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EFFECT OF LIVING WITH AN ELDERLY ON YOUNGSTERS' EDUCATION: EVIDENCE FROM THE MEXICAN 70-y-más PENSION PROGRAM.

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Effect of living with an elderly on youngsters' education: Evidence from the Mexican 70-y-más pension program

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Abstract

Ageing in emerging countries where there is few access to pension and social security arises many questions for elderly and their families. This paper explores the effect of living with an elderly on youngsters' education. First I assume that characteristics that explain the arrival of elderly and influence educational decisions are time-invariant. By a fixed-effect model, I find that the arrival of a male elderly significantly decreases youngsters' school attendance, especially among boys. Moreover, by a difference-in-differences model, I find that the introduction of the 70-y-más non-contributed pension program among eligible elderly women benefits to girls' education.

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1 Introduction

Ageing is one of the major issues facing countries, in particular the developing world. While developed countries already have a significant fraction of seniors in their population (18.7% of seniors aged 65 years and older in Europe and 14.5% for United States in 2014, OECD data), developing countries face a smaller but rapidly growing share. In 2030, in Mexico, it is expected that the 70-year-old and older population will more than double (9 million of seniors) which would represent 7.6% of the total population. For Mexico, elderly's issues are rising ones.

The rapid growth of elderly in the population raises many issues and questions as they are mostly dependent. I want in this paper to question the role and the implication of having an elderly in a household. First, the elderly can be considered as a dependent individual if he does not work or earn additional revenue to a family. In Mexico, few seniors earn retirement pension and have access to public health care. Elderly rely on social network within the family as a consequence of limited social services (Montes de Oca Zavala et al, 2014). The family is the main support network that elderly rely on, especially for poor individuals (Pelcastre-Villafuerte et al, 2011). Then the presence of an elderly is tightening the budget constraint. Otherwise, elderly may be a helper in the household, by taking care of children and household chores. As part of the family, elderly influence household's decisions, particularly education of grandchildren. Co-residence is fundamental to study the implication of grandparents in grandchildren's lives (Warren and Hanser, 1997, Erola and Moisio, 2006).

Then, the decision of co-residing with an elderly comes from the interaction of a variety of variables: among them intra household decision process, specific household unobservable characteristics, public policy, geographical area and way of living. Therefore, studying co-residency with seniors arises a complex endogeneity problem; which households have elderly living with them is not exogenous. We may think that these most in need of household help are the ones who would host one, making it likely to generate a downward bias. To solve this, I assume that the characteristics that negatively influence educational decisions and make it more likely that a household has an elderly living with them are time invariant. I use a household fixed effect approach in a panel data of Mexico.

In Mexico, living with elderly is not frequent for regular households with youngsters. I want in this article to deal with inter-generational co-residency. Especially, the impact of living with elderly on youngster's education. This impact may depend on the role of the elderly and on his preferences. If many correlational studies found a positive association between living with an elderly and grandchildren's education attainment, living with elderly implicates also household values and consideration for elderly.

Contrasting with these correlational studies, I find a negative impact of having an elderly moving into the household on youngster's school attendance. These are concentrated in household welcoming a male elderly. Nevertheless, these results should be understood cautiously as I am unable to address endogeneity concerns that are not constant over time. For example if the arrival of an elderly in the household is due to death of his spouse, it is unclear if the death of a grandparent could not also affect educational decisions.

Having shown that the arrival of an elderly may have negative consequences for the youth in the household, I then ask if a pension system could alter this effect. For this, I employ a policy change in Mexico which is the introduction of the 70-y-más program.
In Mexico, a non-contributed pension has been put in place in less populated areas since 2007. This 70-y-más pension provides to elderly aged 70 years old and older an additional revenue, affecting the maximization choice of the household. This additional income may change household decision process and the bargaining power of each household member leading to more power among eligible elderly, and leading to different educational decisions.

These assumptions conflict with theory of unitary models which consider the household as a single entity (Samuelson 1956). Unlike, collective models show that preferences vary within household members. Decision-making depends on each household member's income and consumption and their own bargaining power. Chiappori (1988) allowed each household members to have their own utility and to maximize expected utility. The Pareto efficient allocation is given by maximizing the sum of each members expected utility, weighted by the different bargaining power of each household member.
Empirical papers have rejected unitary models such as Thomas (1990) who shows that unearned income received by mothers has greater effects on chil-

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dren's health (especially daughters') than the effect of paternal income on children's health. Duflo (2003) have shown that women eligible to the Old Age Pension in South Africa have significant impacts on granddaughter's anthropomorphic status. Similarly authors demonstrate that living with an eligible to this pension increases school enrollment (Case and Menendez, 2007) and school attendance among rural children (Edmonds, 2005). Especially, attendance at school among boys is significantly increasing when a male eligible is present.

Moreover, Ambler (2016) shows that elderly women eligible to the South African pension are more likely to be the primary decision-maker in their household. In the context of the 70-y-más program, Salinas-Rodriguez et al (2014) pointed out the positive effect on the mental well-being of the pension recipient. Earning a supplementary pension gives to elderly more power within the family; they participate significantly more in household's decisions pertaining in expenses. Juárez González and Pfutze (2014) proved that earning the 70-y-más pension has a significant impact on elderly and eligibles particularly poor men.

Considering the receipt of the 70-y-más pension as an exogenous shock, the introduction of such a pension will modify the bargaining power of household members and the process of decision-making within the household. Then my paper will also contribute to the literature on household models by testing whether obtaining a pension may alter an elderly's bargaining power. Thus, I study the effect of the introduction of the 70-y-más pension by a difference-in-differences strategy. I use a before and after analysis. Households may decide to move with an elderly to benefit from this pension. Then, to avoid these endogenous households, I set an eligibility criterion in 2005 so that every eligible households lived with elderly in 2005.

