family structures on children's educational success.

Ginther and Pollak (2004) suggest that endogeneity introduces bias due to unobserved individual or household characteristics that may affect both family structure and children's educational attainment. For instance, some individuals may be more positively oriented toward children than others, and their pro-child orientation may be also associated with traditional family structures and with certain positive outcomes for children (Ginther and Pollak 2004). Conversely, a depressed or functionally disabled person may have difficulty attracting or retaining a spouse, and his/her children may also have educational difficulties independent of the effects of family structure (Gennetian 2005). To deal with this problem of endogeneity, a more recent study employs propensity score matching to examine how parents' union dissolution influences students' educational success using data from a nationally representative sample of American adolescents (Frank et al. 2007).

Cross-cultural studies are needed to see if the association holds across contexts. Finding evidence in Uruguay, a context where stigma is less likely to be a factor, would further bolster the case for a clearer linkage between family structure and educational attainment. Below, we give more detail about the specific circumstances in Uruguay and why they make Uruguay an enlightening case study.

Changes in Family Structure in Uruguay

In many ways Uruguay is like its Latin American neighbours, and serves to illuminate how other countries in the region might experience the consequences of family change. In other ways, though, Uruguay is unique and it is precisely the unique structural and cultural elements of Uruguay that make it so useful as a cross-cultural addition to the multiplicity of studies from the US on the relationship between family structure and education. Below, we first briefly describe the broad contours of family change in Latin America and then narrow our focus to the specific family and educational conditions in Uruguay.

Like other areas of the developed world, most Latin American countries have experienced major changes in family structures. Among the most significant transformations are (Attanasio and Székely 2003): a) an increase in the labor

force participation of women; b) growth in the number of divorces; c) a drop in the number of children for younger cohorts; d) an increase in the proportion of inhabitants over 65 years of age; and e) later ages at first marriages.

As a result of the changes described above, many Latin American adolescents are growing up in differently structured homes than their parents. Thus, researchers are very interested in how the family transformations wrought in the previous generation will affect the current Latin American youth.

Uruguay has not avoided the family revolution in Latin America and, in fact, experienced most changes earlier than its neighbours. Uruguay was the first country in Latin America (by nearly a half century!) to adopt more liberal divorce laws, even preceding several European countries in this regard (Paredes 2003). Uruguay also had a sharp decline in fertility levels earlier than other Latin American countries; fertility was as low as 2.3 children per woman in the 1990s and is now around 2.1 (Attanasio and Székely 2003; INE 2008).

Thus, true to its cultural and ethnic heritage, Uruguay has followed a European pattern in fertility change (Cid et al. 2004). The underlying causes for fertility change in Uruguay also fit the European model. Having children at later ages is the most important proximate predictor of fertility decline (Dribe and Stanfors 2009). Other underlying forces include the low infant mortality rates, high female employment, low marriage rates, and high opportunity costs of having children (Hondroyannis 2010).

The most recent demographic data for Uruguay (Observatorio de la Familia 2008 and 2010) show the magnitude of other family changes: the number of marriages per year has declined from more than 20,000 in 1990 to 12,180 in 2008 (this trend is similar both in the capital and in the interior of Uruguay). Meanwhile, the number of divorces has increased from less than 7,000 in 1990 to more than 14,000 in 2004. Over this same time period, non-marital cohabitation among 25-35 year olds increased from less than 10 percent to 30 percent.

Another index of changes in family structure is the number of female headed households. While in 1990 less than 20 percent of the households were headed by women, in 2009 this figure was almost 35 percent (Observatorio de la Familia 2008 and 2010). This measure reflects a number of family related factors, including female labour force participation, later ages of first union, and the growth in the number of divorces.

Based on the demographics described above, it is no surprise, then, that growth in non-traditional family structures is also an important part of family change in Uruguay. Table 1 shows the evolution of the principal household structures in Uruguay: decreases in “Couple with Children” households, growth in households with only one person and households with mother and children, and stability in the percentage of “Only Couple” households (Pradere and Salvador 2009).

<Table 1 about here>

Figure 1 shows that, while about three-fourths of Uruguayan youth still live in traditional homes, one quarter are now growing up with only a single biological parent in the household. Moreover, the number of children living with both biological parents is steadily declining; it has declined about 6 percent over the last five years (Observatorio de la Familia 2008).

<Figure 1 about here>

What should be abundantly clear from the demographic data is that Uruguay has already experienced a family revolution, one that began well before its Latin American neighbours and that fits a Western European pattern. Demographic and family transformations do not occur in an ideological vacuum. Some unique historical, cultural, and structural features of Uruguay help explain why the tectonic plates of family change shifted first in this little part of the Southern Cone of Latin America.

First, while still majority Catholic, Uruguay is more secular than comparably developed Latin American countries, and this may help explain why family change began earlier in Uruguay than in other Latin American countries (Guigou 2006). Second, as mentioned earlier, Uruguay has a small population that is fairly homogenous racially and of Western and Southern European origins. This attunes the country's cultural sensibilities toward European values in a way different from the larger Latin American countries with more diverse populations. Third, Uruguay's geography facilitated an early concentration of the population in Montevideo, thus urbanizing the nation earlier than its neighbours. Finally, Uruguay emerged in the 1980s from a period of dictatorship, and the new democratic regime has enabled and promoted progressive gender ideologies (Paredes 2003). Below we use recent findings to illustrate the contours of family and gender values in Uruguayan culture.

