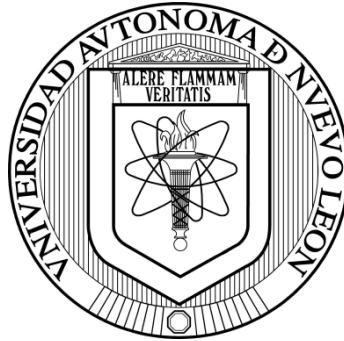# UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN
FACULTAD DE ECONOMÍA
DIVISION DE ESTUDIOS DE POSGRADO

"ESSAYS IN LABOR ECONOMICS: CHILDREN IMMIGRATION, INFORMAL EMPLOYMENT, AND SOCIAL MOBILITY IN MEXICO"

Por

ADELAIDO GARCÍA ANDRÉS

Tesis presentada como requisito parcial para
obtener el grado de Doctorado en Ciencias Económicas

JUNIO 2016

ABSTRACT

My thesis dissertation consists of three empirical essays on labor economics: **Chapter 1. "*How does affect household immigration child labor?*"** focus in a little explored area in Mexico, the effect of household immigration on child labor. Using the 2013 MTI-ENOE, I set up a bivariate probit model to control two mixed effects, the inverse relation between child labor and education, and the endogeneity in the family migration. I find that the probability of child labor to immigrant child is higher compared to a non migrant child, this probability increases with his age and it is larger for boy relative to girls. In relation to household composition, the rates of child labor is higher in household with a father absent. In fact, immigrant children are a vulnerable group, even if they seem to have a higher level of education than non-migrant.

Chapter 2. "*Intergenerational transmission of informal employment in Mexico. A limited choice or better income prospects?*" motivates the use of retrospective data 2011 ESRU Survey of Social Mobility in Mexico. I develop a formal/informal employment occupation model to estimate the likelihood for sons to continue the same father's employment occupation sector. Different from the previous evidence in Mexico, my study differs in three ways: (1) empirical strategy aims at controlling as much as possible for heterogeneity sample, (2) microeconometric framework derives from a structural model with expected wages explicitly determining labor occupation decisions, (3) selectivity bias is achieved using a two-steep estimation. My results show a strong connection between intergenerational occupation, also predicted earnings differentials between occupation sectors. Hence, individuals with informal parent's occupation have less likelihood to be enrolled in the formal sector.

Chapter 3. "*Leaving the nest or living with her parents: Evidence from Mexican millennia's generation*" adds to the literature by examining the determinants of children's propensity to live with their parents. The 2010 Mexican Census enumerated that 67 percent young adults aged 20 to 29 years still living with their parents, 29 percent living with a partner and about 4 percent living alone. Why young adults co-residence with her parents beyond mature age has several issue. i.e., living with parent's serves as an important mechanism through with parents transfer resources to their adult's sons.

I focus on Millennia's Generation (1980–1999) in order to consider some relevant characteristics' in this generation. I found that labor participation reduce the propensity to co residence only for males, this is explained in part by lower labor participation for female sample, however, this results should be considered with caution due to endogeneity between labor participation and co residence. Similar to other papers, I found that children living in household where both parents are working may experience low unemployment rates, which is associated with independence of children at younger age.

TABLE OF CONTENTS

Chapter 1.

How does affect household immigration child labor? Evidence from Mexico

Chapter 2.

Intergenerational transmission of informal employment in Mexico. A limited choice or better income prospects?

Chapter 3.

Leaving the nest or living with her parents: Evidence from Mexican millennia's generation

Chapter 1.

How does affect household immigration child labor? Evidence from Mexico

1.1 Introduction

This paper focus on a little explored area, the effect of migration on child labor, in other words, we would like to test whether immigrant children have a larger propensity to work compared with those non–migrant children.

The International Labor Organization (ILO henceforth) mentions that 1 in 8 persons is migrant around the world, from which a third of the migrant flow from developing countries are young people, aged 12 to 24 year. According to the 2011 Mexican National Survey of Demographics Dynamics (ENADID, for its acronym in Spanish) 16 out of 100 people reside in a different location to its birthplace. Mexican Population Census statistics show a decrease in the immigration rates from 3.8 percent to 2.9 percent between 2000 and 2010, for children aged 5 to 17 years, our objective sample.[1]

Usually, most children migrate with their families, so then migration is a survival solution for households in need, because it provides them new opportunities to families and their children Glind (2010). Also, migration decision is influenced by several factors, such as a conflict and natural disasters, domestic violence, family structure, family income, and search for better opportunities. Hence, migration can provide a positive experience by providing them with a better life, increase job opportunities, escape from immediate threats such as forced marriage, and have access to school or to a better school Hashim (2005). Also, migration might provide an opportunity to run away social order divisions to work with dignity and freedom at the destination Deshingkar and Akter (2009).

---

[1] http://www.ilo.org/ipec/areas/Migration_and_CL/lang--en/index.htm

However, children migrants could face serious challenges in their destinations, e.g. Powers (2011) suggests that a change in household membership changes the overall household workload of both home production and market work. Additionally, empirical studies suggest that migration makes children increasingly vulnerable to child labor, usually because they enroll in the worst forms of child labor with low wages and long working hours, Immink and Payongayong (1999), Edmonds and Shrestha (2013). As Coffey (2013) points out, if parents do not know about this disadvantage, or they do not consider it when deciding whether or not to take their children with them when they migrate, then it constitutes a negative externality of immigration.

This paper examines the empirical evidence linking migration children with child labor using 2013 Child Labor Module (MTI for its acronym in Spanish). Similar to Patrinos and Psacharopoulos (1997) we assume that the migration and child labor choices are made in the child's current household. Hence, we divide the sample in two main groups, a) children living in nuclear households –whether both parents are present and whether one is absent–, and b) children living in non-nuclear household.

In this paper we focus on the migrant children and how migration affects children's development. Migration can have positive or negative effects. Migration depends on family composition; the absence of a male role model might have a detrimental effect on boys, while the demonstration effect of migration might cause some children to reduce their effort in school, because they anticipate migrating for low-skilled work in the future Powers (2011).

Empirical strategy must consider two mixed effects on the child labor decision. First, the inverse correlation between child labor and education time Bhalotra and Tzannatos (2003), and second, the endogeneity in the migration process, i.e., the emigrant population is not randomly selected, composed by individuals who have particular sets of skills and attributes Borjas (1999).

Our paper will model these two decisions with a setup of a Bivariate Probit model composed by two binary dependent variables for the outcome (Child Labor) and a selection equation (Migrant Child). Hence, we estimate child labor and migration determinants in the outcome equation and migration decision separately. We

account for unobserved factors affecting both equations, and then, an error bivariate distribution will be estimated to account for the endogeneity effect.[2]

The outline of the paper is as follows. Section 2 presents a brief review of literature about children in migration. Section 3 presents descriptive statistics about children in the dataset to provide context. Section 4 introduces the empirical model and presents the results. And finally, Section 5 concludes.

---

[2] A Bivariate Probit model has been used by Canagarajah & Coulombe (1997), and Nielsen (1998) to estimating the schooling and working decision jointly.

1.2. Literature review

Theory of migration derives from neo-classical economics that suggests that migration is the result of household or individual decisions made by rational agents who seek to improve their well-being. This choice will be inducement by utility maximization, factor mobility, and wage differentials. However, migrants do not constitute a homogeneous category; migrants could be segmented along gender, class, ethnicity, language and religion. Woman and children remain among the most invisible and vulnerable groups among migrants UNESCO and UNICEF (2012).

As CPI (2013) suggests "children on the move" is an umbrella definition that brings together a wide range of motives. Following Van de Glind (2010) we can distinguish three categories of voluntary migration as follow: 1) children who migrate with their parents (i.e. family moves together), 2) independent child migrants, and 3) children left–behind by migrant parents (i.e. migration for one or both parents).[3]

Regarding to other categories, it includes children who have been trafficked, children who migrate and children displaced by conflict and natural disasters, domestic violence, child fostering, learning experience, family's survival strategy, and others Van de Glind (2010). Some of the children are at risk to have their rights violated, especially those exploited on child labor IPEC (2012).

Also, Patrinos and Psacharopoulos (1997) suggest that migration makes children increasingly vulnerable to child labor. It has been argued that children from larger households are more likely to work, because fewer resources have to be assigned among more household members. Another negative effect can be observed in educational outcomes, e.g. in some cases migrant students are forced to repeat the same grade, regardless of their age or learning needs, due to inflexible school procedures and the absence of remedial classes that address students' learning deficits UNESCO (2013), or due to missing weeks or months of the school year to

---

[3] Independent child migrant may also be a part of a family's survival strategy as the migration of a child decrease the dependency ratio in the household, even when the child does not earn enough to wave. In addition, some children are able to save and send remittances, sometimes contributing to the education of their siblings (Van de Glind, 2010 p. 7).

accompany their parents to the destination site when the migration cycles begin Coffey (2013).

There are several plausible mechanisms that could lead from child migration to poor outcomes. Migration may lead children to forget what they have learned in school, or prevent them from developing relationships with teacher and classmates that help them progress through school. Upon returning to their home villages, migrant children face multiple difficulties. For example, migrant children experience learning difficulties that results from attendance disruptions Gindling and Poggio (2010).

In the case of Mexico, previous studies have examined the effects of migration of parents, Antman (2010) explores the short–run effects of a father's U.S. migrations on his children's schooling and child labor. Their results suggest of children decreasing their study hours and participation in schooling in response to a father's absence, especially for younger children. While for sons aged 12-15 years increase their works hours and child labor participation outside the home.

In addition, McKenzie and Rapoport (2011) find that a household having a migrant member lower the chances to both boys and girls of completing high school, also increases their probability of entering the labor force. With respect to children in migrant households, Hanson and Woodruuf (2003) show that children will significantly complete fewer years of schooling. In addition, they find that the migrant from the household is correlated with more schooling for children with mother with lower education level.

Opposite this results, Malone (2007) finds that a father's absence due to migration is likely to have a positive effect on children's schooling, as a result of remittances, mother's are more likely to see education as one of the primary uses of extra income from abroad. Improvements in child's educational attainment may therefore be more likely to occur when the fathers migrates, leaving the use of remittances and determination of resources for mothers.

1.3. Data

1.3.1 Child labor module MTI–ENOE

The used data come from 2013 Child Labor Module (MTI, for its acronym in Spanish). MTI is collected in the fourth quarter as an appendix to 2013 National Survey of Occupation and Employment (ENOE, for its acronym in Spanish). Child Labor Module (MTI–ENOE henceforth) is conducted by INEGI to measure Mexico's labor force and its employment characteristics. Each sample household is interviewed five times at three-month intervals and the sample is divided into five roughly equal rotation groups.