I find evidence that the introduction of the 70-y-más pension among eligible elderly has significant effects on youngster's school attendance. Especially, living with a female eligible favours girl's education.
This is robust to alternate definitions of the control group.

The remainder of this paper is organized as followed. In section 2, I will present my data and descriptive statistics relative to elderly and youngsters living arrangements. In section 3, I will study the effect of living with an elderly on school attendance of youngsters. In section 4, I will discuss

the effect of living with an eligible to the 70-y-más pension on youngster's education. Section 5 concludes.

2 Data and Descriptive Statistics

I will first present the data I will employ and discuss the general characteristics of this sample.

2.1 The Mexican Family Life Survey

The Mexican Family Life Survey is a longitudinal survey which includes socioeconomic and demographic information (access to health services, health and education of interviewers, income, labor, migration, fertility, marriage). It was collected in three rounds: 2002 (MxFLS-1), 2005-2006 (MxFLS-2) and 2009-2012 (MxFLS-3). This survey is representative at the national level, including information of households living in both rural and urban areas and in 16 different states. In 2002, 8,400 households were reported (35,000 individuals) in 150 communities. Throughout the years, when an individual leave the initial household, enumerators re-contact them in their new household (creating new household in data). Therefore, members in this new household are interviewed. Then attrition problems are solved by recording new household and new household members. The MxFLS-2 re-interviewed and relocated 90 percents of households of the original round (MxFLS-1). The MxFLS-3 re-interviewed all original households from the previous round and additional individuals who moved in household panel. Reporters managed to re-contact 90 percents of household members who leave original households. The MxFLS has been awarded by the World's Bank Regional Award for Innovation in Statistics especially for its ability to re-contact individuals who change their residency between rounds throughout countries (from Mexico to the United States of America).

Moreover, the Mexican Family Life Survey provides data about household members and composition of households.

Educational surveys were administered to youngsters aged 15 years and less and to adults. Educational attainment and attendance at school were recorded at the time of the survey; the MxFLS does not consider fluctuations throughout the year.

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The MxFLS also recorded information at community levels, in particular the city population where households live. This information enables us to construct an eligibility criterion for the 70-y-más pension.

2.2 Descriptive Statistics

I now show the main characteristics of my sample.

Elderly aged 65 years old and older represents 6.35% of the population surveyed (MxFLS-3, 2009-2012), this is a bit more than statistics from the OECD (6.07%). In my empirical analysis, I define a senior as an adult aged 60 year and older; 24.15% of individuals live with at least one senior in 2002, 27.14% live with elderly in 2005 and 28.94% live with them in 2009.

Throughout rounds, elderly are more likely to live in extended and nuclear families (Appendix 1); in 2009, 43.10% elderly live in extended family when in 2002 41.83% of them live in extended family. Similarly, only 27.69% of elderly live with their partner or alone in 2009 when in 2002, 30.21% of elderly live in the same family configuration.

Moreover, male elderlies tend to live slightly more in extended and nuclear family than women. Indeed in 2009, 29.20% of older women live with their partner or alone when only 26.03% of older men live in the same family configuration. Nevertheless, statistics from Instituto Nacional de la Mujeres in Mexico shows that in 2015 older men live in majority in a nuclear family (49,7%), older women live in most of cases in an extended one (47%).

We will focus on the impact that these elderly will have on the educational attainment of children they live with. I will divide, as the education system in Mexico does, children in 3 categories of ages: first primary education or "primaria" students are aged 6 to 12 years old, middle school or "secundaria" for students aged 12 to 15 years old, and high school or "bachillerato" for students aged 15 to 18 years old. Then as in Anglo-Saxon system, a bachelor's degree is obtained after four years of education in university following high school. "Primaria" and "secundaria" are compulsory and widespread: the level of education coverage is comparable to OECD countries (primary education). Nevertheless, teenagers ageing 15 to 19 years are much less enrolled than teenagers in other OECD countries: only 53% of this population is enrolled (the average among OECD countries reaches 83%) in 2014. Indeed, Table 1 shows the education level of children and teenagers using MxFLS-3 data. While primary education is widespread (the rate of school attendance is 98.79%), school attendance is declining with age (62.95% of school attendance in secondary school, 48.21% of school at-

tendance in high school, 16.76% in college). When computing female and male rate of attendance at school, I found that females tend to attend more high school (51.13%) and college (20.23%) than males do (44.78% for high school and 13.38% for college) (Appendix 2.1 and 2.2).

Table 1: Education Level in 2009

Education Level	6 to 11		12 to 14		15 to 17		18 to 20	
	N	%	N	%	N	%	N	%
Elementary	2,125	98.79	518	36.76	117	8.72	94	8.85
Secondary	25	1.16	887	62.95	568	42.32	338	31.83
High School	1	0.05	4	0.28	647	48.21	432	40.68
Normal Basic		0		0	2	0.15	18	1.69
College		0		0	7	0.52	178	16.76
Graduate		0		0	1	0.07	2	0.19
Total	2,151	100	1,409	100	1,342	100	1,062	100

Source: Author's calculation from MxFLS-3.

Table 2 shows descriptive statistics of each group of ages. Children have similar school enrollment rate whether they are living with an elderly or not. Teenagers register school enrollment rate slightly lower when they live with an elderly (0.934) rather than when they do not live with them (0.951). Moreover, teenagers living with elderly are more likely to repeat grade (0.224) than teenagers who do not cohabit with elderly (0.186). Finally, young adults have a lower school enrollment rate when they do live with a senior (0.492) than when they live without elderly (0.552).

However, as this pattern is unlikely to be causal, I will focus on family transitions. Data from the three-round MXFLS gives us an idea of the migration of seniors within families with youngsters. First, we focus on youngsters who has been contacted each of the three rounds. The two-way Table 3 provides indication about youngsters living with elderly throughout the rounds. There are slightly more youngsters living with elderly in 2009 than in 2002. Only 70 youngsters live with elderly in 2002 and do not live anymore with them in 2009. Whereas, 191 youngsters live with elderly in 2009 but did not live with elderly in 2002.