Among the most important features of Uruguayan culture regarding family and gender roles is fairly strong support for gender equality in labor market participation and household work. Uruguayans are significantly more likely to disagree with the statement, "men make better political leaders than women" on the 2006 World Values Survey compared with the 1996 World Values Survey (Pagano et al. 2009). Paredes (2003) cites a recent opinion poll where more than 80 percent of the Uruguayans (with equal support from men and women) think that both spouses have to contribute to the household earnings. A 2001 survey of women (aged 25 to 54) shows that Uruguayan women believe that men should take an equal share of household tasks (Bucheli et al. 2002). These opinions appear to be translating into action: a survey of 1,806 women aged 25 to 54, finds that three indexes of ideological orientation (institutionalism, conservatism, gender traditionalism) strongly predict women's union formation history and labour force participation (Peri 2003). We note, however, that, despite a general liberalizing of ideas about family and gender roles, Uruguayan

women still lag behind men in earnings and political participation (Paredes 2003); in this area of gender inequity Uruguay is not unlike its neighbours to the North.

While women are marrying later and striving for equality in the workplace and the home, largely to the approval of both men and women, there is also evidence of changing views toward the place of children in the family. Using opinion polls from the 1990s, Paredes (2003) argues that maternity, though still important in female identity, is not as central as in the past. Evidence from another poll in 2001 shows that many Uruguayan women no longer believe that childbearing is important for women to have a fully satisfying life nor that children present a compelling reason to preserve a struggling marriage (Bucheli et al. 2002).

Finally, it is important to note that family transformation and progressive attitudes are unevenly distributed across the socio-economic landscape in Uruguay. Several studies find that poor express more conservative values regarding both the role of women in housekeeping and childrearing and toward divorce when children are involved (Aguiar et al. 2009; Bucheli et al. 2002; Paredes 2003). Thus, the poor in Uruguay are more likely to express support for traditional family forms but less likely to live in them (Observatorio de la Familia 2008).

Pulling together the information above, the picture of Uruguay that emerges reveals a progressive, European-style culture. Though gender inequity exists and traditional values are more prominent among the poor, Uruguay exhibits little of the “family culture wars” of the US, nor the internally uneven demography or its more geographically and racially diverse Latin American neighbours. Thus, it is fairly safe to say that stigma against non-traditional families is comparatively minimal in Uruguay. Where it does exist, it is not likely to come from cultural elites in the media, corporate, or government groups; the more highly educated are the most progressive. These unique cultural and demographic features make Uruguay an important case study for examining the results of family decline, especially as a contrast to the US where religious conservatism and racial prejudices make stigma more likely.

Changes in Children’s Education in Uruguay

Like other developed Latin American nations, Uruguay has experienced increasing demand for a more highly educated populace. Latin American countries have invested considerable economic resources in order to improve their educational supply, particularly in terms of school infrastructure and appealing to students. Despite these efforts, drop-out rates remain high. Filgueira et al. (2003) observe that the drop-out problem appears to be on the demand side and the primary focus of diagnosis and policy should go from supply to demand. Given the evidence from other developed nations, family structural changes may play a significant role in understanding why students are not completing school.

Before discussing how family structure might influence children's education in Uruguay, it is necessary to explain some features of the Uruguayan educational system. Below we describe three related, but distinct, educational problems encountered in Uruguay: drop-out after Junior High School, students falling behind grade level, and greater problems among boys.

The school system in Uruguay is predominantly public and centralized with a common curriculum for all schools (Ravela 2005). Students typically begin Primary school at six years old. After six years of Primary school students begin the first three years of Secondary school (Junior High School) followed by another three years of Secondary school (Completed High School). School enrolment patterns in Uruguay are typical for Latin America (UNESCO 2010). Though students have nearly universal access to schooling and persist through Primary school, significant drop out problems emerge among teenagers--and the problems are worse for vulnerable subpopulations. Related to this drop out problem is the high number of students who have fallen behind grade level.

In Uruguay boys are more likely to drop out than girls. Figures 2 and 3 display the drop out levels and proportion of boys and girls badly behind in terms of years of education. This gender gap does not appear to be related to differing access for boys vs. girls, nor to differential parental investments by gender. Giacometti (2007) finds no evidence to support gender based discrimination in regards to educational access or in parents' valuation of the relative worth of daughters' and sons' education.

One possible explanation for this gender gap is that young men have easier access to the labour market. In other words, it is easier for teenage boys in Uruguay to find work (albeit low wage work) after completing Primary school. For males who are already behind or struggling in school, it may be more inviting to secure the immediate benefits of a low wage job rather than face another six (or more) years of education in order to access better wages. Gauthier and Monna (2008) provide another explanation. They find that gender seems to be significant in determining the amount of time that parents spend with their children. Namely, sons tend to receive less attention than daughters from their mothers. In Uruguay where 23 percent of children live with only their biological mother (see figure 1), boys may receive less parental attention on average.

<Figures 2 and 3 about here>

Again, we note here that Uruguay is an important test case of the idea that non-traditional family structure is negatively related to educational attainment primarily because of societal stigmas associated with alternative family forms. Some forms of stigma seem especially unlikely in Uruguay. Because Uruguay was one of the first South American countries to introduce more permissive divorce laws (Bucheli and Vigna 2005) and because the divorce rate

has grown steadily over the last 20 years (Observatorio de la Familia 2010), most Uruguayans have been touched by divorce in one way or another. We think it is unlikely that teachers hold prejudices against the academic skills of children from non-traditional families (e.g., children from "broken" families can't be smart). In relatively secular and progressive Uruguay, discrimination and ridicule may come from unsupportive classmates (especially among the poor where traditional values are stronger), but it is unlikely to come from institutionalized sources controlled by the more well-educated elite.