The MTI–ENOE complements normally collected information for the population aged 12 to 17 years in the ENOE basic questionnaire and extends its analysis to include features related to labor market participation and schooling for children aged 5 to 11 years. The 2013 ENOE's fourth trimester sample of contains a total sample of 121,116 households. MTI–ENOE is a complete survey to identify the factors that determine child labor participation and schooling attendance. The questions are asked only to one child in every household. Because the MTI–ENOE is applied in households with full interview where children aged 5-17 years are living, the objective sample is 95,634 children.[4]

1.3.2 Children immigration using MTI–ENOE

The National Survey of Demographic Dynamics (ENADID) is a national household survey to collect a wide range of information about population change in Mexico. ENADID collects the same information as the 2010 census: age at migration, state of origin for the migrant, month and year of departure, current residence, and, if the international migrant is back to Mexico, return date to Mexico. ENADID asked residence over the five years previous to the survey, while Census additionally asks residence on the previous year. However, ENADID and Mexican Population Census do not include detailed information about a labor force and its employment characteristics for children population.

---

[4] The 2013 MTI was designed by an inter-institutional working team of technicians, led by the Ministry of Labor and Social Welfare and the National Institute of Statistics and Geography, with advice from the ILO and UNICEF
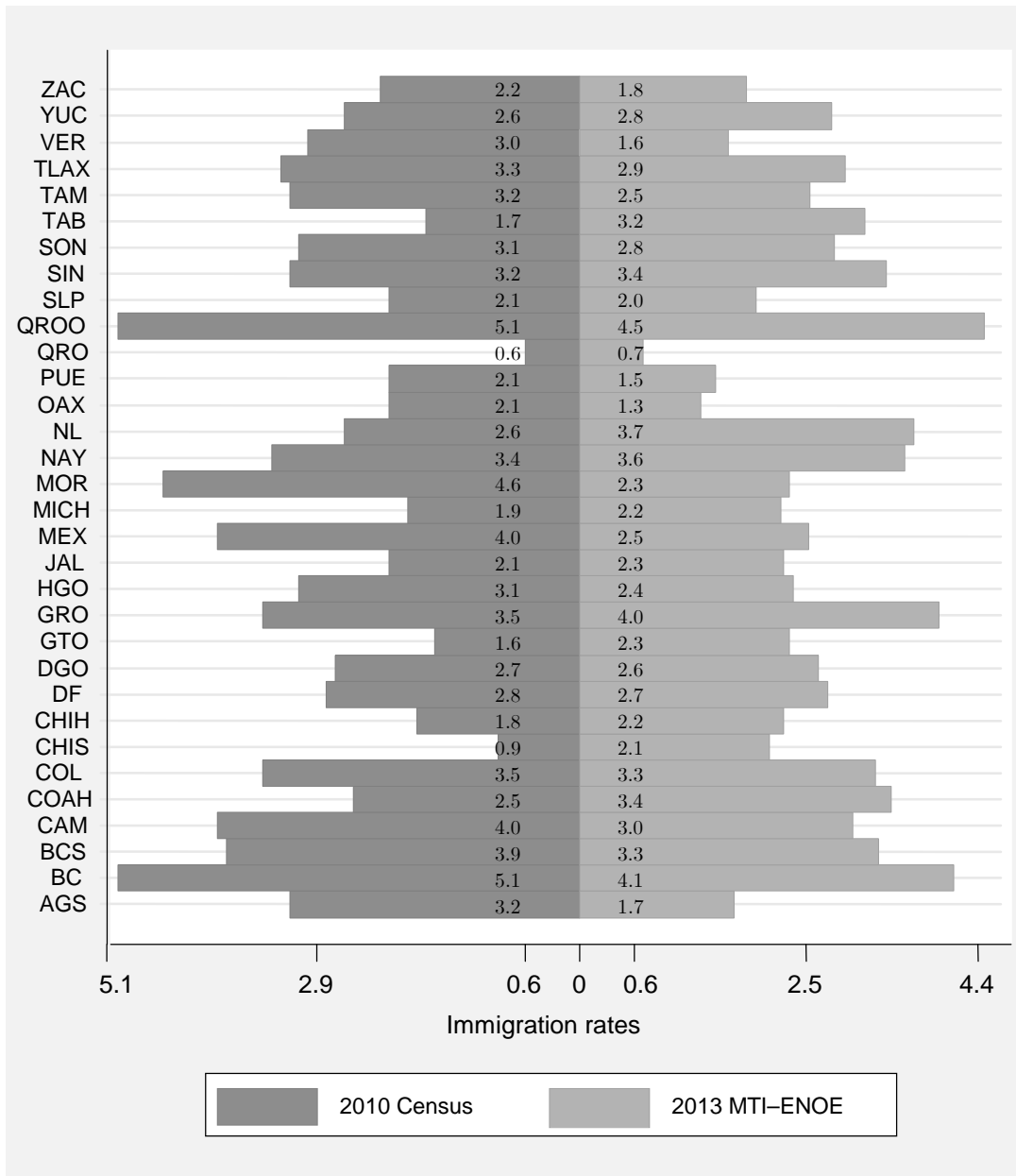
Compared to ENADID and Mexican Population Census, ENOE is limited to identify migration movements. ENOE does not collect information on previous residence, but we can measure only movements into and out the existing households.

ENOE let us identify new arriving families in the surveyed households. To measure children in immigration is used the question of residency status that refers to the previous year of the survey. There are three possible values: if the value that stores this field is 1, the child is an habitual resident; if the value is 2, he is a definitive absent; and if the value is 3, he is a new resident. So, we define immigrant children as the cases where he is a new resident.

Given the limitations of the databases to jointly measure child labor and migration, in this paper we will use ENOE data. Then to verify the validity of our measurement, we calculate rates of immigration per state comparing information from ENOE and Mexican Population Census, because both are analogous in terms of the previous residence one year before the survey; although each refers to the immigration movements in 2012 and 2009 respectively.

Graph 1 shows the comparison between both sources of information. Quintana Roo and Baja California Norte are the states that host the largest percentage of immigrants while Queretaro has the lowest immigrant rate; facts that can be identified from both datasets. Eight states differ by 0.1 or 0.2 percentage points (pp), while the rest differs in no more than 1.5 pp. Even though, temporal comparison between datasets is not the same year. ENOE seems a good approximation to the measure immigration rates among states because the absolute differences are relatively small.

Graph 1. Children immigration statistics in Mexico

State	2010 Census	2013 MTI–ENOE
ZAC	2.2	1.8
YUC	2.6	2.8
VER	3.0	1.6
TLAX	3.3	2.9
TAM	3.2	2.5
TAB	1.7	3.2
SON	3.1	2.8
SIN	3.2	3.4
SLP	2.1	2.0
QROO	5.1	4.5
QRO	0.6	0.7
PUE	2.1	1.5
OAX	2.1	1.3
NL	2.6	3.7
NAY	3.4	3.6
MOR	4.6	2.3
MICH	1.9	2.2
MEX	4.0	2.5
JAL	2.1	2.3
HGO	3.1	2.4
GRO	3.5	4.0
GTO	1.6	2.3
DGO	2.7	2.6
DF	2.8	2.7
CHIH	1.8	2.2
CHIS	0.9	2.1
COL	3.5	3.3
COAH	2.5	3.4
CAM	4.0	3.0
BCS	3.9	3.3
BC	5.1	4.1
AGS	3.2	1.7

Immigration rates

Legend: 2010 Census · 2013 MTI–ENOE

Source: Author's calculation based 2010 Census, 2013 MTI–ENOE

From now on we are referring only to the information obtained from MTI-ENOE dataset. ENOE obtains the information from 29,302,018 households, from which 361,568 are immigrant households, and represent 1.23% of the total households. The immigration movement is basically within the same state, intrastate 85.5%, while 14.5% corresponds to families that arrived from a different state in Mexico, defined as interstate immigration.

This pattern is also estimated with the ENADID dataset.[5] **Graph 2** shows that Quintana Roo, Baja California Norte, Guerrero, Nuevo Leon, and Nayarit are the states with the largest intrastate immigration ranging from 2.7% to 3.7%. Quintana Roo and Guerrero have as the principal activity of the tourism, as well as, Baja California Norte and Nayarit but also these states have an industrial development; Nuevo Leon is one of the principal industrial states in the country. Other states such as Coahuila, Sinaloa, Baja California Sur, and Tabasco have high rates of intrastate immigration from 2.9% to 3.1%. Colima, Baja California Norte, Durango, and Quintana Roo show large rates of interstate immigration, 1.3%, 1%, 0.8% and 0.8%, respectively.

Graph 2. Children immigration by origin
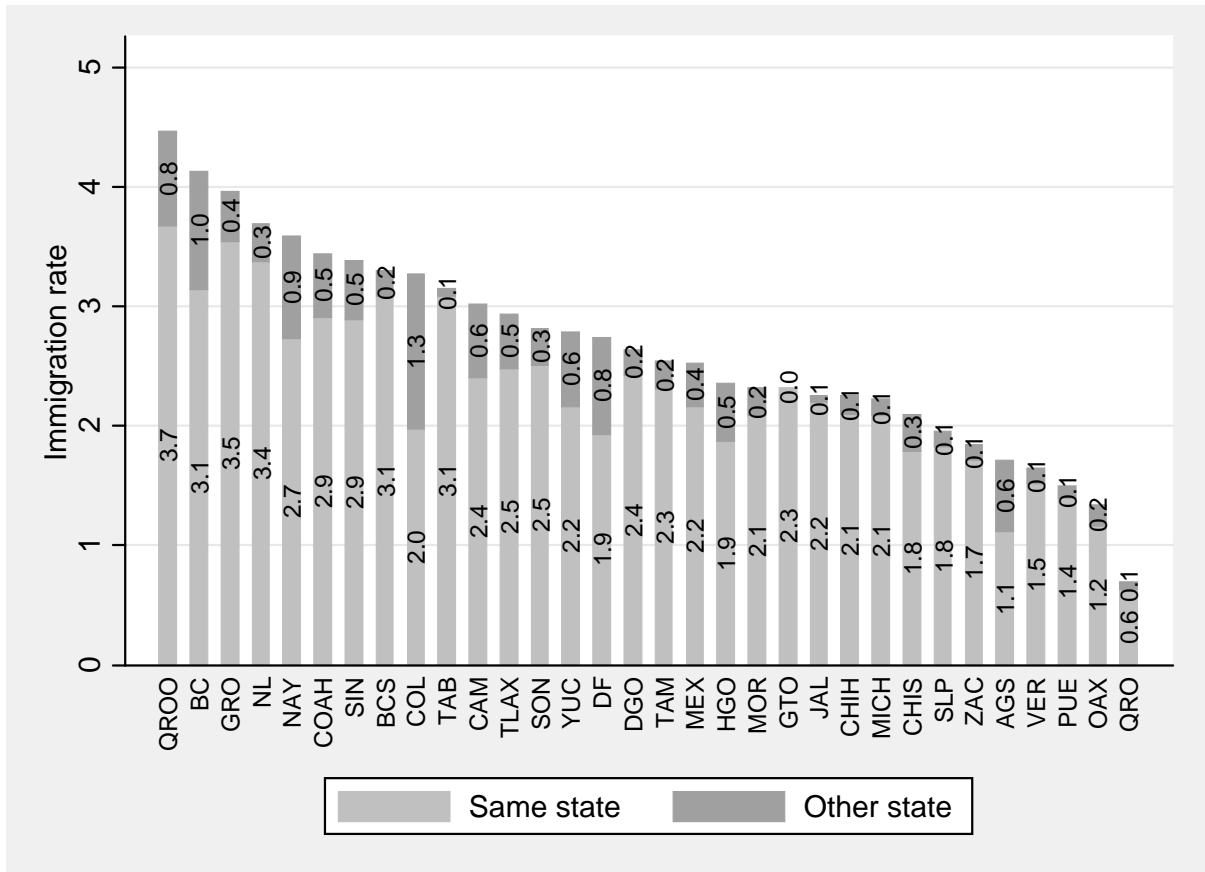
Source: Author's calculation based 2013 MTI–ENOE

---

[5] According to the 2011 ENADID, one in three children under 15 years recorded change in the place of residence; 92.3%, 6.4% and 1.3% represents, intrastate, interstate, and international immigration, respectively.