Table 2: Descriptive statistics by group of ages

VARIABLES	Full Sample		Without Elderly		With Elderly	
	Mean	sd	Mean	sd	Mean	sd
Children (5-10)						
Ever repeated grade	0.0919	0.289	0.0915	0.288	0.0954	0.294
Attend school	0.969	0.173	0.969	0.173	0.969	0.173
Family size	5.890	2.056	5.700	1.946	7.369	2.274
Number of adults present	2.280	0.837	2.252	0.776	2.496	1.186
Any elder present	0.114	0.318				
Nb of Obs	7,341	7,341	6,502	6,502	839	839
Teenagers (11-14)						
Ever repeated grade	0.191	0.393	0.186	0.389	0.228	0.420
Attend school	0.949	0.221	0.951	0.217	0.934	0.249
Family size	6.006	2.078	5.850	1.991	7.135	2.336
Number of adults present	2.327	0.865	2.327	0.820	2.327	1.137
Any elder present	0.121	0.326				
Nb of Obs	6,4994	6,4994	5,709	5,709	785	785
Young Adults(15-20)						
Level of education expected	8.02	1.74	8.02	1.72	8.00	1.81
Ever repeated grade	0.26	0.44	0.25	0.43	0.27	0.45
Attend school	0.54	0.50	0.55	0.50	0.49	0.50
Family size	6.05	2.15	5.93	2.07	6.74	2.44
Number of adults present	2.56	1.03	2.60	0.98	2.31	1.28
Any elder present	0.15	0.36				
Nb of Obs	6,868	6,868	5,815	5,815	1,053	1,053

Source: Author's calculation from MxFLS-1, MxFLS-2 and MxFLS-3.

Notes: - Adults are defined as individuals aged more than 20 years and less than 60 years.

- For Young Adults statistics, especially for the variable Level of education expected the number of observations differs: 2,326 observations for full sample, 2,000 observations for the sample of young adults living without elderly, and 326 observations of young adults co-residing with elderly.

Table 3: Two-way table of presence of elderly in youngster's household

| | Living Arrangements in the 2nd period | | | | | |
| | 2002 - 2005 | | 2005 - 2009 | | 2002 - 2009 | |
	With Elderly	Without	With	Without	With	Without
With Elderly in first period	232	35	246	54	197	70
Without Elderly in first period	68	2,515	142	2,408	191	2,392

Source: Author's calculation from MxFLS-1, MxFLS-2 and MxFLS-3

Table 4 shows means of school attendance and repeating grade in 2009 of youngsters whether they are living with elderly in 2009 and whether they lived with elderly in 2002. Youngsters from this sub-sample are ageing 11 to 20 years; among the 2,850 youngsters sample, school attendance mean reaches 0.69. School attendance is lower (0.55) when a senior move in or when a household member ages to become a senior. Similarly, the entry of a senior is costlier in terms of repeating grade. The difference between living with a senior in 2009 and without senior in 2002 is 26% of probability of repeating grade. Whereas, there is 20% of probability of repeating grade when individuals do not live with senior or do live with seniors in both periods. However, I am confronted with the problem of having few observations.

Table 4: Presence, Move-in, Move-out of elderly among youngsters in 2009

Attend School	Ever Repeated Grade	N	
Full Sample	0.69	0.2	2,850
	(0.46)	(0.4)	
No Elderly Present	0.7	0.2	2,462
	(0.46)	(0.4)	
Elderly Present	0.62	0.23	388
	(0.49)	(0.42)	
Senior present in 2009 and in 2002	0.68	0.2	197
	(0.47)	(0.4)	
Senior present in 2002 not in 2009	0.63	0.2	70
	(0.49)	(0.4)	
Senior present in 2009 not in 2002	0.55	0.26	191
	(0.49)	(0.44)	

Sources: Autor's calculation from MxFLS-1, MxFLS-2 and MxFLS-3
Notes: - in the table mean (sd)
- Values of attendance at school and repeated grade are measured in 2009.

3 Cohabitation Effects

Having shown the data I will use, I now propose an estimation strategy and present the results obtained.

3.1 Estimation Strategy

I want in this part to isolate the endogeneity problem of living with a senior. Indeed, co-residing with a senior is part of unobservable household decisions. It implies several effects on youngsters' investment in education. Youngsters living with seniors are more likely to live in families with larger household size, and maybe with numerous dependent individuals.

Seniors present in the household can be givers or receivers of family support and must play active role in their grandchildren's lives. Gomes (2007) shows that Mexican seniors and adult children provide both care and material support to grandchildren. Support is distinguished by the gender of grandparents; grandfathers are more likely to provide grandchildren and adult children financial support (either from wages or pensions), whereas grandmothers are more likely to provide domestic help such as caregivers of children. The role of grandmothers has been particularly studied as caregiver and child-rearing in Mexico. For Varly and Blasco (1999) grandmothers are more accepted in adult children houses because of their care-giving roles towards grandchildren.

Multiple papers also study family living arrangements on education of grandchildren. Solomon and Marx (1995) show that children raised solely by their grandparents excel academically compared to children living in single-parent household or blended family. Studies also find out that youngsters living with elderly are as likely to excel academically (Entwisle and Alexander, 1996) as children living in married-parents' families. Especially, youngsters living with a mother and their grandparents have college attendance rates as high as teenagers living in married-parents' families (Deleire and Kalil, 2002). Among minorities population in the United States, children with a teenage mother, living with a grandmother reduces significantly behavioral problems (Leadbeater and Bishop, 1994).

The empirical literature has also focused on parts of the world where children co-residing with elderly is commonplace. In rural China, Zheng and Xie (2011) found that education of co-resident grandparents has a pos-

itive and significant effect on grandchildren attainment at school. Living with a well-educated grandparent significantly reduces children's likelihood of school dropout. Pong and Chen (2010) also showed that co-residing with their grandparents has a positive effect on academic achievement of children.