To bring together the threads of discussion above: Children in Uruguay, especially poor and rural children, face an educational system with high drop-out after Primary school, a large number of students who have fallen behind, and a system which offers short term rewards to boys who exit the system for low wage work. Thus, we are returning to the primary research question of this paper: Does growing up in a non-traditional home hinder the educational attainment of Uruguayan students?

Based on previous research from the United States, we suspect many of the same mechanisms hypothesized in the US context are also at work in Uruguay: non-traditional families have fewer resources on average, less ability to supervise children's educational pursuits, and higher levels of instability. Furthermore, young men growing up with single mothers or in stepfamilies may receive relatively less attention than young women in similar households, leaving them more vulnerable to falling behind or dropping out. Additionally, non-traditional families may create pressures for young men to exit the educational system in order to supplement family income or otherwise take on more adult roles in the family. For all of these reasons we hypothesize that non-traditional family structure may be negatively related with schooling performance of Uruguayan children, especially young men.

Below we use two methods, the instrumental variable approach and propensity score matching, specifically designed to deal with endogeneity, to examine nationally representative data from Uruguay. We seek to answer two questions: Is there evidence for a link between family structure and students' drop-out and/or falling behind grade level? And is this link operative for both boys and girls?

Data

Because we aim to explore relationships between children's educational achievements and family structure, we need data which specifies the timing of family transitions for each child. In Uruguay, though there is no longitudinal cohort data, a unique feature of the Year 2006 Continuous Household Survey is that, for the first time, it includes information about the timing of family transitions. The Continuous Household Survey ("Encuesta Continua de Hogares") of 2006 is representative of the entire country (both rural and urban areas). Approximately 87,000 households and 260,000

individuals are surveyed. This cross-sectional data is provided by the National Institute of Statistics (“Instituto Nacional de Estadística”) of Uruguay, a public institution.

The sample used in this study is limited to the 6,402 children aged 9 to 16. We concentrate our analysis of school drop-outs and falling behind in these ages because in Uruguay nearly 100 percent of 6 year olds attend primary school and problems are rare before age 9. We truncate our sample at 16 years old because at this age students should have completed the Junior High School, which is mandatory by law. There are two groups in the present sample: a) *traditional family group*, children who live with both biological parents (and these parents never formed another couple before: thus, neither parents nor children have experienced family-structure transitions), and b) *non-traditional family group*, children who live with one biological parent at the time of their entrance into the education system.

Because children whose parents eventually divorce might manifest behavioral problems before their parents separate (Ginther and Pollak 2004) we only include children in the *non-traditional family group* who were born *before* the family transition but started formal education *after* a completed transition. Also, the survey has no information about the timing of children’s drop-out or grade retention so we have to use only children who experienced family transition before beginning schooling (otherwise we wouldn’t know if their drop-out/grade retention was before or after family transition). Hence, our *non-traditional family group* includes children from several different family structures: extended and not extended families, step parent, single parent, divorced parent, and separated parent from marriage or cohabitation.

Dependent Variables

Drop out simply indicates that the student is not enrolled in school at the time of the survey.

We define *badly behind* as follows:

An educational gap (being behind) is defined as the difference between expected years of schooling (number of years of schooling under assumption of an initial enrolment age of 6 and completing one grade per year without grade repetition) and actual years of schooling, as a proportion of expected years of education. For instance, an adolescent of 14 years old should have accomplished 8 years of education. If this adolescent has only completed 7 years of formal education, then his gap is $[(14 - 6 - 7)/(14 - 6)]=0.125$

Because the survey does not include a question about the birthday of the child, we cannot be certain of the match between the child’s age and grade level. Thus, we take a conservative approach and suppose that a student may be enrolled in a lower academic year because his birthday falls during midterm². Also, the time of the survey may not

² Academic year commences in March and no child may start primary school till he/she is 6 years old at least on April 30th.

coincide with the end of the courses and hence the students may underreport the years of education achieved. Thus, for these two reasons, we identify the educational gap subtracting two years to the estimated years of schooling as follows:

$$\text{educational_gap} = \frac{[\text{age} - 6 - \text{years of schooling} - 2]}{[\text{age} - 6 - 2]}$$

Hence, using this definition, if the educational gap of one child is over zero, it indicates that he or she is unquestionably behind in their studies and likely badly behind.

Method

While an experiment in which children were randomly assigned to non-traditional families or to a traditional family control group and then tracked for ten years might be the ideal way to evaluate the effects of family structure on subsequent children schooling outcomes, such an experimental evaluation is obviously unethical. To approximate experimental design with the data actually available, we employ two strategies designed to identify causal influences.

First, we use an instrumental variables (IV) approach. We instrumented non-traditional family status with the mean of non-traditional family status by child age in each locality.

In other words, we estimate this model:

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_kx_k + u$$

where “y” is the educational outcome, “x₁” is family structure (takes the value 1 in the non-traditional family structure case and 0 otherwise), and “x₂ ... x_k” are controls such as age, parents’ education, etc. We want to specify the effect on “y” (the educational outcome) of an exogenous change in the regressor variable “x₁” (the family structure). But there could be unobserved individual or household characteristics (i.e., parents’ commitment to family and child care) that may affect both family structure (a regressor) and educational attainment of the children (the dependent variable). If this is the case, there is no exogenous change in the regressor and the estimator of the effect can no longer be given a causal interpretation. One solution to the endogeneity problem is to directly include as regressors controls for parents’ commitment to household and child care. But such regressors are rarely observable or available. The instrumental variables (IV) approach provides an alternative solution.