There are several reasons for the families to migrate, we observe that there are states that attract people because of the tourism, industry development and other economic activity that generate high value added. Besides the state's environment there are family reasons to migrate which depend on the family structure. A nuclear family is composed by father, mother and children. In some nuclear could be absent one of the parents, or could have no children in the household; the relevant condition is that if the family moves they will go together and share the same household, in our sample represent 24.05% of the immigrant households.

Also there are families composed, besides the nuclear family, by other relatives such as families of the siblings and parents of the head of the family or spouse, they formed extended families, representing 75.67% of the immigrant households. In this case, we can infer that children migrate with or without the family but stay with relatives. The rest 0.31% are children immigrants that arrived to non-relatives households.

Table 1 shows the main reasons that children in immigrant households answered. One of the reasons is to meet the family and other reasons. It is surprising that a low percentage declares job and to study reasons. Although, it is evident that these percentages are larger when they arrived to extend families 1.86% and 5.70% respectively, and when they arrive to non-relatives family is 8.63% for job and 6.92% for study reasons. Even though children may not reveal that the reason to migrate is to work or to study; the fact is that some of them are working. The MTI–ENOE allows us not only counting them but also analyzing their labor conditions.

Using the MTI–ENOE questionnaire and the international convention, the definition of a child worker is a person aged from 5 to 17 years who responded to be performing any economic activity or have plans to do, in the previous week of the interview. The economic activity is the production for individual consumption or any other action intending to produce or provide goods and services to the market. These activities may be paid or unpaid. The calculation does not include child workers who engage in activities that form part of survival strategies in poor families, such as: looking after cars parked in the street; cleaning windshields at traffic lights; singing in public transport or other types of street entertainment.[6]

---

[6] This information is unavailable due to MTI–ENOE only covers households.

Table 1. Reasons for children's immigration

Reasons	Household composition			Total
	Nuclear	**Extended**	**Non-relatives**	
Job	0.58 %	1.86 %	8.63 %	1.57 %
Study	2.32 %	5.70 %	6.92 %	4.89 %
Married	2.74 %	6.71 %	-	5.74 %
Divorce	0.91 %	0.36 %	-	0.49 %
Health problems	-	0.07 %	-	0.05 %
Meet with family	56.39 %	52.65 %	84.44 %-	53.65 %
Insecurity	0.12 %	0.04 %	-	0.06 %
Other	36.93 %	32.61 %	-	33.55 %
Total	**100 %**	**100 %**	**100 %**	**100 %**
Immigrant families	87,127	274,441	1,112	362,680

Note: Sampling weights used to compute the children population
Source: Author's calculation based 2013 MTI–ENOE

Table 2 shows the percentage of children who are working due to their migratory status. It is clear that the majority of households are non–migrant, 98.77%. We calculated that the percentage of worker children differs between non-migrant and immigrant by 3.41 percent (91.40% compared to 87.96 %). Data show a larger percentage of children workers in immigrant households, 12.01%, and in non-migrant households are 8.60%. Total children working rate are 8.65% independent on the migration status.

Table 2. Child labor by migration status

	Non-migrant	**Immigrant**	**Total**
Non-worker	91.40 %	87.96 %	91.35 %
Worker	8.60 %	12.01 %	8.65 %
Total percentage	**100 %**	**100 %**	**100 %**
Total households	28,974,940	362,680	29,337,620

Note: Sampling weights used to compute the children population
Source: Author's calculation based 2013 MTI–ENOE

Not only is the working status of the children in the immigrant households relevant, but also the number of hours that they work per week, earnings, education and the reasons to be working instead of studying. **Table 3** shows the number of hours worked per week. It is evident that a large proportion of non-migrant children work less than 24 hours per week, about 27.80% work less than 15 hours and 15.95% work between 15 to 24 hours per week, for immigrant children these percentages are 11.12% and 12.40% respectively.

The pattern changes as the weekly working hours increase, since children immigrant work longer hours, 9.17% work between 25 to 34 hours compared to 6.80% of non-migrant children. The fact that immigrant children work the longest is showed when we compare the percentage of children that work more than 35 hours per week, because the percentage is two times the percentage of non-migrant children.

Table 3. Worked hours per week by migration status

Working hours	Non-migrant	Immigrant	Total
Less than 15 hrs	27.80 %	11.12 %	27.51 %
15 to 24 hrs	15.95 %	12.40 %	15.89 %
25 to 34 hrs	6.80 %	9.17 %	6.84 %
35 or more hrs	28.76 %	58.14 %	29.27 %
Irregular	19.75 %	6.61 %	19.52 %
Unknown	0.94 %	2.56 %	0.97 %
Total	**100 %**	**100 %**	**100 %**
Children 5-17 years old	**2,493,017**	**43,676**	**2,536,693**

Note: Sampling weights used to compute the children population
Source: Author's calculation based 2013 MTI–ENOE

For comparison reason it is shown the distribution of weekly working hours for non-migrant and immigrant children. Because it is our interest to know if the children receive a payment for their work that could give us a hint of why immigrant work longer hours than non-migrant, **Graph 3** shows a comparison between non-migrant and immigrant children by monetary and non-monetary payment.

Graph 3. Worked hours per week by migration status

Children with monetary payment

Children with non monetary payment
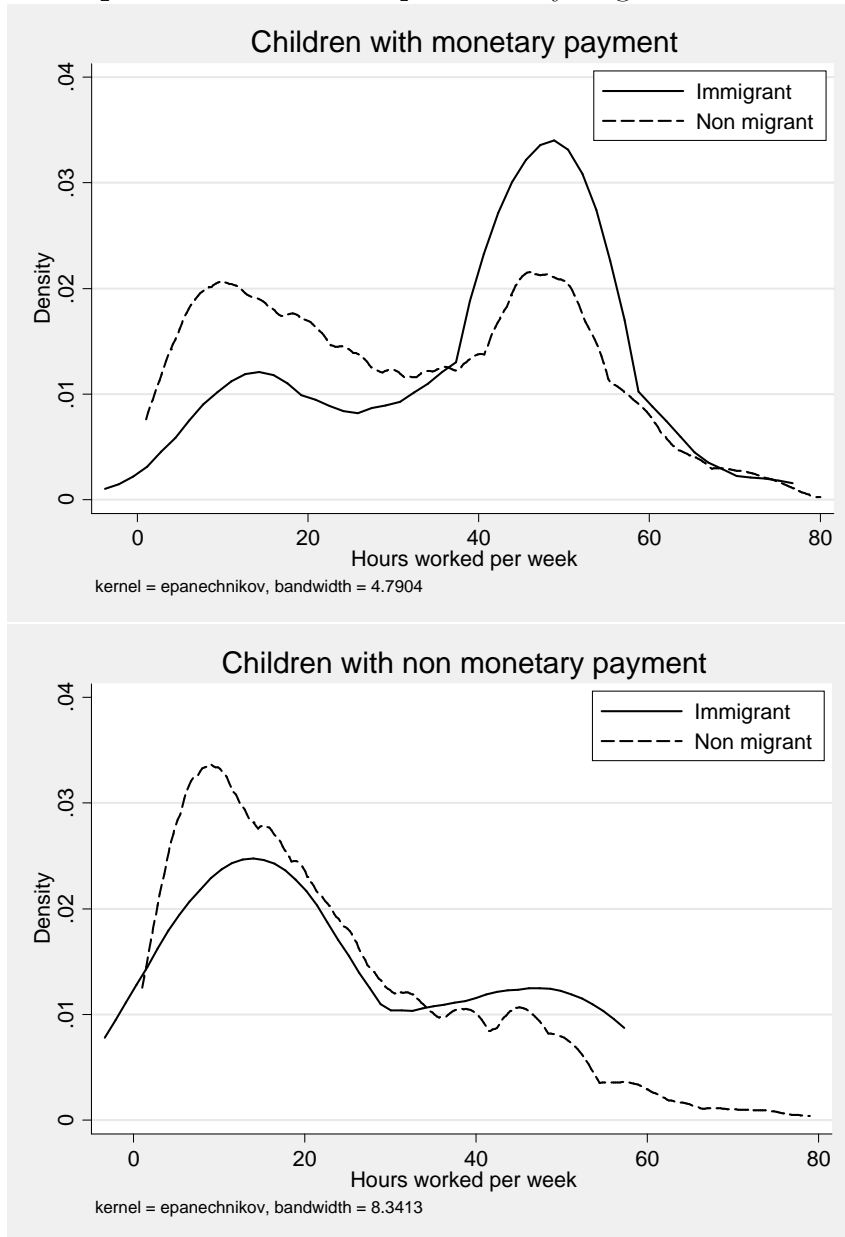
We observe an interesting pattern; immigrant children work longer hours to receive a payment while non-migrant children work fewer hours per week for a payment. Also we can notice that a larger percentage of non-migrant children work fewer hours and mainly do not get a monetary payment. This fact may indicate that children may work for a family business. The gap between the longer worked hours per week between immigrants and non-migrants is reduced if the children do not receive a monetary payment.

In relation to the children's earnings in **Table 4**, we observe that there is no difference between the percentages of non-migrant and immigrant children that receive less than 1 minimum wage (mw). However, we can observe that larger percentages of immigrant children receive more than 1 to 3 mw. This is related to the longer hours worked per week relative to non-migrant children. On the contrary, the non-monetary payment percentage is almost two times larger for non-migrant children, 46.40% versus 19.00% reported by immigrant children.

Table 4. Children's earnings by migration status

Minimum Wage (mw)	Non-migrant	Immigrant	Total
Less than 1 mw	28.38 %	28.11 %	28.38 %
1 to 2 mw	17.01 %	31.21 %	17.25 %
2 to 3 mw	5.29 %	14.06 %	5.44 %
More than 3 mw	1.14 %	6.36 %	1.23 %
Non monetary payment	46.40 %	19.00 %	45.93 %
Unknown	1.77 %	1.27 %	1.77 %
Total	**100 %**	**100 %**	**100 %**
Children 5-17 years old	2,493,017	43,676	2,536,693

Note: Calculated using the expansion factors.
Source: Author's calculation based 2013 MTI–ENOE

From previous tables we have seen that the main reason for children to work is to get a monetary payment. **Table 5** shows that if a child is immigrant one of the reasons to work is because the household needs extra income, 12.10% compared to non-migrant children, 8.61%. However, the main reason to work, when the child is immigrant, is because he needs to finance his own expenditures, 38.96%, also it is for the non-migrant children workers but lower in magnitude, 22.98%. This fact confirms that migrant children workers appear vulnerable if the house to which they move becomes unable to maintain their costs. If the household needs workers, perhaps for family business, then a larger percentage of children respond it as one of the reasons to work, 22.55%; similar percentage is responded if they like to help in the household, 22.49%. For immigrant children workers these percentages are smaller, 18.49% and 14.61%, respectively.