However, most studies are correlational and depict an association between co-residing with elderly and grandchildren's education in specific contexts. In most situations, this relationship is positive; it may not apply to all contexts. Moreover, a correlation between two variables does not mean necessarily causality between these variables. These studies do not explain the household decision process that lead them to live with elderly and the impact on grandchildren's education that it has; which is the endogeneity problem.

Indeed, elderly may be a dependent, a worker or a helper in the family. Depending on the revenue that he earns, he may contribute to the family budget or tighten it. It is not instructive because it does not unveil the decision process and bargaining power among elderly. Most empirical articles have studied bargaining power among couples and elderly are rarely considered as decision makers. Moreover, it may suggest that elderly have different preferences from their adult children. Then living with an elderly shall have different effect on education of youngsters than living solely with adult parents. Then these articles do not provide a clear theoretical framework of how living with an elderly may impact on children's outcomes.

Moreover, these studies do not explain the bias from household revenue or characteristics. The most in need, especially the poorest elderly or elderly in poor health are more likely to ask for help to their family members. Otherwise, elderly may host most in need family members. Then co-residency with inter-generational members must be explained by reasons that impact negatively educational decisions. I assume that these characteristics (especially household's wealth, health of members of the family) are time-invariant. Indeed, household's revenue may vary slightly over time, the household may remain in the same wealth quintile or decile. Moreover, health conditions of an elderly may not change throughout years. I then try to avoid the downward bias by using a fixed-effect model.

Setting aside these specific household characteristics and I am able to estimate the impact of co-residing with an elderly on youngster's education. By a fixed-effect model I can put aside households and individual's characteristics. Using all MxFLS rounds (2002, 2005-2006, 2009-2012), I am able to find households throughout time, their characteristics and youngster's attendance at school.

Then, I estimate the impact of co-residing with an elderly on youngster's education by a fixed-effect model (households and time):

$$Y_{ijt} = H_j + Time_t + \beta senior_{jt} + \phi X_{ijt} + \varepsilon_{ijt} \qquad (1)$$

Where Y_{ijt} is alternatively the attendance at school for child i in household j in time t, H_j the household fixed effect for household j, $Time_t$ the time fixed effect. $senior_{jt}$ is a variable equal to 1 if a senior lives in the household at the time of the survey and 0 otherwise. X_{ijt} are supplementary family background variables (age, gender of youngsters, mother's and father's age and education); I will use this set of variables only in the case of OLS specification.

β is the coefficient of interest; by looking at this specification, I am looking at variations in education in response to the arrival or departure of elderly individual.

However, I am assuming that endogeneity is entirely due to intra-household characteristics; with a fixed effect model I am not controlling for omitted variable that vary throughout time. Lack of medical structure for dependent elderly may have an impact on household decisions. Old-age public policies are not studied in this part neither. The decision of living with an elderly may be explained by intra household unobservable characteristics and household decision-process. For example, if a senior joins the household when his or her spouse dies, we must suppose that this death does not influence the children's attendance decision.

I choose school attendance as the indicator of education amongst youngsters. School attendance shows the investment in human capital of parents for their children. I want to test if a household is more likely to invest in education of children and teenagers when a senior is present. In MxFLS data, enumerators ask if the household member is currently attending school on the day of the interview. Moreover, Table 1 shows that educational level

is variant between groups of ages. I define group of ages that have similar school attendance means. First group of ages are "Children" going to primary school [5-10]. Then the second group of ages is named "Teenagers" and is composed of youngsters aged [11-14] going to upper classes of primary school and mainly to secondary school. Then the third group of ages is called "Young Adults" and is composed of youngsters aged [15-20] and supposed to attend high school and college.

Using MxFLS-3 data, education level for boys and girls is similar for primary and secondary school. Attendance at school is higher among girls than boys for high school and college (Appendix 2.1 and 2.2). Thus I pay particular attention to boys.

3.2 Results

Results are given in the tables 5 to 7. In Table 5, columns (1) and (3) present OLS regression of attendance at school on elderly's presence with family background variables (age and gender, mother's age and education, father's age and education), while columns (2) and (4) indicate a regression of attendance at school on seniors' presence with individual fixed-effect. Table 5 provides regressions using the full sample, Table 6 presents results differentiating among cohorts, then Table 7 presents the results differentiating the gender of the child.

OLS regression in Table 5 shows a negative and significant relationship between youngster's education and the presence of an elderly. This contradicts the literature described in 3.1; most studies showed a positive association between co-residency with elderly and grandchildren education attainment. However, I am not able to detect a causal evidence between presence of an elderly and youngster's school attendance using this method. This effect may be biased by household revenue or characteristics; I fix these characteristics throughout time. Using fixed-effect model allows me to isolate time-invariant household and individuals characteristics. Then I must find the real effect of co-residing with elderly when controlling for household characteristics. Colums (2) introduces results of the fixed effect model, and the arrival of elderly leads to a decrease in school attendance by 9.39 percentage points. The effect is larger and more significant in fixed effect model suggesting families who have an elderly living with them are positively selected.

Columns (3) and (4) of Table 5 show that the arrival of a male elderly leads to a significant reduction in school attendance among all youngsters. A fixed effect model provides substantial and higher coefficients than the OLS estimation for both coefficients. Using fixed effect estimation, the arrival of a male elderly leads to a reduction in school attendance of 12.6 percentage points, significant at 1% level. The effect of living with a male elderly is larger and more significant than the effect of living with a female elderly; eventhough, living with a female elderly is also negatively associated with youngster's education, the coefficient is not significant.