The IV estimator provides a consistent estimator of the parameter “ b_1 ” (the effect of family structure) under the assumption that valid instruments exist. A valid instrument has the property that changes in the instrument are associated with changes in “ x_1 ” (the family structure) but do not lead to changes in “ y ” (the educational outcome). Thus, the IV estimator requires two conditions: a) the instrument has to be correlated with family structure, and b) the instrument has to be uncorrelated with the unobserved individual or household characteristics.

In this paper, we have instrumented non-traditional family structure with the mean of non-traditional family by child age in each locality. There are 111 localities and children with 8 different ages. Thus, within the restrictions of available cross-sectional data, the identification of the IV estimates is based on the interaction of age and locality. Exploiting the locality specific variation in education across ages, we seek to control for unobserved characteristics that might be correlated with educational attainment and family structure. In the results section, tables with the first stage of estimates show that the instrumental variable is highly correlated with non-traditional family. And we argue that the mean of non-traditional family by child age in each locality is not correlated with the unobserved characteristic (i.e. parents’ commitment to household and child care). Berlinski et al. (2008) employ a similar strategy to analyze the impact of preschool exposure on children’s subsequent academic achievements. Specifically, they instrumented preschool attendance by the average preschool attendance in the child’s age cohort in his/her locality of residence.

In order to properly evaluate the possible effects of family structure on children’s drop-out and falling behind grade level, we also introduce the following controls:

Child’s age: We include the age of the child to account for the possible bias due to children’s exposure to different educational public policy or government interventions along the years. Also we incorporate child’s age because it could be reasonably argued that opportunities from the labor market emerge as teenagers get older, hence influencing drop-out and falling behind.

Disability: The Survey provides information about the possible existence of some disability in a child (i.e., if the child attends a school for children with disabilities or if the child receives a disability pension). We use this control because a student with physical or psychological disabilities may have additional difficulties successfully navigating the educational system.

Education of the head of household: A myriad of studies (e.g., Brown 2004) show examples of the positive impact of parents’ education (especially mother’s) on children’s schooling outcomes. (Step)Mother’s and (step)father’s education are also proxies of resources available that may affect child outcomes (Gennetian 2005).

Region: the GDP per capita, labour opportunities and educational facilities are different among the regions of Uruguay. Thus, we introduce dummies for the capital (Montevideo, where the majority of the population resides), for three other urban areas and for rural areas.

Household Wealth Index: Children from wealthier households have more material resources to support their educational performance. For example, Ravela (2005) shows positive correlation between a socio-economic context index (a measure of wealth) and school achievement average in language in Uruguay. Due to the fact that employing current income as a proxy of household wealth could introduce bias in the estimation (Jeynes 2002), we create an index of relative wealth using the goods information of the Continuous Household Survey. The survey provides information about goods in the household such as: hot water heater, electric tea kettle, refrigerator, color television, cable TV service, washing machine, dishwasher, microwave, computer, internet connection, automobile for personal use, phone service, etc. For each good i , we have constructed a dummy variable d_i which takes value 1 if the house has this good or service, and 0 otherwise. Thus, we have developed this indicator in two steps:

1st) we calculate the sample mean of each d_i ;

2nd)

$$\text{“relative wealth index”} = \frac{\sum_{i=1}^{i=13} [1 - \text{mean}(d_i)] d_i}{\sum_{i=1}^{i=13} [1 - \text{mean}(d_i)]}$$

Therefore, as an indicator of relative welfare, the formula above determines that the greater number of people in the sample having a particular good, the less relative welfare that good implies. This indicator of wealth/poverty is highly correlated with current household income (Cid and Ferrés 2008) and it is a better index than current income in the case of cross sectional household surveys. Cross sectional surveys in Uruguay typically report only the income at the month of the survey (INE 2009), while the relative wealth index that we employ shows welfare in comparison with other households. All the estimates in this paper include this wealth/poverty control. In other words, the effect of poverty on children’s educational attainment is controlled in all regressions in order to try to isolate the effect of family structure.

Table 2 displays descriptive statistics for the sample.

[Insert Table 2]

We test for linkage separately by sons and daughters because of the possible bias introduced by households that invest more in a child by taking gender into consideration. As mentioned earlier families may pressure boys into early entry into the labour market and this may be especially true of non-traditional households. Also, Sax (2006) states that, researchers have found evidence of sex differences in noncognitive parameters that are relevant to how children learn. The existence of sex differences in cognitive function and language skills could explain part of the different educational

outcomes between sons and daughters or the different reaction towards an external shock (family transition, for instance).

As mentioned above IV approaches are dependent on the assumption that the chosen instrument is valid, a validity which is difficult to conclusively establish. Thus, to introduce more robustness into our analysis we also use propensity score matching. Propensity score matching, like the IV approach, seeks to identify linkages, but is not dependent upon the same assumptions.

We observe (y_i, x_i, D_i) , $i=1, \dots, N$, where y_i is the children education performance, x_i represents the regressors, and D_i is a dummy variable and takes the value 1 if the individual belongs to a non-traditional family and is 0 otherwise. The impact of a hypothetical change in D on y , holding x constant, is of interest. But no individual is simultaneously observed in both states. Moreover, the sample does not come from a randomized social experiment: it comes from observational data and the assignment of individuals to the traditional and non-traditional families is not random. Hence, we estimate the effects of family structure based on propensity score. This approach is a way to reduce the bias performing comparisons of outcomes using individuals from traditional and non-traditional families who are as similar as possible. The propensity score is defined as the conditional probability of belonging to a non-traditional family given baseline characteristics:

$$p(X) \equiv Pr\{D=1|X\} = E\{D|X\}$$

where $D=\{0,1\}$ is the indicator of exposure to a non-traditional family structure and X is the vector of baseline characteristics.