Table 5. Children's reasons to work by migration status

Reasons to work	Non-migrant	Immigrant	Total
Household needs income	8.61 %	12.10 %	8.67 %
Household needs workers	22.55 %	18.49 %	22.48 %
Learn and trade	13.59 %	6.46 %	13.47 %
Own expenditure	22.98 %	38.96 %	23.25 %
Like to help	22.49 %	14.61 %	22.35 %
Other	9.78 %	9.40 %	9.78 %
Total	**100 %**	**100 %**	**100 %**
Children 5-17 years old	2,493,017	43,676	2,536,693

Note: Calculated using the expansion factors.
Source: Author's calculation based 2013 MTI–ENOE

Education could be one of the reasons for children to move to another city. It was not one of the main reasons reported moving tough. **Table 6** confirms that a larger percentage of the immigrant children are not attending school, 19.93%, compared to non-migrant children who show a lower percentage, 7.07%. Nevertheless, the majority of children would be attending the school, non-migrant 92.93% and immigrant children, 80.07%.

Table 6. School attendance by migration status

Attending to school	Non-migrant	Immigrant	Total
No	7.07	19.93	7.23
Yes	92.93	80.07	92.77
Total	**100 %**	**100 %**	**100 %**
Total Households	28,974,940	362,680	29,337,620

Note: Calculated using the expansion factors.
Source: Author's calculation based 2013 MTI–ENOE

Previous table does not tell much about the education level that children are attending. **Table 7** shows the attained level of education of the children by their migration status. Children face a larger opportunity cost of studying as they get older, so then it is likely that migrant children would have at least some level of education, and then migrate to work. The self-selection of migrant is related to the education level of the migrants; those who are more able would be more likely to migrate.

From the data we can infer that non-migrant children are more concentrated on the lower levels of incomplete attained education, such as no schooling years, partial primary and partial secondary relative to immigrant children. On the contrary, larger percentages of immigrant children have attained complete primary, secondary and high school or more. Therefore, immigrant children seem to have higher education than non-migrant children.

**Table 7.** Educational attainment by migration status

Education level	Non-migrant	Immigrant	Total
Non schooling	18.88 %	16.77 %	18.86 %
Partial primary	42.15 %	37.72 %	42.09 %
Completed primary	9.75 %	10.28 %	9.76 %
Partial secondary	15.07 %	13.46 %	15.05 %
Completed secondary	8.36 %	14.68 %	8.43 %
High school or more	5.77 %	7.09 %	5.78 %
Total	**100 %**	**100 %**	**100 %**
Children 5-17 years old	2,493,017	43,676	2,536,693

Note: Calculated using the expansion factors, exclude 0.02% matching to Unknown category.
Source: Author's calculation based 2013 MTI–ENOE

According to the evidence presented migration does not necessarily is accompanied with high school attendance. In fact, there are two trends of school dropout percentages, see **Graph 4**. The first trend, defined for children who are 6 to 11 years old, reveals that non-migrant children have the highest dropout rates. The second trend, for children who are 12 years old or more, the dropout rates are larger for immigrant children.

Graph 4. Age stopped school attendance
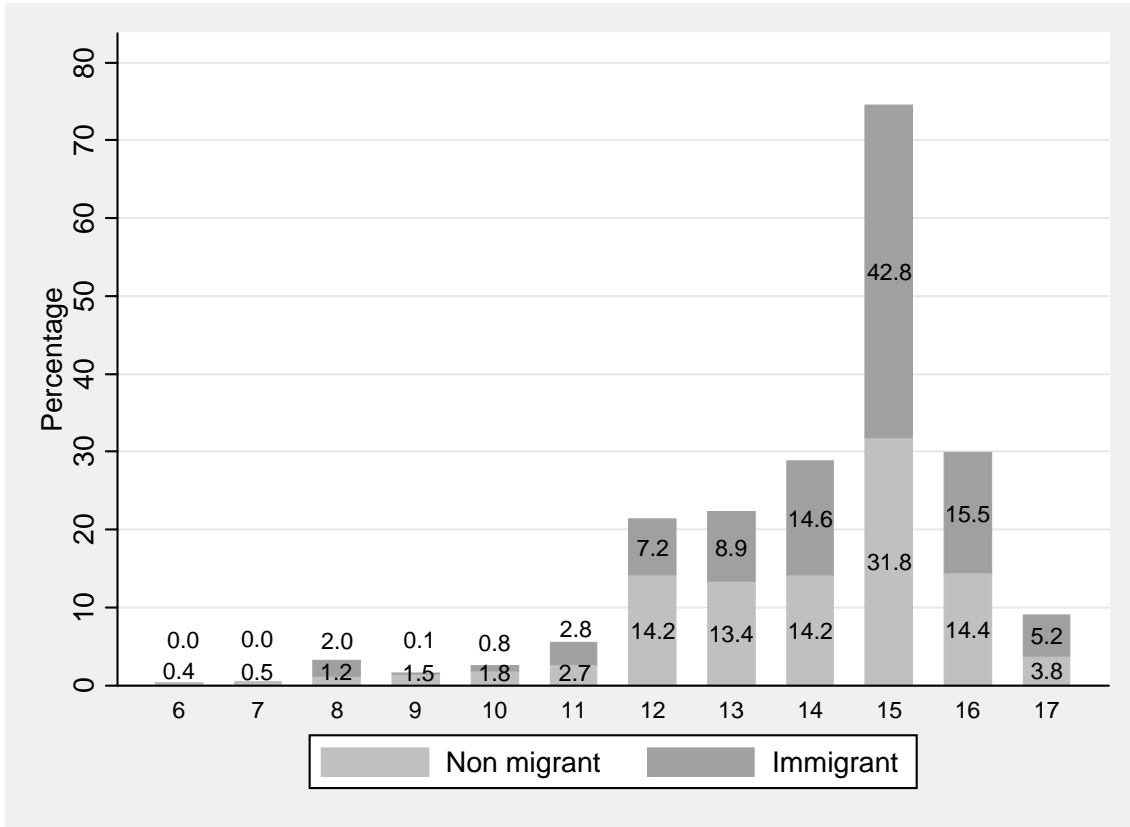
Note: Only include children currently not attending to school.
Source: Author's calculation based 2013 MTI–ENOE

It is remarkable that the highest dropout school rate is at 15 years old and is larger for immigrant children, 42.8%, compared to 31.8% of non-migrant. In this sense, the immigrant children are more vulnerable, most of all, if they are teenagers.

Although compulsory education in Mexico is until secondary, the dropout attendance rates are higher in this level SEP (2013). This pattern could be explained because the eldest children became more productive and therefore the opportunity cost to keep them in the school it increases UCW (2012).

1.4. Empirical strategy

1.4.1 Identification

It is assumed that the heads of the family. Mother and father, would decide what is best for the family to improve their income and living conditions. Then child labor and migration are two decisions that children cannot make by themselves. Family would choose whether to send the children to school, to work, or both, and whether to move to another city to improve the family income.[7]

The migration process involves different factors that may result in higher child labor, although the opposite is also expected if the purpose of moving is for getting higher education. Family income is relevant to determine how child labor and migration are related. On one hand, if a family has restrictions for moving to another city to get better job conditions and higher wages, it would be likely that children would be sent to work. On the other hand, a family may decide moving to another city but this change creates imbalances on the family's income that makes them send their children to work instead to the school. Also a family may move not only to increase family income but to get schooling opportunities for their children. Then the association between migration and child labor could be in both directions.

The question to be answered is whether migrant families, and therefore, migrant children are more likely to work. This paper will try to model these two decisions as independent, however, there are unobserved factors affecting both child labor and migration decisions. For example, father, mother and children's ability, attitude toward improving opportunities, preference to study in better quality schools, and the like.

Endogeneity of the migration process, including the fact that migrant households and members self–selection into this status on the basis of both observed and unobserved characteristics, complicates identification of the causal effect of migration on child development. The empirical strategy to deal with child labor

---

[7] Van de Glind (2010) stated that children during the migration process are exposed to high risk of violence, abuse and worst forms of child labor, especially if they migrate without the family. However, the available information cannot let us analyze this type of children migration, instead using ENOE will let us to analyze closely child labor conditional to the migration status of the family.

and migration to account for the endogeneity is to estimate child labor and migration determinants separately but considering that there are unobserved factors affecting both equations, and then an error bivariate distribution will be estimated to account for the endogeneity effect.

1.4.2 Recursive bivariate probit model

The difference between univariate and bivariate Probit is the potential nonzero correlation (ρ 0) between the unobserved explanatory factors in the two equations. Estimating both equations as a system will not affect the consistency of individual Probit estimates. More details about the Recursive Bivariate Probit model see: Maddala and Lee (1976), Greene (1998).

The estimated model is composed by two binary dependent variables for the outcome and selection equations. The outcome equation has as dependent variable, Y_1, representing the Child Labor variable that takes the value of 1 and 0 otherwise; and the selection equation has also a binary dependent variable, Y_2, if the individual is a Migrant Child takes the value of 1 and 0 otherwise. Hence, the latent variable Y_{i1}^* represents the decision of child labor and the latent Y_{i2}^* represents the decision to migrate.

The set up for the model is as follows:

$$Y_{i1}^* = {}_1'\mathbf{x}_{i1} + u_1 Y_{i2} + v_{i1} \qquad (1)$$

$$Y_{i1} = 1 \ \ if \ \ Y_{i1}^* > 0 \, , 0 \ \ \text{otherwise}$$

$$Y_{i2}^* = {}_2'\mathbf{x}_{i2} + v_{i2} \qquad (2)$$

$$Y_{i2} = 1 \ \ if \ \ Y_{i2}^* > 0 \, , 0 \ \ \text{otherwise}$$

$$E(\varepsilon_{i1}|\mathbf{x}_1, \mathbf{x}_2) = E(\varepsilon_{i2}|\mathbf{x}_1, \mathbf{x}_2) = 0$$

$$Var(\varepsilon_{i1}|\mathbf{x}_1, \mathbf{x}_2) = Var(\varepsilon_{i2}|\mathbf{x}_1, \mathbf{x}_2) = 1$$

$$Cov(\varepsilon_{i1}, \varepsilon_{i2}|\mathbf{x}_1, \mathbf{x}_2) = \varrho \ \ ; \ \ i = 1,2,3,...,n$$

The model accounts for the effect that migration has on child labor, since y_{i2} is also included in the first equation as an endogenous variable. This is a recursive, simultaneous bivariate probit model, where X_{i1} and X_{i2} are row vectors of exogenous variables which determine respectively, Child Labor and Migrant Child propensities, and (β_1) and (β_2) are associated parameter column vectors.