Table 5: Effect of living with a senior on attendance at school (the full sample)

VARIABLES	(1)	(2)	(3)	(4)
	OLS	FE	OLS	FE
Elder	-0.0166**	-0.0939***		
	(0.00840)	(0.0224)		
Female Elder			-0.000253	-0.0372
			(0.0108)	(0.0295)
Male Elder			-0.0270**	-0.126***
			(0.0113)	(0.0265)
Family Background variables	Yes	No	Yes	No
Fixed Effect	No	Yes	No	Yes
Observations	20,703	20,703	20,703	20,703
R-squared	0.260	0.163	0.260	0.164
Number of ind		11,746		11,746

Source: Author's calculation from MxFLS-1, MxFLS-2 and MxFLS-3.
Note: Family Background variables: age, gender, father's age and education, mother's age and education.
Clustered by hhd
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Then, in this particular context, elderly must behave as dependent seniors tightening the budget constraint and encouraging young household member to allocate their time in working rather than in education. Especially, males once retired and due to the few access to pension, they may be highly dependent. This could also show a male preference for labor than education. Whereas, I cannot conclude on the effect of living with a female

elderly on education of youngsters. This may be due to the complex situation of female elderly; they are dependent and they have few access to retirement pension, however they often participate in household chores and childcare activities.

When the analysis is conducted by cohort (Table 6), I find no evidence that this aggregate result holds within each age group suggesting that the most negative impact may occur when youth are crossing age categories. The strategy of cohort chosen do not represent at its best reactions to the arrival of an elderly in the household.

I find evidence that the effect of living with an elderly is worst amongst boys than amongst girls. While the probability of attending school falls by 8 percentage points for girls it does so by 3 percentage points more for boys. Especially, living with a male senior reduces school attendance amongst boys by 16.1 percentage points (Table 7). This result is coherent; boys are less likely to attend school than girls (Appendix 2.1 and 2.2). As Juárez González and Pfutze (2014) described, poor boys are more likely to work as they are the marginal labor force in their household. Then, I conclude that in response to the arrival of a male elderly (who is tightening the budget constraint), male youngsters tend to work more and give up school, especially in poorer households.

Table 6: : Effect of living with a senior on attendance at school within cohorts

	Children (5-10)	Teenagers (11-14)	Young Adults (15-20)
VARIABLES	FE	FE	FE
Elder	0.0216	-0.0885	-0.0607
	(0.0407)	(0.0744)	(0.0682)
Fixed Effect	Yes	Yes	Yes
Observations	7,341	6,4994	6,868
R-squared	0.105	0.090	0.374
Number of ind	6,004	6,064	6,048

Source: Author's calculation from MxFLS-1, MxFLS-2 and MxFLS-3.
Clustered by hhd
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

However, there may be factors that change over time and influence both the arrival or departure of an elderly and educational decisions of kids which are not taken care of by the fixed effect strategy. Endogeneity problem may be originated from omission of relevant variables that change by household over time. In that case, an instrumented strategy would be more adequate.

Table 7: Effect of living with a senior on attendance at school by gender (Fixed-Effects)

	Girl (the full sample)		Boy (the full sample)	
VARIABLES	(1)	(2)	(3)	(4)
Elder	-0.0759**		-0.113***	
	(0.0314)		(0.0320)	
Female Elder		-0.0330		-0.0380
		(0.0434)		(0.0408)
Male Elder		-0.0906**		-0.161***
		(0.0367)		(0.0366)
Fixed Effect	Yes	Yes	Yes	Yes
Observations	10,369	10,369	10,334	10,334
R-squared	0.146	0.147	0.180	0.182
Number of ind	5,913	5,913	5,876	5,876

Source: Author's calculation from MxFLS-1, MxFLS-2 and MxFLS-3.
Clustered by hhd
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4   Pension Effects

Having shown that the presence of an elderly, particularly a male, affects negatively educational decision, I now explore if the receipt of a pension may solve this problem, using the 70-y-más program as a source of exogenous variation.

4.1   The 70-y-más Program

The national non-contributory program 70-y-más allows to transfer an amount of money to people aged 70 years old and older. The program was initially created in 2007 and aimed to respond to the exclusion of a vulnerable population; the 70-year-old people living in a locality of 2,500 or less inhabitants. Since 2009, it includes also every 70-year-old living in a locality of 30,000 or less inhabitants, with a total budget of 13,000 million of pesos (around 0.1% of the Mexican GDP). Moreover, to benefit from this program elderly must accept the suspension of the program Apoyo para Adultos Mayores de Oportunidades.

Every two months, beneficiaries receive $500 Mexican pesos monthly (US$40- the minimum daily salary in Mexico is fixed at $70.10 Mexican pesos in 2015 or monthly $1,402 Mexican pesos) and other rights: reception of $1,000 to $1,160 Mexican pesos for the beginning of the program, until $300 pesos of help per year to access to financial and bank products (credit cards and bank account), up to $85 pesos per year to maintain the bank account administration of the program beneficiary. Moreover, it includes non-economic services such as help to access health services and be reported in INAPAM (Instituto Nacional de las Personas Adultas Mayores). The aim is to make the most vulnerable population aware of their rights, access to prior services and make them less excluded and poor.

Implemented at a national level, the program impacts the lives of 1.8 million of seniors in 2009 in more than 75,000 localities in the whole country. It is the second most important program for seniors at that time after the Oportunidades program for seniors.

From our Mexican Family Life Survey Data, households have been interviewed from 2009 until 2011. Then elderly must fulfill the following requirements to benefit from the 70-y-más pension:

- be 70 years old and older

- live in a locality of 30,000 or less inhabitants

- accept the suspension of the Oportunidades para Adultos Mayores program.

One may be worried that the program beneficiaries had already been receiving income supplements from the program Oportunidades.