The propensity score was estimated in this research using a Logit model. Due to the probability of observing two units with exactly the same value of the propensity score is in principle zero since $p(X)$ is a continuous variable, various methods have been developed in previous literature (for a summary, see Cameron and Trivedi 2005) to match comparison units sufficiently close to the treated units. In this analysis, after estimating $p(X)$, we employed the Kernel Matching method.³

Since we need to estimate $p(X)$ —the conditional probability of belonging to a non-traditional family—using a logit model, we introduce the following variables to help explain the probability of living without one biological parent. We focus especially on variables related to the mother because only 3 out of 100 children live only with their father and we have no information on non-resident biological parents.

³ This matching method was applied using the Stata ado file “psmatch2” developed by Leuven and Sianesi (2003).

Mother's religion and race: Studies have shown that both religion and race signify significant subcultural influences which can effect family formation decisions across the life course (Wilcox and Wolfinger 2007).

Mother's age and region: These variables take into account possible changing attitudes towards family stability across generations (Thornton 1985) and across different regions (Kalmijn and Uunk 2007).

Mother's education: Studies have reported an inverse association between spouses' levels of education and the risk of marital disruption (Jalovaara 2003).

Household wealth: Greater levels of wealth are associated with a greater likelihood of maintaining traditional family forms (Bucheli and Vigna 2005).

Results

We begin our analysis with results from simple logistic regressions. Table 3 displays odds ratios from Logit models predicting drop out and children being behind grade level. The odds ratios suggest that being in a non-traditional family increases the probability of drop-out from school and of falling behind for both sons and daughters. But as we detailed earlier, simple regression models are vulnerable to selection effects due to unobserved individual or household characteristics that may affect both the family structure and the later educational attainment.

As a first approach to deal with endogeneity we employ an instrumental variable (IV) approach. Specifically, we instrumented non-traditional family status with the mean of non-traditional households by child age in each locality. The suitability of this instrument is reflected in its significant positive correlation with the family structure of each child (see Table 4), and in the assumption that there is no correlation between the instrument and the unobserved family/child characteristics. Hence, in Table 5 we show results from the second stage IV model. In the case of sons, the impact of growing up in a non-traditional family is significantly different from zero for both the probability of school drop-out and falling behind in school. There is no significant effect for girls on either dependent variable. This differential effect on sons' education is consistent with our theory that sons' educational prospects are more likely to be sidetracked in non-traditional homes.

[Insert Table 3 and Table 4 and Table 5]

Shifting our analytical lens, in Table 6 and Table 8 we use propensity score matching to examine the relationship between family structure and educational outcomes. In the case of girls, the point estimates indicate that non-traditional family status increases the probability of drop-out and falling behind in school, but the effect is significantly different

from zero only at the 0.10 significance level. For boys, non-traditional family status has no statistically significant effect on drop-out (though the point estimate is positive, as expected). Non-traditional family does, however, have a statistically significant impact on falling behind for boys. This greater impact on falling behind for boys is consistent with our hypothesis and matches the results from the earlier instrumental variable analysis.

Thus, using the propensity score and the Kernel matching method, there is evidence that living with only one biological parent is negatively related to children's educational attainment. The matching method intends to make comparisons between individuals from traditional and non-traditional family structures who are as similar as possible. This similarity between these two groups of individuals can be seen in means comparison tests (t-tests) shown in Table 7 and in Table 9. There are no statistically significant differences in the key characteristics of the treated and control matched individuals, indicating that estimates in Table 6 and Table 8 are unbiased. Taken together with our earlier findings from the IV approach, these findings give strong evidence that there is a significant link between non-traditional family structures and lower educational attainment, especially for boys.

[Insert Table 6, Table 7, Table 8, and Table 9]

Discussion

Uruguay, like many Latin American countries, has experienced huge changes in family structure in the last thirty years: the marriage rate has declined even as divorce has become common, birth rates are among the lowest in South America and about a quarter of children live with only one biological parent. During the same period some students have failed to benefit from the significant investments and improvements in the educational system. Specifically, a high proportion of students, especially young men, drop out after Primary school and others fall badly behind in school, making them vulnerable to future drop-out. In this study, we engage the debate about the influence of family structure on educational attainment by presenting the cross-cultural case of Uruguay as well as employing analytical methods designed to overcome selection problems.

Using the 2006 Continuous Household Survey of Uruguay, which provides information on the timing of family transitions, we find strong evidence that being raised in a non-traditional family is significantly linked with students' drop-out and falling behind in school. Our evidence shows that boys are especially vulnerable to negative educational influences of non-traditional households. Differential responses to shocks (Sax 2006) or relatively less attention from (single) mothers (Gauthier and Monna 2008) may explain why boys are faring worse than girls. We suspect, however,

that the gender gap is likely because boys in non-traditional homes feel more pressure to exit the school system for low wage work, rather than hazard another six or more years of school.

We reach these results from *observational* data. No “lottery-based” or “quasi-experimental” results are available to avoid selection bias. Nor would we suggest randomly assigning children to traditional or non-traditional families. To cope with this problem we have employed two different techniques: two stage least squares with instrumental variables and propensity score estimations.