The vectors x_{i1} and x_{i2} represent the set of independent observable variables that are affecting both decisions to work and to migrate. For identification purposes, we need at least one different independent variable in the selection equation. This two-step procedure represents an attempt to deal with the simultaneity problem Greene (1998).

Another important variable is the effect of children school attendance on migrant household decision. In equation (2) school attendance has an effect on the decision to migrate; for example, family can send the children outside or migrate together to have access to school or to a better school Hashim (2005), or, parents who care more strongly about education of their children may migrate in order to earn income that can be used to pay for schooling expenses McKenzie and Rapoport, (2011). Since most data sets describe an inverse correlation between child labor and schooling attendance at the micro-level Bhalotra and Tzannatos (2003), we do not include school attendance in the outcome equation.

Family composition has important implications, for example, the absence of a male role model might have a detrimental effect on boys, while the demonstration effect of migration might cause some children to reduce their effort in school, because they anticipate migrating for low-skilled work in the future Powers (2011). Since child labor and migration decisions are both made in the child's current household, we divide the sample in two groups, a) children living in nuclear household –whether both parents are present and whether one can be absent–, and b) children living in extended families, non-nuclear household.

Table A1 describes the variables in the model; the dependents variables are the choices to send a child to work and the household migration decision, and the independent variables are the child's age, gender, household's size, household's composition, household's head completed grades in school, locality size and regions. And **Table A2** presents a summary statistics for the dependent and independent variables used the regression analysis. It also summarizes some of the other descriptive statistics that have been used to contextualize the main results.

1.4.3 Results

Tables 8 and **9** show the marginal effects on the probability that children –aged 12 and 17 years old– work conditional to their migration status and other independent variables. **Table 8** shows the marginal effect applying a simple Probit model, while **Table 9** shows the conditional marginal effect between child labor and migration accounting for the endogeneity effect explained in **Section 1.4.2**.

Results providing evidence that family structure is important not only on the decision to migrate but also the decision to work. The coefficient that relates child labor and migration is positive in the models presented without controlling for endogeneity, models (1)–(4) in **Table 8**, and also when controlling for endogeneity, models (5)–(8) in **Table 9**. Comparing the whole sample, the probability that a child works is estimated at 1.05%, if he is immigrant; while the coefficient when we control for endogeneity effect became larger, 5.16%.

The coefficient of a nuclear family, relative to extended families, is negative indicating that it is a factor that may reduce child labor, although it is not statistically significant when considering the whole sample. Therefore, we divide the sample in nuclear families to incorporate three possibilities: parents present in the household, father is absent, and mother is absent in the nuclear household.

Results show that the probability that a child works –given that he is an immigrant– is positive and larger. In fact, if parents are present in the nuclear family, model (2), the probability of child labor and immigration is 2.42% while controlling for endogeneity is even larger, 7.48%, model (6). Comparing uncontrolled models where the father is absent, model (3), and the model (4) where the mother is absent, the probability that an immigrant child works is larger when the father is absent than the other case.

For the models where we controlled for endogeneity, (7) and (8), we found the same pattern, but the coefficients are much larger than any other model, 9.88% and 9.28% respectively. Without conditioning to immigrant children, we also found that that the probability of child labor is lower if the household is nuclear with parents present, but larger if the father is absent; in magnitude these coefficients are smaller than the case of immigrant children.

These results provide evidence that it is more likely that children work if they are immigrant and if the live in households with the mother being the head of the family. We can also infer that estimating a joint probability between child labor and migration that accounts for the unobservable affecting both decisions deliver better estimated coefficients, since the Rho (ρ) coefficient is statistically significant different from zero and the log-likelihood tests are larger than the Probit models, which do not control for endogeneity.

In general, we can also see that control variables coefficients on comparable models have the same direction for the child labor probability. In the case of the Biprobit models, the coefficients are larger in magnitude and have smaller standard errors relative to the Probit models. For this reason, we will focus on the interpretation of the models (5)–(8) in **Table 9**. The coefficients shown on the model (5), which considers the whole sample, are smaller than the estimated coefficients obtained for nuclear families. In fact, when we compare the coefficients for nuclear families, the largest coefficients, in absolute value, are estimated for nuclear families with father absent while the lowest in nuclear families with mother absent.

Similar to Grootaert and Kanbur (1995), Jensen and Nielsen (1997), Rosati and Rossi (2001), we found that the probability of child labor of a immigrant child is higher compared to a non migrant child, this probability increases with his age and it is larger for boys relative to girls, see **Graph A3.**

We did not include a measure of the family income; the reason is because it is not completely identified from the dataset used, especially for the cases where the children do not migrate with their family. If this is the case, it would be convenient to include children's wage. However, in the descriptive section we found that children work to get a monetary payment, not only to increase family income but also to finance their expenditures, mainly if they are immigrant. Then, it is not clear whether to include it as a measure of the family income.

To avoid a larger measurement error, instead, we include a binary variable indicating whether the head of the family is working. We assume that the mother is the head of the household in the model (7) since a father is absent, and the father is the head of the family if the mother is absent, model (8). For the model (6) where both are present they self-declare who is the head of the family. The results imply that if the head of the family is employed the probability of child

labor increases; although this effect seems counterintuitive. It is consistent with Basu and Van (1998) argument that child and adult work is complementing.

Regarding the education, we found that the probability of child labor is reduced if the education level of the head of the family increases relative to the head of the family with no education. Similar to a previous paper based in Mexico Hanson and Woodruff (2003), McKenzie and Rapoport (2011), the probability of child labor is reduced in larger magnitude in localities with more than 100,000 populations relative to localities with less than 2,500 inhabitants. Then, the probability of child labor is larger in rural localities relative to urbanized areas.

By region we observe that in the Pacific and South regions have the largest probabilities of child labor relative to Northern states. Comparing the four models, it is remarkable that the probability that children work is about 7.69% in the families with the father absent in the Pacific region relative to northern states. Also the probability of child labor is larger in Center and North Center relative to Northern states. Only in the Capital, Distrito Federal and Estado de Mexico, the probability of child labor is lower than in the Northern states, although none of the coefficients are statistically significant.

Finally, in Biprobit models **Table 9** we can account the indirect effect of education on child labor. We build a set of interaction binary variables combining currently school attendance and highest level attained. We observe an inverse relationship between both variables as we expect, however, this effect is not homogeneous for certain educational outcomes. However, older children may be more apt to engage in work than in school not only because they may have already completed at primary or secondary school, rather because they are more productive in labor activities.

Table 8. A probit model analysis of the decision to child labor

	Model 1 All sample		Model 2 Nuclear Hh with both parent's		Model 3 Nuclear Hh with father's absent		Model 4 Nuclear Hh with mother's absent	
	Coeff	StdError	Coeff	StdError	Coeff	StdError	Coeff	StdError
1 if child immigrant	0.0105**	(2.157)	0.0242**	(2.525)	0.0250**	(2.612)	0.0242**	(2.522)
1 if male child	0.0359***	(28.514)	0.0339***	(22.659)	0.0340***	(22.681)	0.0339***	(22.630)
Age	0.0096***	(6.870)	0.0091***	(5.403)	0.0091***	(5.405)	0.0093***	(5.482)
Age squared	0.0002***	(4.262)	0.0002***	(3.530)	0.0002***	(3.536)	0.0002***	(3.490)
1 if nuclear household	-0.00114	(-0.765)						
1 if Hh with both parents			-0.0122***	(-5.761)				
1 if Hh with father's absent					0.0118***	(5.445)		
1 if Hh with mother's absent							0.00812	(1.362)
Household size	0.00102**	(2.898)	0.0037***	(6.672)	0.0036***	(6.457)	0.0027***	(5.121)
1 if Hh head employed	0.0315***	(16.883)	0.0270***	(10.394)	0.0270***	(10.372)	0.0247***	(9.612)
1 if Hh head's partial primary	-0.0146***	(-5.632)	-0.0104**	(-2.838)	-0.0105**	(-2.861)	-0.0110**	(-3.003)
1 if Hh head's full primary	-0.0222***	(-8.770)	-0.0218***	(-6.151)	-0.0219***	(-6.193)	-0.0226***	(-6.384)
1 if Hh head's partial secondary	-0.0246***	(-6.390)	-0.0240***	(-4.961)	-0.0241***	(-4.997)	-0.0251***	(-5.192)
1 if Hh head's full secondary	-0.0346***	(-13.648)	-0.0348***	(-9.946)	-0.0350***	(-10.006)	-0.0357***	(-10.194)
1 if Hh head's preparatory or more	-0.0578***	(-21.299)	-0.0571***	(-15.630)	-0.0573***	(-15.687)	-0.0587***	(-16.080)
1 if loc with 100 000 or more pop	-0.0237***	(-14.609)	-0.0246***	(-12.558)	-0.0247***	(-12.565)	-0.0245***	(-12.470)
1 if loc with 15 000 to 99 999 pop	-0.0152***	(-7.287)	-0.0170***	(-6.750)	-0.0170***	(-6.749)	-0.0169***	(-6.703)
1 if loc with 2 500 to 14 999 pop	-0.0156***	(-7.659)	-0.0145***	(-5.983)	-0.0145***	(-5.987)	-0.0146***	(-6.025)
Center North	0.0149***	(7.241)	0.0132***	(5.372)	0.0132***	(5.366)	0.0134***	(5.469)
Center	0.0150***	(6.360)	0.0157***	(5.599)	0.0157***	(5.588)	0.0163***	(5.780)
Capital	-0.00112	(-0.370)	-0.00127	(-0.344)	-0.00131	(-0.354)	-0.00118	(-0.319)
Gulf	0.0136***	(6.035)	0.0132***	(4.877)	0.0132***	(4.882)	0.0132***	(4.849)
South	0.0190***	(8.462)	0.0163***	(6.038)	0.0163***	(6.042)	0.0168***	(6.184)
Pacific	0.0318***	(14.526)	0.0308***	(11.808)	0.0308***	(11.804)	0.0312***	(11.907)
Observations	95,496		67,305		67,305		67,305	
Log likelihood	-21,708.1		-15,162.2		-15,164.0		-15,177.7	
McFadden's R2	0.202		0.194		0.194		0.193	
R Count	91.85%		92.06%		92.06%		92.06%	

Marginal effects; t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's calculation based on 2013 MTI/ENOE.