Oportunidades offered initially educational, health and nutritional programs to help specifically families with children, to stop the inter-generational transmission of poverty between poor parents and children, since 2006, it expanded its program to other vulnerable population: families living with elderly aged 70 years and older. Indeed, in 2009 the Oportunidades program gave a monthly contribution of $295 pesos (US$22.7) for each senior living in localities of more than 20,000 inhabitants, subject to coming to doctor visit. Eligible seniors benefit from additional non-economical services, in particular from packs of free health services. While some elderly were covered by Oportunidades, it represented a clear improvement over the existing program. Elderly who subscribed to the 70-y-más program and accepted the suspension of the Oportunidades program, benefited from a raise of the monthly pension of 69.49%.

4.2 Empirical Methodology

4.2.1 Theoretical model and Data set

To analyze the effect of the program on youngsters' school enrolment, I implement a difference-in-differences strategy. With the 2010 Mexican national census, Juárez González and Pfutze (2014) demonstrate the effect of the 70-y-más pension on labor force participation with a difference-in-differences strategy by using the two thresholds of the program eligibility: be aged more than 70 years old and living in a locality of 30,000 inhabitants or less. I take advantage from the Mexican Family Life Survey panel to put in place a difference-in-differences strategy with a before and after analysis. I want to analyze attendance at school before the 70-y-más program was put in place (2005) and after the implementation of this program (2009). The treated group consists of youngsters who already live with a senior eligible to the program before its implementation. The control group consists of youngsters who did not live with a senior eligible to the program.

Then, my difference-in-differences strategy is the following:

$$DiD = [E[2009|D=1] - E[2009|D=0]] - [E[2005|D=1] - E[2005|D=0]]$$
(2)

With D a dummy variable equal to 1 when youngsters are living with an eligible elder and equal to 0 otherwise.

4.2.2 Empirical Strategy

Data collection from the 3rd round lasts from 2009 to 2012. Households of interest (living with both youngsters and elderly aged more than 70) were mostly interviewed in 2009 and in 2010 (95.35% of them). Moreover, the 70-y-más program was initiated in 2007, collecting data in 2005 and in 2009 allows us to enunciate the following assumptions:

- In 2005, individuals are not aware of the implementation of such a program. Elderly were not expecting the receipt of the pension, then I assume they did not change their behaviour.

- In 2009 and in 2010, the program was already initiated since two to three years so then we can expect eligible elderly were receiving the pension from 70-y-más program. Indeed, participation rates to the 70-y-más program were practically of 100% in localities of less than 30,000 inhabitants in 2009 (Informe de la Evaluación Especíca de Desempeño 2009-2010, CONEVAL).

I suppose then that youngsters living in households with elderly eligible to the 70-y-más pension in 2005 are in a worst situation than youngsters who do not live with an eligible. From 2005 to 2009, I suppose that the situation of these youngsters in terms of school attendance is better thanks to the introduction of the pension. With a supplementary revenue, the household maximizes a less restricted budget constraint. This hypothesis is verified in Appendix 3 where I compare school attendance of all youngsters between 2005 and 2009 with youngsters living whether with an eligible or not.

However, households were re-interviewed 4 to 5 years after the second round. Two main questions arise from this issue; first the introduction of the pension among elderly may encourage families to live with elderly. Then, I may not have exogenous households. To avoid the endogeneity problem, I consider the treated group as all youngsters who have lived in 2005 in

a family with an elderly aged 66 years and older in a locality of less than than 30,000 inhabitants. In other words, I set a criterion of eligibility on households in 2005 and I find those households in 2009. Then I include youngsters who do live with elderly in 2005 and do not live anymore with elderly in 2009 (because of death or move out).

The three-round panel Mexican Family Life Survey provides data about in which locality households do live, the population size of localities, and individuals' information. The data set allows me to create the eligibility criterion (equation 3); living with a household member older than 65 years in 2005 and the household is living in a locality of 30,000 inhabitants or less.

$$Eligible_{jt} = Age \geq 66 \; years \; in \; 2005 * Locality \leq 30,000 \; in \; 2005 \qquad (3)$$

Out of 8,125 youngsters reported in 2005, 3,739 live in localities with a maximum of 30,000 inhabitants and 725 live with an elderly older than 65 years old. In total, 543 youngsters live with elderly presumably eligible to the 70-y-más pension in 2005.

The second main issue involves education of children between the two rounds. Five years of schooling is a long period for children; during this time period, a child is able to begin and finish primary school, or is able to proceed from secondary school to high school. Attendance at school varies substantially from primary to secondary and high school. Nevertheless, I will compare youngsters from the same group of ages (as in Section 3.1) in 2005 and in 2009, according to the presence of an eligible elder. Definition of cohorts is crucial to the analysis.

The two criteria required for the 70-y-más pension select households and individuals. First, living with an eligible is an endogenous household decision. Children living with an elderly are more likely to live in household with numerous members and take specific household decisions (Section 3). Secondly, households living in more rural areas are fundamentally different from households living in more urban areas.

First, Edmonds (2005) studies the Old Age Pension in South Africa which gives pension to female elderly aged 60 years and older and male elderly aged 65 years and older. He selects a sample of children living with elderly aged between 50 and 75 years old for his regressions. Then, Juárez González and Pfutze (2014) compare households from localities of 25,000 to

30,000 inhabitants (eligible to the pension) to households from localities of 30,000 to 35,000 inhabitants, assuming they share similar characteristics.

I use a difference-in-differences strategy with the following regression:

$$Y_{ijt} = \alpha + \beta Eligible_{jt} + \delta Post + \theta Eligible_{jt} * Post + \phi X_{ijt} + \varepsilon_{ijt} \quad (4)$$

Where Y_{ijt} is school attendance of child i in household j in time t. $Eligible_{jt}$ is defined in equation (3). Post is a dummy equal to 1 when the intervention has been put in place and 0 otherwise. $Eligible_{jt} * Post$ is an interaction term between the variable $Eligible_{jt}$ and Post and represents the difference-in-differences coefficient.

Youngsters have different characteristics (whether they live in small or big areas, whether they live with elderly or not), however I assume that these characteristics are not significant to explain different school attendance response and educational decisions. Then, youngsters are comparable.