As we have noted throughout, Uruguay is in some ways representative of family changes and educational problems in all of Latin America, but it is also unique in important ways. For reasons related to the country’s progressive, European-style culture and particular historical, ethnic, and demographic development, Uruguay experienced the “family revolution” well before many of its continental neighbours. Uruguay also exhibits an unusually high drop-out rate between Primary and Secondary school. We find evidence at the individual level that these two distinctive trends (early family change and excessive drop-out) may be linked. Add to this finding that, because of Uruguay’s progressive outlook, unmeasured stigma is unlikely to explain the associations we observed (Pagano et al. 2009; Paredes 2003; Peri 2003; Pradere and Salvador 2009), and the case of Uruguay becomes a unique and important addition to findings from the US and other contexts, which support a role for family structure in influencing children’s educational outcomes.

We should note at this point that our findings provide little leverage on the debate as to whether family structure effects are due to underlying socio-economic causes or from the instability associated with non-traditional family forms. Our analytical task was a straightforward one: to determine whether or not non-traditional family structure is linked to children’s educational attainment in Uruguay. Our evidence says that it does, and especially for boys.

Future research should more fully specify and test the mechanisms (which we only theorized) by which non-traditional family structure influences educational outcomes. Specifically, family structure may influence educational attainment because: 1) Families experience a decline in resources following a divorce or other loss of a parent or guardian; 2) Parents may be able to devote less time and attention to each child due to the absence of one (biological) parent or the additional of a step parent and/or step children; 3) Parental conflict both before and after a family transition causes emotional distress or estrangement; 4) Family transition triggers increased residential mobility which interferes with school progress and socialization. Any or all of these mechanisms may operate in non-traditional Uruguayan families. However, as we indicated earlier, the gender differential we find in the impact of family structure is suggestive of two specific mechanisms. Namely, boys may be more disadvantaged from the relative lack of parental supervision in a single or step-parent household, or boys may be less resilient to the shocks of family disruption (Sax 2006). These two mechanisms, in particular, deserve further investigation.

Our study of Uruguay, a relatively secular and gender progressive country where stigma is less likely, presents an important test case of societal intolerance on the Latin American front. Scholars should also pursue research on this subject from other cultural contexts, especially those even more tolerant of non-traditional family structures. Our research also uses the best available data from Uruguay to make a first approach in the Latin American context to the problem of selection bias in family and education research. Further research and improved data is needed to better understand selection processes and the complex relationships among parents and children.

We realize that our findings do not represent conclusive evidence that family structure causes educational problems; such evidence would be difficult to produce with the best data and methods. Instead, we add these cross-cultural findings to the panoply of evidence from the US and other contexts. Non-traditional family structures have now been linked with children's educational struggles across multiple cultural contexts, using various data sources, and with sophisticated methods to deal with possible selection problems. When considered alongside the multiple mechanisms by which non-traditional family structure is theorized to influence children's educational outcomes, we think the linkage is strong.

As for the children in Uruguay growing up in non-traditional families, policymakers should pay special attention to the struggles that these children and their parents face in navigating the educational system. Boys especially will need greater incentives to persist in school or else the lure of easily available work, albeit low wage, will continue to draw them away from further education.

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Table 1 - Principal Household Structures in Uruguay – Years 1986 & 2007

	1986	2007
Only Couple with Children	40%	33%
Couple with Children plus other Relatives or Friends	10%	6%
Only Couple without Children	15%	15%
One Person Household	10%	21%
Only Mother with Children	7%	11%
Mother with Children plus other Relatives or Friends	4%	4%
Only Father with Children	1%	1%
Other	13%	9%

Source: Pradere and Salvador (2009)

Table 2 – Definition and Description of Variables - Uruguay, 2006

	Mean	Std. Dev	Min	Max
Drop out from School	.078	.268	0	1
Presence of Important Educational Gap	.096	.294	0	1
Living with only one biological parent at the time of formal education	.285	.451	0	1
Child Age	12.280	2.259	9	16
Female	.485	.499	0	1
Disabled (1)	.014	.120	0	1
Education of the Household Head	7.950	3.455	0	22
Wealth Index	.222	.182	0	.910
Montevideo-Country's Capital	.306	.461	0	1
Urban-Country's Centre	.120	.325	0	1
Urban-Country's South	.135	.342	0	1
Urban-Country's Frontier	.236	.424	0	1
Rural	.200	.400	0	1
Observations	6402			

(1) No data are available about the kind disability. The data only present whether children with disabilities are attending school and whether they child receive a disability pension. Children with disabilities represent a small proportion of the sample and if this group is dropped the results are substantively unchanged.

Table 3 – Impact of Non-traditional Family Structure on a) Drop-Out from School and on b) Child Behind Grade Level – Logistic Estimates - Year 2006 - Children aged 9-16

Binary Dependent Variables	Daughters (Odds Ratio)	Sons (Odds Ratio)	Observations
a) Drop-Out	1.503 (.307) **	1.437 (.214) **	3111 (Daughters) 3291 (Sons)
b) Child is Behind Grade Level	1.381 (.201) **	1.816 (.242) ***	3111 (Daughters) 3291 (Sons)
<u>Controls:</u> -Child's age -Regional Dummies -Household Wealth Index -Disability -Education of Household Head	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis (Std. Err. adjusted for 111 clusters in locality)

***p<0.01; **p<0.05; *p<0.10

Table 4 – First Stage of TSLS Estimates - Impact of Non-traditional Family Status on a) Drop-Out from School and on b) Child Behind Grade Level — (Instrument: Mean of Non-traditional Households by Age and by Region) - Year 2006 - Children aged 9-16

Dependent Variables	Female	Male	Observations
Non-traditional Family	.980 (.045)***	.894 (.046)***	3111 (Daughters) 3291 (Sons)
<u>Controls:</u> -Child's age -Regional Dummies -Household Wealth Index -Disability -Education of Household Head	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis (Std. Err. adjusted for 111 clusters in locality)