Table 9. A bivariate probit model analysis of the decision to child labor

	Model 5 All sample		Model 6 Hh with both parent's		Model 7 Hh with father's absent		Model 8 Hh with mother's absent	
	Coeff	StdError	Coeff	StdError	Coeff	StdError	Coeff	StdError
1 if child immigrant	0.0516***	(7.046)	0.0748***	(4.722)	0.0988***	(5.052)	0.0928***	(4.386)
1 if male child	0.0521***	(9.904)	0.0582***	(6.211)	0.0717***	(6.630)	0.0681***	(5.806)
Age	0.0144***	(5.161)	0.0159***	(3.811)	0.0196***	(3.934)	0.0190***	(3.754)
Age squared	0.00035***	(4.214)	0.00043***	(3.324)	0.00053***	(3.366)	0.00050**	(3.212)
1 if nuclear household	-0.00173	(-0.795)						
1 if Hh with both parents			-0.0231***	(-4.229)				
1 if Hh with father's absent					0.0229***	(4.060)		
1 if Hh with mother's absent							0.0152	(1.260)
Household size	0.0014**	(2.752)	0.0064***	(4.648)	0.0076***	(4.554)	0.0055***	(3.756)
1 if Hh head employed	0.0357***	(8.733)	0.0383***	(5.399)	0.0481***	(5.636)	0.0423***	(5.002)
1 if Hh head's partial primary school	-0.0184***	(-5.345)	-0.0165**	(-2.743)	-0.0207**	(-2.791)	-0.0206**	(-2.825)
1 if Hh head's full primary school	-0.0273***	(-7.068)	-0.0329***	(-4.591)	-0.0413***	(-4.808)	-0.0403***	(-4.474)
1 if Hh head's partial secondary school	-0.0273***	(-6.290)	-0.0337***	(-4.282)	-0.0427***	(-4.450)	-0.0418***	(-4.197)
1 if Hh head's full secondary school	-0.0431***	(-8.364)	-0.0541***	(-5.413)	-0.0676***	(-5.755)	-0.0654***	(-5.164)
1 if Hh head's preparatory or more school	-0.0660***	(-9.193)	-0.0851***	(-5.875)	-0.106***	(-6.320)	-0.103***	(-5.524)
1 if loc with 100 000 or more pop	-0.0350***	(-8.536)	-0.0431***	(-5.736)	-0.0530***	(-6.053)	-0.0502***	(-5.408)
1 if loc with 15 000 to 99 999 pop	-0.0193***	(-6.377)	-0.0262***	(-4.739)	-0.0326***	(-4.925)	-0.0308***	(-4.502)
1 if loc with 2 500 to 14 999 pop	-0.0197***	(-6.583)	-0.0226***	(-4.507)	-0.0282***	(-4.670)	-0.0270***	(-4.329)
Center North	0.0236***	(5.591)	0.0241***	(3.985)	0.0295***	(4.109)	0.0288***	(3.926)
Center	0.0244***	(5.010)	0.0299***	(4.039)	0.0364***	(4.177)	0.0361***	(4.016)
Capital	-0.00112	(-0.262)	-0.00202	(-0.323)	-0.00257	(-0.334)	-0.00219	(-0.298)
Gulf	0.0219***	(4.872)	0.0246***	(3.728)	0.0301***	(3.831)	0.0285***	(3.645)
South	0.0319***	(6.136)	0.0310***	(4.259)	0.0379***	(4.415)	0.0371***	(4.204)
Pacific	0.0586***	(8.232)	0.0637***	(5.731)	0.0769***	(6.029)	0.0743***	(5.496)

Table 9. A bivariate probit model analysis of the decision to child labor (continuation)

	Model 5 All sample		Model 6 Hh with both parent's		Model 7 Hh with father's absent		Model 8 Hh with mother's absent	
	Coeff	StdError	Coeff	StdError	Coeff	StdError	Coeff	StdError
1 if child immigrant								
Currently schooled*Partial primary	-0.0149***	(-5.347)	-0.0123***	(-1.954)	-0.0152***	(-1.910)	-0.0143***	(-1.879)
Currently schooled*Full primary	-0.0166***	(-4.920)	-0.0130***	(-1.869)	-0.0162***	(-1.826)	-0.0152***	(-1.799)
Currently schooled*Partial Secondary	-0.0159***	(-5.186)	-0.0077***	(-1.511)	-0.0096***	(-1.486)	-0.0089***	(-1.468)
Currently schooled*Full secondary	-0.0148***	(-4.255)	-0.0132***	(-1.735)	-0.0165***	(-1.695)	-0.0154***	(-1.673)
Currently schooled*Preparatory	-0.0144***	(-4.029)	-0.0072***	(-1.196)	-0.0089***	(-1.181)	-0.0084***	(-1.170)
Observations	95,496		67,305		67,305		67,305	
Log likelihood	-28273.0		-16,972.0		-1,6973.8		-16,987.6	
Rho (p)	-0.598		-0.403		-0.404		-0.398	
Chi2	47.79		5.323		5.351		5.216	

Note: Bivariate Probit model corresponds to conditional probability Prob[y_1=1, y_2=1|$\mathbf{x}_1$, $\mathbf{x}_2$].

Marginal effects; t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Author's calculation based on 2013 MTI/ENOE

1.5. Conclusions

This paper set out in a little explored area, the effect of household immigration on child labor. We set up a model that accounts for the endogeneity effect of migration and other unobservable factor affecting both decisions, the decision to child labor and decision to migrate. Our main substantive findings is that compared to non migrant children, immigrants have more propensity to child labor and, this condition is robust to a variety of specifications and controls.

For nuclear household, this propensity increase in households with father's absent, that is, in household where the mother is the head of the family. Although we did not include family income, households with mother as the head have lower income than in households with the father as the head of the family. We also found results consistent to previous evidence on child labor that the probability to work increases with age, it is larger for boys, and it is larger in rural areas. In fact, we found that immigrant children are a vulnerable group, even if they seem to have a higher level of education than non-migrant, they work longer hours for a payment.

Similar other countries, child labor in Mexico are still observed, even less than the age permitted by law. Among children, we found that immigrants are the most observed vulnerability. If child labor is an obstacle to social and economic development, and also drives possible intergenerational transmission or poverty. The Mexican government should ensure the implementation of the UN conventions on the Rights of the Child (UN CRC) and the ILO Child Labor Conventions (No. 138, No. 182). Also, develop labor monitoring mechanism and oversight of child labor in the informal economy, where most children work.

1.6. Bibliography

Antman, F. (2010). The intergenerational effects of parental migration on schooling and work: What can we learn from children's time allocations?. *Journal of Development Economics*, 9 1(1), 200-208.

Basu, K., and Van, H. (1998). The economics of child labor. *The American Economic Review*, 88 (3), 412-427.

Bhalotra, S., and Tzannatos, Z. (2003). Child labor: What have we learnt? Washington, D.C.: Social Protection Discussion Paper Series. The World Bank.

Borjas, J. (1999). The economic analysis of immigration. In O. Ashenfelder, and D. Card, Handbook of Labor Economics, Amsterdam: Elsevier, 1698-1757..

Canagarajah, S., and Coulombe, H. (1997). Child labor and schooling in Ghana. Washington, D.C.: World Bank Working Paper No. 1844.

Casteras, D. (2009). Efectos de la migración sobre el trabajo infantil en Colombia. *Revista Economia Institucional*, 11 (20), 229-252.

Coffey, D. (2013). Children's welfare and short-term migration from rural India. Journal of Development Studies, 49 (8), 1101–1117.

CPI (2013). Save the children's. Child protection strategy 2013-2015: Children without appropriate care. Child Protection Initiative.

Deshingkar, P., and Akter, S. (2009). Migration and Human Development in India. London: Human Development Research Paper. United Nations Development Programme.

Edmonds, E., and Shrestha, M. (2013). Independent child labor migrants. In A. Constant, and K. Zimmermann, International Handbook of the Economics of Migration Bonn, Germany: IZA and Bonn University, 98-120.

Gindling, T., and Poggio, S. (2010). The effect of family separation and reunification on the educational success of immigrant children in the United States. Bonn: IZA Discussion Paper No. 4887.

Glind, H. (2010). Migration and child labor. Exploring child migrant vulnerabilities and those of children left-behid. Geneva: ILO's International Programme on the Elimination of Child Labor (IPEC).

Greene, W. (1998). Gender Economics Courses in Liberal Arts Colleges: Comment. *The Journal of Economic Education*, 29 (4), 291-300.

Grootaert, C., and Kanbur, R. (1995). Child labor: An economic perspective. *International Labor Review*, 134 (2), 187-203.

Hanson, G., and Woodruff, C. (2003). Emigration and Educational Attainment in Mexico. National Bureau of Economic Research .

Hashim, I. (2005). Exploring the linkages between children's independent migration and education: Evidence from Ghana. Brighton, UK: Sussex Centre for Migration Research.

Immink, M., and Payongayong, E. (1999). Risk analysis of poor health and growth failure of children in the central highlands of Guatemala. *Social Science and Medicine*, 48 (8), 997-1009.

IPEC (2012). Child migrants in child labor: An invisible group in need of attention. Switzerland: ILO and Child Helpline International.

Jensen, P., and Nielsen, H. (1997). Child labor or school attendance? Evidence from Zambia. *Journal of Population Economics*, 10 (4), 407-424.

Hanson, G., and Woodruff, C. (2003). Emigration and educational attainment in Mexico. UCSD Working Paper.

López-Córdova, E. (2005). Globalization, Migration and Development: The Role of Mexican Migrant Remittances. Working Paper 20, 1-40.

Maddala, G., and Lee, L. (1976). Recursive models with qualitative endogenous variables. In V. Sanford, *Annals of Economic and Social Measurement*, 525-545.

Malone, L., (2007). Migrant's remittances and investments in children's human capital: The role of asymmetric preferences in Mexico.

McKenzie, D. (2005). Beyond remittances: the effects of migration on Mexican households. In Ç. Özden, and M. Schiff, International Migration, Remittances and the Brain Drain, The World Bank and Palgrave Macmillan, 123-148.

McKenzie, D, and Rapoport, H. (2011). Can migration reduce educational attainments? Depressing evidence from Mexico. *Journal of Population Economics*, 24 (4), 1331-1358.

Nielsen, H. (1998). Child labor and school attendance in Zambia: Two joint decisions. Aarhus, Denmark: Centre for Labor Market and Social Research. Working Paper No. 98 (15).

Patrinos, A., and Psacharopoulos. (1997). Family size, schooling and child labor in Peru. An empirical analysis. *Journal of Population Economics*, 10 (4), 387-405.

Powers, E. (2011). The impact of economic migration on children's cognitive development: Evidence from the Mexican family life survey. Inter-American Development Bank. Department of Research and Chief Economist.

Rosati, F., and Rossi, M. (2001). Child labor and human capital accumulation: Evidence from Pakistan and Nicaragua. Understanding Children's Work Research Paper.

SEP (2013). Programa Sectorial de Educación 2013-2018. México, D.F.: Secretaría de Educación Pública.

UCW (2012). La Experiencia Mexicana en la Reducción del Trabajo Infantil: Evidencia empírica y lecciones políticas. Roma: Understanding Child Labor.

UNESCO (2013). For a better inclusion of internal migrants in India. New Delhi: UNESCO.

UNESCO, and UNICEF. (2012). For a better inclusion of internal migrants in India. Policy Briefs. New Delhi, India: UNESCO and UNICEF.

UNESCO, and UNICEF. (2012). Internal Migration in India Initiative. For a better inclusion of internal migrants in India. New Delhi: UNESCO and UNICEF.