To avoid the bias from eligibility criteria, I will select a sub sample of youngsters living in small areas (42,000 inhabitants and less) and living with elderly (aged 60 years and older). I consider that these households share similar characteristics.

4.3   Results

In accordance with my empirical strategy, I get the following estimates from equation (4).
Table 8 reports difference-in-differences estimations using the full sample and cohort group. Using the full sample, living with an eligible to the pension increases school attendance by 5.38 percentage points. This result is robust to family background variables.

This effect must be explained by the gain in bargaining power and the link of help inside the family after the introduction of the 70-y-más pension. Salinas-Rodriguez et al (2014) also did a qualitative study by interviewing seniors after the introduction of the program; elderly feel happier and confident because they have a clue role in the family; they can manage their own money and decide of their spending. The solidarity inter-generational role persists: "My daughters don't even ask me or tell me what to do with my money... [...] Anyway I give them money because I know they don't

have, because they are poor and they don't have enough money for medicine [...].". The pension reestablishes the link of help and aid from parents towards children and grandchildren.

Breaking down my result by cohort, I do not find a significant impact of the introduction of the 70-y-más pension among elderly on education of youngsters. As in 3.2, the cohort decomposition is not optimal to find effects of the introduction of the pension on education of youngsters. We must find more substantial effect when using crossing age categories. However, I find that effects are greater among the young adults' cohort than the children's and the teenagers' cohort. For young children the coefficient is even negative.

The introduction of the 70-y-más pension among eligible women increases significantly school attendance among youngsters. Consistent with Ambler (2016) and Duflo (2003) conclusions, our results contribute to show that earning a supplementary pension enhances the bargaining power of female senior among household, especially for decisions related to education of grandchildren. The introduction of the 70-y-más pension among eligible women increases school attendance among young adults by 14.5 percentage points. This result is not surprising as far as young adults are the least likely to attend school. However, this result is no longer significant when adding family background variables and both results are significant at 10% level.

Table 9 introduces difference-in-differences estimations using boys and girls subsamples. I do not find significant results for the introduction of the pension among elderly on education of both subsamples. Nevertheless, the introduction of the 70-y-más pension among eligible women increases significantly school attendance among girls by 12.9 percentage points, it is robust to family background variables. Like Duflo (2003) conclusions, living with an eligible elderly enhances girl's situation. These results may unveil women elderly preferences for youngsters', especially girls' education.

Table 8: Difference-in-differences estimations using full sample and cohort descomposition

VARIABLES	Full Sample	Children (5-10)	Teenagers (11-14)	Young Adults (15-20)	Young Adults (15-20)
Eligible*Post	0.0538*	-0.0284	0.0192	0.0880	0.0517
	(0.0297)	(0.0355)	(0.0349)	(0.0663)	(0.0588)
Family Background Variables	Yes	Yes	Yes	No	Yes
Observations	12,572	4,555	3,634	4,383	4,383
R-squared	0.277	0.042	0.035	0.002	0.215
Female Eligible*Post	0.0669*	-0.0365	-0.0122	0.145*	0.103
	(0.0395)	(0.0498)	(0.0467)	(0.0879)	(0.0781)
Male Eligible*Post	0.0234	-0.00274	0.0468	0.0100	-0.0213
	(0.0406)	(0.0488)	(0.0473)	(0.0912)	(0.0811)
Family Background Variables	Yes	Yes	Yes	No	Yes
Observations	12,572	4,555	3,634	4,383	4,383
R-squared	0.277	0.042	0.037	0.002	0.215

Source: Author's calculation from MxFLS-2 and MxFLS-3.
Note: Family Background variables: age, gender, father's age and education, mother's age and education.
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9: Difference-in-differences estimations among boys and girls

VARIABLES	Boys	Boys	Girls	Girls
Eligible*Post	0.0588		0.0583	
	(0.0390)		(0.0463)	
Female Eligible*Post		0.0289		0.129**
		(0.0519)		(0.0612)
Male Eligible*Post		0.0701		-0.0408
		(0.0528)		(0.0641)
Family Background Variables	Yes	Yes	Yes	Yes
Observations	6,270	6,270	6,302	6,302
R-squared	0.291	0.291	0.264	0.265

Source: Author's calculation from MxFLS-2 and MxFLS-3.
Note: Family Background variables: age, gender, father's age and education, mother's age and education.
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

However, I do not find significant effect of the introduction of the pension among male and female eligible on education of boys. This is a surprising result as far as Juárez González and Pfutze (2014) demonstrated that the introduction of this pension impacts negatively and significantly on the labor force participation of poor young boys aged 12 to 17. Especially for the first three wealth quintiles, they show that living with an older eligible woman reduces by 6.5 percentage points the young boys' labor force participation. To find significant effect of living with an eligible, it would be more appropriate to study school attendance among wealth quintile.

I do not find evidence of the effect of living with a male eligible on youngsters' education. This is contrasting with Edmonds (2005) conclusions who find that in presence of a male eligible to the Old Age Pension in South Africa, boy's hours of work are declining and attendance at school is significantly increasing. Moreover, in our results the presence of a male elderly is associated with a reduction in school attendance among girls (Table 9). These results may be due to the study context and Mexican men preferences as described in 3.2.

Table 10: Difference-in-differences estimation on youngsters living with elderly

VARIABLES	42000 & Elder	42000 & Elder
Eligible*Post	0.0692*	
	(0.0356)	
Female Eligible*Post		0.0910**
		(0.0436)
Male Eligible*Post		0.0252
		(0.0445)
Family Background Variables	Yes	Yes
Observations	4,264	4,264
R-squared	0.325	0.325

Source: Author's calculation from MxFLS-2 and MxFLS-3.
Note: Family Background variables: age, gender, father's age and education, mother's age and education.
Standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

In Table 10, I reduce the sample to household living in less populated areas (42,000 inhabitants and less) and to household living with senior aged 60 years and older. Among a sample of 4,264 youngsters living with at least one senior, 742 live with an eligible. I find that the introduction of the pension among eligible has a positive effect on youngsters' education when using family background variables. Consistent with results in Table 8, living with a female eligible enhances youngster's attendance at school.