***p<0.01; **p<0.05; *p<0.10

Table 5 – Second Stage TSLS Estimates - Impact of Non-traditional Family Status on a) Drop-Out from School and on b) Child Behind Grade Level — (Instrument: Mean of Non-traditional Households by Age and by Region) - Year 2006 - Children aged 9-16

Binary Dependent Variables	Female	Male	Observations
a) Drop-Out	.039 (.026)	.094 (.029)***	3111 (Daughters) 3291 (Sons)
b) Child is Behind Grade Level	.040 (.026)	.127 (.034)***	2887 (Daughters) 3291 (Sons)
<u>Controls:</u> -Child's age -Regional Dummies -Household Wealth Index -Disability -Education of Household Head	Yes Yes Yes Yes Yes	Yes Yes Yes Yes Yes	

Robust standard errors in parenthesis
(Std. Err. adjusted for 111 clusters in locality)
***p<0.01; **p<0.05; *p<0.10

Table 6 - Average Effect of Non-traditional Family Structure - estimation with the Kernel matching method - Year 2006 - Female aged 9-16

	Effect on Drop-out	Effect on Child Behind Grade Level
Number of Individuals from Non-traditional Family Structure	833	833
Number of Individuals from Traditional Family Structure	2,223	2,223
Average Effect (difference between non-traditional & traditional family structure)	.0202	.0225
Std. Error	.0106	.0118
T-stat	1.90	1.90

Table 7 - Descriptive Statistics for Individuals from Non-traditional Families and Traditional Families, and Matched Groups – Year 2006 - Female aged 9-16

Variable	Sample	Mean		t-test	
		Non-traditional families	Traditional families	t	p>t
Mother's Race: African	Unmatched	.129	.085	3.63	0.000
	Matched	.129	.124	0.29	0.770
Mother's Race: Indigenous	Unmatched	.050	.024	3.61	0.000
	Matched	.050	.041	0.90	0.366
Mother's Age	Unmatched	37.854	39.583	-6.05	0.000
	Matched	37.854	37.827	0.08	0.939
Mother's Religion: Christian (not Catholic)	Unmatched	.153	.133	1.43	0.154
	Matched	.153	.156	-0.17	0.868
Mother's Religion: Jewish	Unmatched	0	0	.	.
	Matched	0	0	.	.
Mother's Religion: Afro-spiritualism	Unmatched	.013	.008	1.16	0.245
	Matched	.013	.013	-0.13	0.894
Mother's Religion: Believe in God, (without religion)	Unmatched	.361	.293	3.60	0.000
	Matched	.361	.353	0.32	0.746
Mother's Religion: Atheist or Agnostic	Unmatched	.097	.063	3.16	0.002
	Matched	.097	.096	0.08	0.940
Mother's Religion: Other	Unmatched	.0036	.0036	0.00	0.999
	Matched	.0036	.0038	-0.09	0.928
Mother' Education	Unmatched	8.268	8.518	-1.84	0.066
	Matched	8.268	8.270	-0.01	0.992
Wealth Index	Unmatched	.162	.248	-11.74	0.000
	Matched	.162	.165	-0.35	0.725
Region: Urban-Centre	Unmatched	.1224	.1223	0.01	0.995
	Matched	.1224	.1224	-0.00	0.998
Region: Urban-South	Unmatched	.159	.134	1.74	0.081
	Matched	.159	.164	-0.24	0.808
Region: Urban-Frontier	Unmatched	.253	.224	1.65	0.098
	Matched	.253	.261	-0.37	0.711
Region: Rural	Unmatched	.087	.248	-9.96	0.000
	Matched	.087	.084	0.23	0.819

Table 8 - Average Effect of Non-traditional Family Structure - estimation with the Kernel matching method - Year 2006 - Male aged 9-16

	Effect on Drop-out	Effect on Child Behind Grade Level
Number of Individuals from Non-traditional Family Structure	891	891
Number of Individuals from Traditional Family Structure	2,342	2,342
Average Effect (difference between non-traditional & traditional family structure)	.0162	.0601
Std. Error	.0128	.0151
T-stat	1.26	3.99

Table 9 - Descriptive Statistics for Individuals from Non-traditional Families and Traditional Families, and Matched Groups – Year 2006 - Male aged 9-16

Variable	Sample	Mean		t-test	
		Non-traditional families	Traditional families	t	p>t
Mother's Race: African	Unmatched	.145	.082	5.40	0.000
	Matched	.146	.145	0.06	0.952
Mother's Race: Indigenous	Unmatched	.051	.023	4.20	0.000
	Matched	.051	.054	-0.22	0.828
Mother's Age	Unmatched	38.458	39.607	-4.18	0.000
	Matched	38.461	38.3	0.49	0.627
Mother's Religion: Christian (not Catholic)	Unmatched	.127	.119	0.62	0.537
	Matched	.128	.130	-0.12	0.906
Mother's Religion: Jewish	Unmatched	.003	.0004	2.13	0.034
	Matched	.002	.0007	0.85	0.398
Mother's Religion: Afro-spiritualism	Unmatched	.019	.007	2.80	0.005
	Matched	.019	.016	0.40	0.690
Mother's Religion: Believe in God, (without religion)	Unmatched	.345	.328	0.91	0.363
	Matched	.346	.348	-0.11	0.916
Mother's Religion: Atheist or Agnostic	Unmatched	.104	.063	3.94	0.000
	Matched	.104	.105	-0.05	0.962
Mother's Religion: Other	Unmatched	.003	.003	-0.20	0.842
	Matched	.003	.002	0.17	0.867
Mother' Education	Unmatched	8.287	8.521	-1.75	0.079
	Matched	8.271	8.301	-0.20	0.842
Wealth Index	Unmatched	.172	.240	-9.62	0.000
	Matched	.171	.174	-0.43	0.665
Region: Urban-Centre	Unmatched	.099	.127	-2.17	0.030
	Matched	.100	.102	-0.18	0.861
Region: Urban-South	Unmatched	.132	.129	0.23	0.817
	Matched	.132	.136	-0.22	0.826
Region: Urban-Frontier	Unmatched	.263	.226	2.21	0.027
	Matched	.264	.260	0.19	0.850
Region: Rural	Unmatched	.093	.239	-9.46	0.000
	Matched	.092	.096	-0.29	0.771