Van de Glind, H. (2010). Migration and child labor. Exploring child migrant vulnerabilities and those of children left-behind. Geneva: ILO's International Programme on the Elimination of Child Labor (IPEC).

1.7 Appendix

Table A1. Variables definition

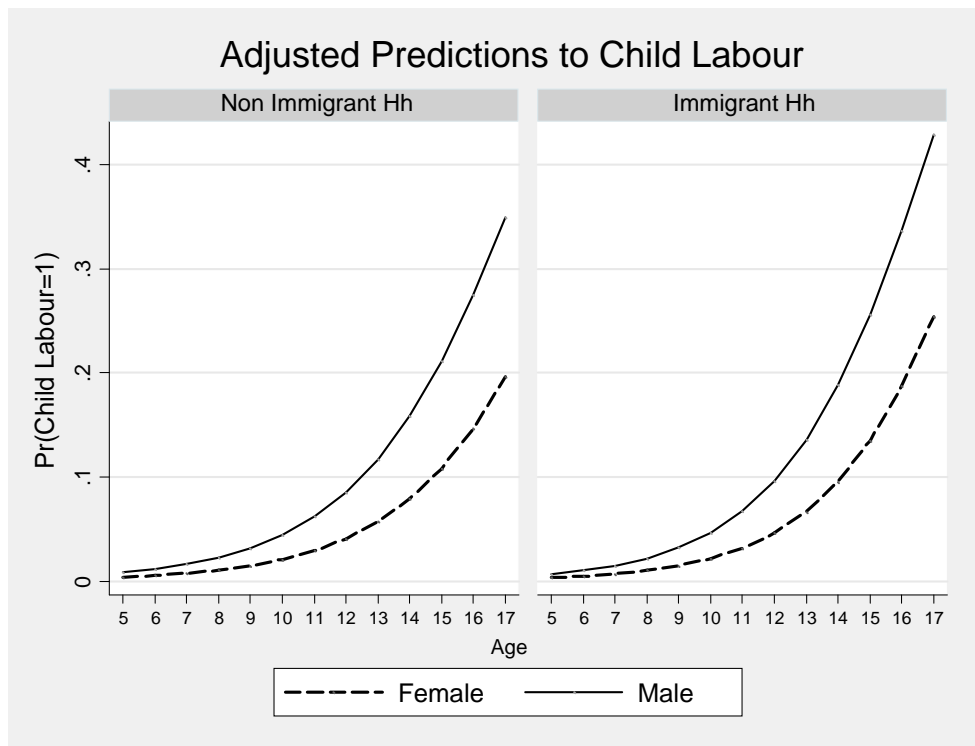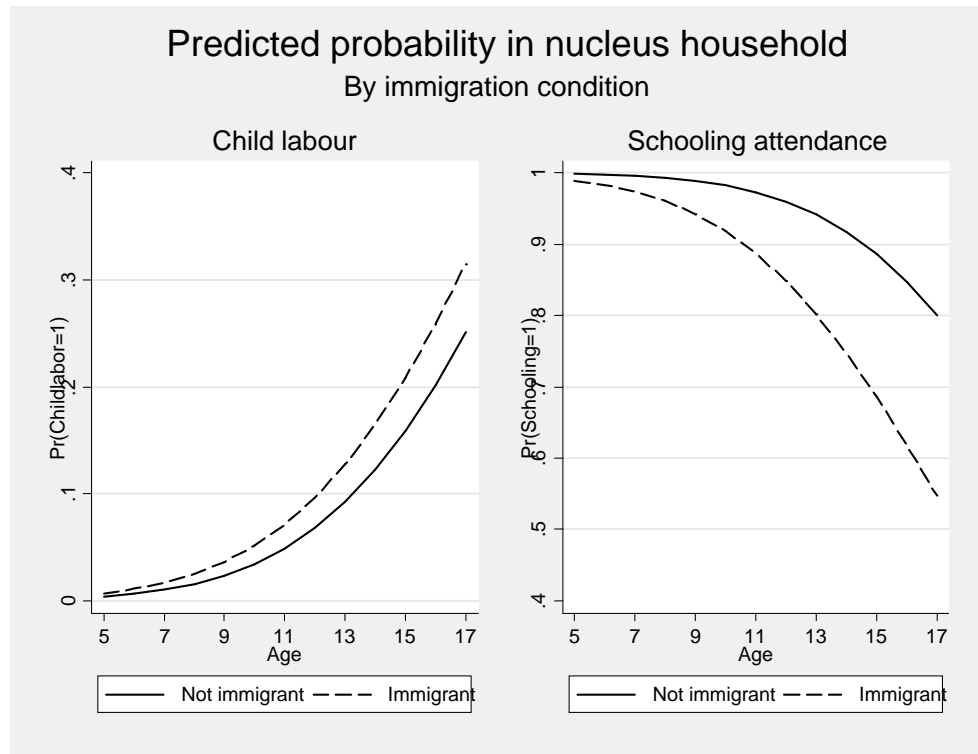| Variables definition |
| --- |
| **Dependent variables** |
| Child labor: 1 if child labor and, 0 otherwise |
| Immigrant Household: 1 if immigrant household, 0 otherwise |
| **Independent variables** |
| **a) Children's characteristics** |
| 1 if male child: Dummy variable (Yes=1), 0 otherwise |
| 1 if currently schooling: Dummy variable (Yes=1), 0 otherwise |
| 1 if partial primary: Dummy variable (Yes=1), 0 otherwise |
| 1 if full primary: Dummy variable (Yes=1), 0 otherwise |
| 1 if partial secondary: Dummy variable (Yes=1), 0 otherwise |
| 1 if full secondary: Dummy variable (Yes=1), 0 otherwise |
| 1 if preparatory or more: Dummy variable (Yes=1), 0 otherwise |
| **b) Household characteristics** |
| Household size: Number of members living in the household. |
| 1 if nucleus Household: Dummy variable (Yes=1), 0 otherwise |
| Hh head earnings |
| 1 if Hh head employed: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh with both parents: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh with father's absent: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh with mother's absent: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh head's not schooling: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh head's partial primary school: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh head's full primary school: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh head's partial secondary school: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh head's full secondary school: Dummy variable (Yes=1), 0 otherwise |
| 1 if Hh head's preparatory or + school: Dummy variable (Yes=1), 0 otherwise |
| **c) Other controls** |
| Less than 2 500 hab |
| 2,500 to 14 999 hab |
| 15 000 to 99 999 hab |
| 100 000 or more hab |
| North: BC, SON, CHIH, NL, TAM, COAH. |
| Center North: DGO, ZAC, SLP, AGS, GTO, QRO. |
| Center: HGO, TLAX, PUE, MOR. |
| Capital: DF, MEX. |
| Gulf: VER, TAB, CAM, ZAC, QROO. |
| South: MICH, GRO, OAX, CHIS. |
| Pacific: JAL, NAY, SIN, BCS, COL. |
| Source: Variables definition based on 2013 MTI/ENOE. |

Table A2. Summary descriptive statistics

Variable	min	max	mean	SD	N
1 if child labor	0	1	0.083	0.275	95,496
1 if child immigrant	0	1	0.013	0.113	95,496
Age	5	17	11.063	3.712	95,496
1 if male child	0	1	0.510	0.500	95,496
1 if child currently schooled	0	1	0.932	0.252	95,496
1 if child non schooling	0	1	0.185	0.389	95,496
1 if child with partial primary school	0	1	0.418	0.493	95,496
1 if child with completed primary school	0	1	0.096	0.294	95,496
1 if child with partial secondary school	0	1	0.151	0.358	95,496
1 if child with completed secondary school	0	1	0.088	0.283	95,496
1 if preparatory or more schooling	0	1	0.062	0.241	95,496
Household size	2	24	5.196	1.829	95,496
1 if nuclear household	0	1	0.705	0.456	95,496
1 if nuclear household with both parents	0	1	0.860	0.347	67,305
1 if nuclear household with father's absent	0	1	0.128	0.335	67,305
1 if nuclear household with mother's absent	0	1	0.011	0.107	67,305
1 if male household head	0	1	0.773	0.419	95,496
1 if Hh head's employed	0	1	0.843	0.364	95,496
1 if Hh head's non schooling	0	1	0.055	0.229	95,496
1 if Hh head's partial primary school	0	1	0.127	0.333	95,496
1 if Hh head's full primary school	0	1	0.191	0.393	95,496
1 if Hh head's partial secondary school	0	1	0.034	0.182	95,496
1 if Hh head's full secondary school	0	1	0.302	0.459	95,496
1 if Hh head's preparatory or more school	0	1	0.291	0.454	95,496
1 if locality 100 000 or more population	0	1	0.545	0.498	95,496
1 if locality 15 000 to 99 999 population	0	1	0.132	0.339	95,496
1 if locality 2 500 to 14 999 population	0	1	0.133	0.340	95,496
1 if locality less than 2 500 population	0	1	0.189	0.392	95,496
North	0	1	0.177	0.382	95,496
Center North	0	1	0.208	0.406	95,496
Center	0	1	0.124	0.330	95,496
Capital	0	1	0.067	0.250	95,496
Gulf	0	1	0.142	0.349	95,496
South	0	1	0.143	0.350	95,496
Pacific	0	1	0.140	0.347	95,496

Source: Author's calculation based on 2013 MTI/ENOE.

Graph A3. Marginal probabilities to child labor

Predicted probability in nucleus household
By immigration condition

Child labour

Schooling attendance

Adjusted Predictions to Child Labour

Non Immigrant Hh

Immigrant Hh

Source: Author's calculation based on 2013 MTI/ENOE.

Chapter 2.

Intergenerational transmission of informal employment in Mexico. A limited choice or better income prospects?

2.1 Introduction

The intergenerational mobility (IGM, henceforth) is measured by the connection between parents' and adult children's socioeconomic status, where higher association means less social mobility Corak (2004). According to Torche (2013), this socioeconomic standing is captured by different measures were the most common are: individual earnings and family income, social class, and occupational status.

Recent evidence show that family background has a dramatic impact on the likelihood of remaining in the same sector of employment. In particular, evidence shows that having a self–employment or informal occupation parents makes sons significantly more likely to follow the same parents' occupation, Hout and Rosen (2000), Colombier and Masclet (2008), Pasquier–Doumer, (2012). Also, some studies shows that informal employment is the result of an optimal choice where individuals expect a higher welfare than if they were wage earners or entrepreneurs in the formal sector Maloney and Ribeiro (1999), Maloney (2004), Packard (2007).

Understanding the relationship between IGM and employment occupation is essential for assessing the fairness of social mobility and earnings distribution. In fact, the intergenerational transmission of the self–employed status is frequently connected with high expected earnings Fairlie and Robb (2006), Colombier and Masclet (2008). While there is no consensus on the voluntary nature of entry into informal self-employment, strong evidence points to a strong intergenerational transmission of employment status Pasquier–Doumer (2012).

In Mexico, the way that social mobility has been measured depending on the specific aspects of social mobility of interest as well as on the available data. Valero and Tijerina (2003), Castillo and Vela (2013), and Velez-Grajales and

Velez-Grajales (2014) have been estimated a larger intergenerational social mobility as it relates to entrepreneurial activity, income and occupations.