These results should be understood cautiously as I select a subset from the total population. However, they indicate that the inclusion of larger municipalities is not driving the previous results.

5 Conclusion

This paper provides a first set of evidence of the impact of living with a senior (eligible to pension) on youngsters' education, in Mexico.

I found some evidence that living with a male elderly decreases attendance at school among youngsters, especially boys, particularly when using fixed effect estimator. Results emphasize that distinction between older men and older women is predominant. It suggests that their preferences for educate their grandchildren should be different. However, there may still be some endogeneity biasing the results. It appears also that my cohort strategy is not optimal to study the effect of living with an elderly on school attendance.

Applying a difference-in-differences with an eligible criterion on households who lived with elderly in 2005, I found that the introduction of the 70-y-más pension among eligible increases attendance at school among youngsters. I find evidence that girls and youngsters aged 15 to 20 years benefit from the presence of a female elderly. I suppose that households are exogenous and my results come from the strong assumption that youngsters share similar characteristics. However, these results may bring lessons about increase of bargaining power among elderly when they earn an additional revenue and preferences on grandchildren education. As Juárez González and Pfutze (2014) highlighted, receipt of the 70-y-más pension may benefit younger individuals. However, further studies must particularly consider the situation of poor boys in Mexico.

I believe it could be interesting to study further bargaining power among elderly especially female elderly, in an extended family. It would be interesting to provide more evidence that female elderly have preferences for grandchildren education in Mexico, which could give interest in public policy targeting both generations, especially by studying the educational decisions among households who belong to different economic classes.

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7 Appendix

Appendix 1: Composition of elderly's household and marital status

	2002	2005	2009		2009	
				Male	Female	All individuals
Composition of households	%	%	%	%	%	%
Couples	30.21	29.86	27.69	26.03	29.2	4.36
Nuclear	27.97	28.35	29.22	29.66	28.81	14.59
Extended	41.83	41.79	43.1	44.31	42	81.04
Marital Status						
Domestic Partnership	5.8	4.51	6.47	8.61	4.53	13.03
Separated	3.9	4.25	3.52	2.14	4.77	2.90
Divorced	1.17	1.45	1.27	0.86	1.65	1.06
Widow	26.72	26.45	24.35	14.91	32.94	3.88
Married	56.29	57.28	58.56	68.25	49.73	43.71
Single	6.13	6.07	5.83	5.24	6.37	35.42

Source: Author's calculation from MxFLS-1, MxFLS-2 and MxFLS-3.
Notes : We consider family decomposition within the three following characteristics: Couple families: elderly living with their partner or alone, nuclear family: if elderly live with their adult children, and extended family: elderly living with at least their grandchildren - they may not live with their adult children.

Appendix 2.1: Education level among girls

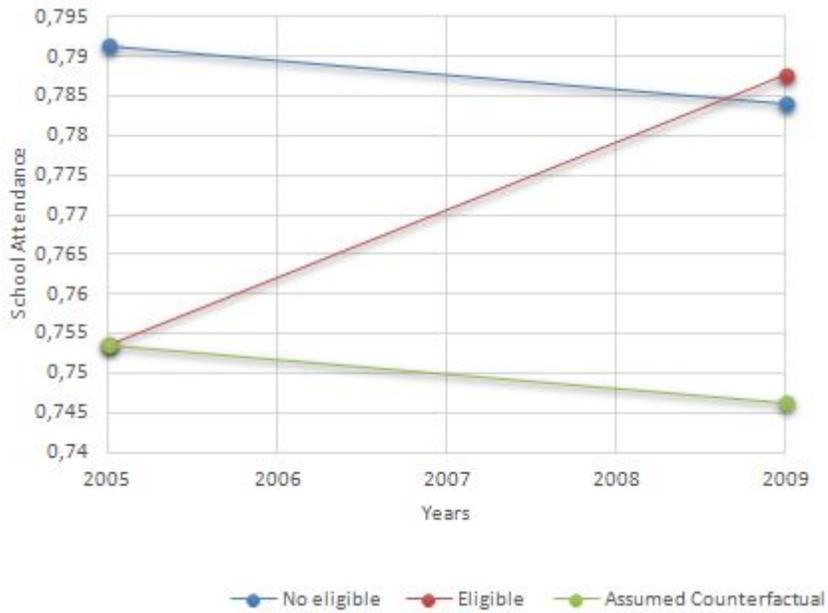| Education Level	6 to 11		12 to 14		15 to 17		18 to 20	
	N	%	N	%	N	%	N	%
Elementary	1,081	99.27	262	36.8	33	4.99	41	7.82
Secondary	8	0.73	447	62.78	284	42.97	142	27.1
High School			3	0.42	338	51.13	222	42.37
Normal Basic					1	0.15	12	2.29
College					5	0.76	106	20.23
Graduate							1	0.19
Total	1,089	100	712	100	661	100	524	100

Source: Author's calculation from MxFLS-3.

Appendix 2.2: Education level among boys

Education Level	6 to 11		12 to 14		15 to 17		18 to 20	
	N	%	N	%	N	%	N	%
Elementary	1,044	98.31	256	36.73	84	12.17	53	9.85
Secondary	17	1.6	440	63.13	293	42.46	196	36.43
High School	1	0.09	1	0.14	309	44.78	210	39.03
Normal Basic					1	0.14	6	1.12
College					2	0.29	72	13.38
Graduate					1	0.14	1	0.19
Total	1,062	100	697	100	690	100	538	100

Source: Author's calculation from MxFLS-3.

Appendix 3: Difference in differences estimation using the full sample

Source: Author's calculation from MxFLS-2 and MxFLS-3.