Figure 1

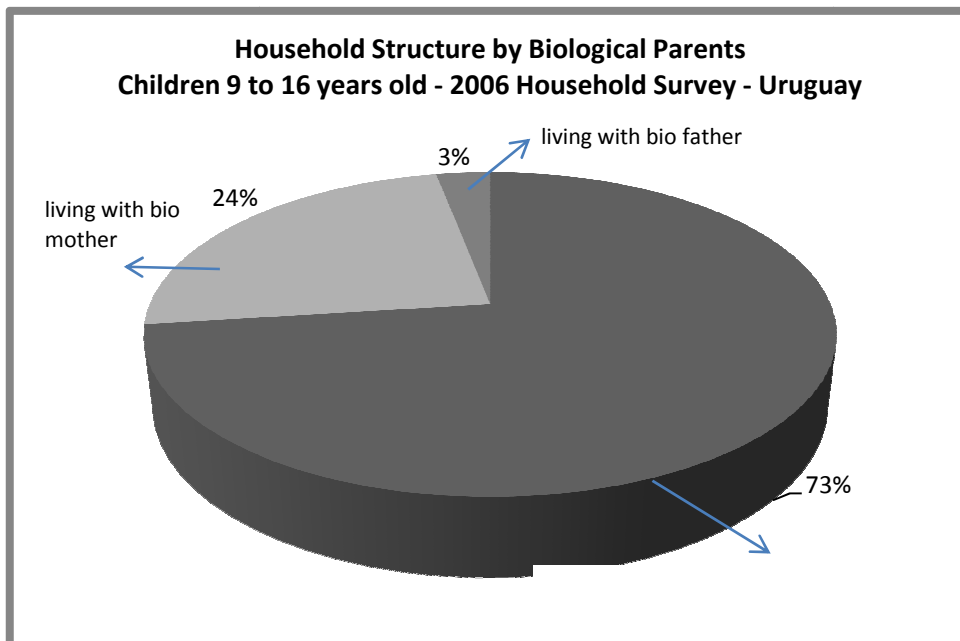


Figure 2

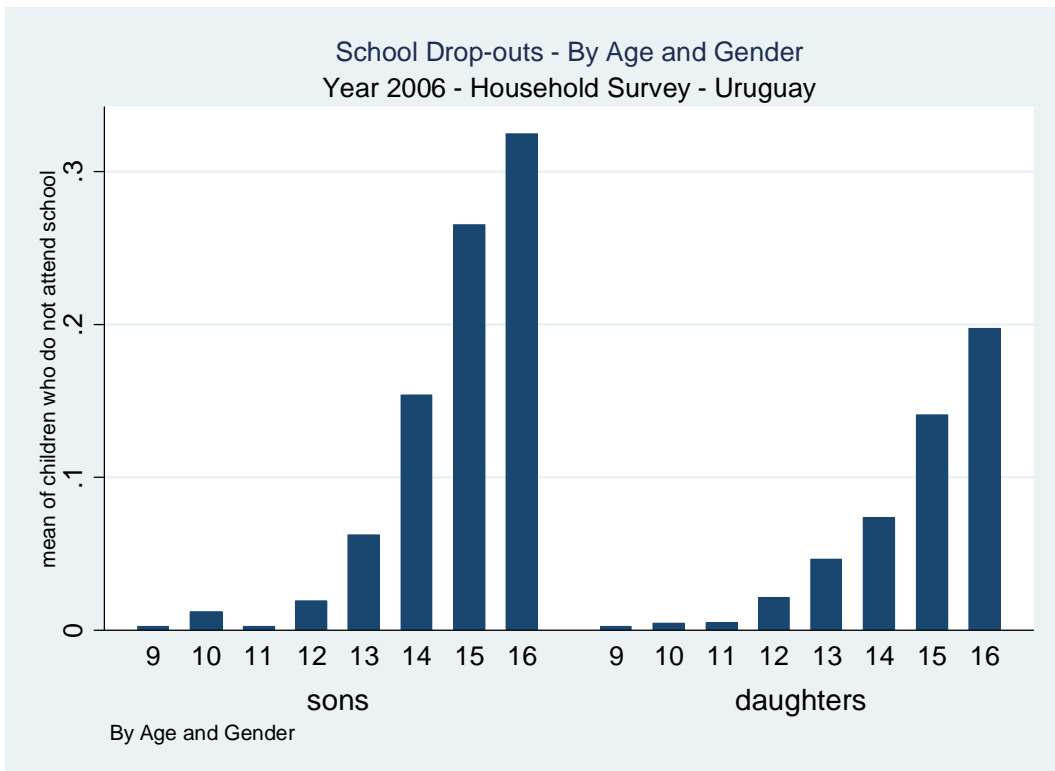


Figure 3