However, up to now, research regarding intergenerational transmissions of employment occupations has only focused on sons and parents' living in the same household Valero and Tijerina (2003), Castillo and Vela, (2013), mainly because there are not data from longitudinal surveys. This paper motivates the use of a retrospective data collection 2011 EMOVI (*Social Mobility Survey in Mexico,* EMOVI for its acronym in Spanish). 2011 EMOVI is an attractive dataset for a retrospective data collection in Mexico. This survey collects current respondents' socioeconomic data and the comparable retrospective information on their parents' when the interviewee was 14 years old.

This interest motivates literature in labor economics addressing the intergenerational relationship between parents and sons occupations. We provide a further examination and robust check for this possibility controlling skill level, parents' occupation and family background. Different from the previous evidence in Mexico, our study differs in three ways: (3) empirical strategy aims at controlling as much as possible for heterogeneity sample, (1) microeconometric framework derives from a structural model with expected wages explicitly determining labor occupation decisions, (3) selectivity bias is achieved using a two-steep estimation following Lee (1982) procedure.

The outline of the paper is as follows. Section 2 briefly looks at some of the associated literature. Section 3 introduces the model that is estimated and discusses its identification. Section 4 highlights a few features from the data and presents results. Finally, section 5 concludes.

2.2 Literature review

A large number of economists suggest the existence of segmented labor markets, Lewis (1954), Harris and Todaro (1970), have been highlighted that developing countries are characterized by a dual labor market, consisting of a modern sector that is organized and large informal sector with a reduced amount of efficiency. This two groups of sectors seems to be operating in different labor markets. One contains the primary segment of better paid and more attractive jobs, while the secondary segment encompasses rather low paid, unqualified and short term jobs Eichhorst and Kendzia, (2014). These jobs are characterized by low (or even zero) marginal productivity which justifies the low wages. Hence, informal employment appears as a constrained choice and a large informal sector involved inefficiency Pasquier-Doumer, (2012), Mboutchouang et al., (2013).

Nevertheless, recent findings for some countries show that informal employment is the result of an optimal choice where individuals expect a higher welfare than if they were wage earners or entrepreneurs in the formal sector Maloney and Ribeiro (1999), Packard (2007). More recent evidence views the informal sector as an active and voluntary entrepreneurial small firm sector, where individuals choose to be informal because they expect a greater welfare that if they wage–earners of formal entrepreneurs Maloney, (2004). Hence, a proportion of informal occupation may reflect an efficient allocation of labor Pasquier–Doumer (2012).

If there is no consensus on the voluntary nature to be engaged into informal employment and efficiency of informal production units, some stylized facts lead reflections toward and intergenerational transmission of informal entrepreneurship status De Paul, Massil, and Modeste, (2013). In the economic literature, the intergenerational transmission of the employed status is frequently connected with high expected earnings Colombier and Masclet, (2008), Fairlie and Robb (2006).

Evidence from Mexico show a high correlation between self-employment and the informal sector of the economy, recently statistics show that almost 6 in 10 people are in the informal sector employment (ILO, 2012). Leal-Ordoñez (2013) refers to four facts concerning informality in Mexico: 1) the informal sector in Mexico is large, 2) the distribution of labor across establishment sizes has a "missing middle", 3) informal establishments are small, and 4) informal establishments operate with low capital-labor ratios.

On this view, occupational status has an important advantage as a measure of economic standing and is a weighted average of the mean level of earnings and education of detailed occupations Torche (2013). In relation to wages differences between both sectors, Moreno (2007) estimate the average conditional differences using the Mincer equation. It corrected for selectivity to controlling the heterogeneity among individuals in each sector. He finds that workers with higher levels of education earn more in the formal sector, but, individuals with high school or less receive higher wages in the informal sector, these results are similar for woman with basic and secondary school.

Regarding the choice of being salaried employee in the formal or informal sector, Huesca and Padilla (2012) use a contrafactual technique to estimate the wages received if the workers are employed in both sectors. They found that workers with high schooling attainment have more probability to work in the formal sector and woman with low education attainment have more likelihood to work in the informal sector. However, this likelihood changes with age, that is, people between 40 and 45 years have more propensity to be employed in the formal sector.

Few studies have addressed individual earnings from an intergenerational approach. One of the first papers is by Valero and Tijerina (2003), they estimates a Mincer equation for sons controlling by parent's characteristics and parent's wages. They found the sons of parent's employer and parent's self-employer have higher wages than sons whose parents were employed. This may be caused due to the transmission of skills and training.

In regard to intergenerational transmission of occupational in Mexico, Castillo and Vela (2013) use a probit model to estimate the probability that children keep the same occupational position that their parents. They results indicate that the social-domestic context have an influence in the labor decisions. Hence, self-employed parents transmit informal human capital to their offspring. However, this results could be affected because it does not correct for self-selection bias in the employment decision and heterogeneity in the sample.

2.3 Empirical strategy

2.3.1 Identification

A key issue in examining pay determination is worker preferences. In a narrow sense, we might be interested in why a worker chooses to work in a particular sector. The model is based on a binary representation of the employment status decisions. Assume that there are two employment options available to each individual: (1) informal sector or (2) a formal sector. Several important features should be considered. First, informal sector regime is associated with more flexibility and independence, usually, formal sector implies greater responsibility and full-time job. Second, each sector has different working conditions and different market institutions.

Similar to Rees and Shan (1986) we assume that employment status and earnings are determined simultaneously. This requires a 3SLS estimation process. In the first stage, we estimate a reduced form probit model of sector occupation decision. This is used to construct a sample selection correction term. In the second stage, we estimate an OLS standard Mincer equation to obtain an earnings function. This is used to compare the differences in earnings between both occupational sectors, and correct the bias in sample selection. And finally, in the third stage, the differences in earnings are used to estimate a probit model of the decision to be employed in the formal or informal occupation sector. [8]

Following Lee (1982) self-selection correction, we assume a linear utility function, $U_{informal}$ and U_{formal} that represents the utility derived by individual i from states of occupation.

$$I_i^* = \Pr(U_{\text{informal}} - U_{\text{formal}} > 0) = \Pr(a + \beta(\log Y_{\text{informal}} - \log Y_{\text{formal}}) + \gamma X_i + \varepsilon_i > 0) \quad (1)$$

Equation (1) can be estimated as a probit model. However, earnings are only observed in one of the two states, so Lee (1982) two-stage procedure must be used to construct predicted earning for each individual.

---

[8] The self–selection problem has been analyzed in different context. For example, Lee (1978) investigates the joint determination of the extent of unionism and the effect of unions on wage rates. Adamchik and Bedi, (1983) examine whether there are any differential of workers in the public and private sector, and others.

Hence, we define an indicator variable (I_i^*) as follow, $(I_i^* = 1)$ if $U_{\text{informal}} - U_{\text{formal}} > 0$ and 0 otherwise. Thus that represents the individuals i's marginal propensity to choice occupation sector.

$$\text{Individual } i \text{ decides employed in the informal sector if } I_i^* > 0 \qquad (2)$$

$$\text{Individual } i \text{ decides employed in the formal sector if } I_i^* \leq 0 \qquad (3)$$

We estimate Mincer's (1974) semi logarithmic wage function for the informal workers $\ln(Y_{\text{informal}})$ and formal workers $\ln(Y_{\text{formal}})$. Background characteristics, notably occupational and sectoral choices of parents, are often used as a method of identifying sectoral choices made by workers Dustmann and Van Soest (1998) so that pay premia or penalties to working in a particular sector can be conditioned on the potentially self–selected characteristics of the workers (Koumenta, 2011 p. 227)

$$\ln(Y_{informal}) = a_{informal} + \delta_{informal}Z_i + e_{informal} \qquad (4)$$

$$\ln(Y_{formal}) = a_{formal} + \delta_{formal}Z_i + e_{formal} \qquad (5)$$

Where (Z_i) are covariate vectors, (δ) are coefficient vectors, and (e) are the error terms $N(0, \sigma_{informal}^2)$ and $N(0, \sigma_{formal}^2)$ respectively. The model is identified by the exclusion from (Z_i) of elements of (X_i). Equation (1) can then be estimated using the standard maximum likelihood procedure. However, estimating the income equations (4) and (5) by Ordinary Least Square (OLS) might be inappropriate because it fails to reflect the possibility of self-selection in the decision to choose an occupation sector. For example, informal occupation workers might have some unobserved characteristics that affect their income generating capabilities.

To deal with possible self-selection bias, Lee (1982) methodology recommends substituting income equations (4) and (5) into (1) and obtain the reduced form of the sector occupation decision equation.

$$I_i^* = \beta_0 + \beta_1 X_i + \beta_2 Z_i + \varepsilon_i^* \qquad (6)$$

Assuming the error term (ε_i^*) is normally distributed with unit variance, Equation (6) can be estimated by a maximum likelihood probit and the fitted values for the decision employment occupation probabilities. Hence, $(\hat{\varphi}_i)$ are used to calculate the selectivity correction variables or inverse Mill's ratios as

follow: $H1_i = \left(- f(\hat{\varphi}_i) / F(\hat{\varphi}_i)\right)$ and $H0_i = \left(f(\hat{\varphi}_i) / 1 - F(\hat{\varphi}_i)\right)$, where $F(\hat{\varphi}_i)$ is the standard cumulative distribution function and $f(\hat{\varphi}_i)$ is the standard normal density function. Thus, $(H1_i)$ and $(H0_i)$ measure the truncation effect associated with sample selectivity (see, for more details (Lee, 1982)).

As a result, the two income equation (4) and (5) are modified to incorporate the inverse Mill's ratio as follows:

$$\ln(Y_{informal}) = a_{informal} + \delta_{informal}Z_i + \sigma^*_{informal}H1 + \eta_{informal} \tag{7}$$

$$\ln(Y_{formal}) = a_{formal} + \delta_{formal}Z_i + \sigma^*_{formal}H0 + \eta_{formal} \tag{8}$$

Thus, $(\sigma^*_{informal})$ and (σ^*_{formal}) corrects for selectivity bias in the observations, the selectivity bias can be positive or negative. It can consider four different cases. For example, if $(\sigma^*_{informal} < 0)$ and $(\sigma^*_{formal} > 0)$, the implication is that each group has a comparative advantage in its chosen employment status. Typically it occurs when $\sigma^*_{informal}$ is very large relative to σ^*_{formal}. Hence, individual with higher skills enter professions with the greater variance in earnings, see, for more details Madala, (1983).

Finally, OLS predicted values of earnings for individuals i in both informal $\ln(Y_{informal})$ and formal $\ln(Y_{informal})$ occupation of (7) and (8) are substituted in the structural form of the employment sector decision, Equation (1), to obtain consistent parameter estimates.[9]

---

[9] The model presented above is referred to as an endogenous switching regression model. It is used to address issues of self selection and the estimation of treatment effects when there is no random allocation of subjects to treatment and control groups as is generally the case with observational (as opposed to experimental) data.

2.4 Dataset and results

2.4.1 Informal employment definition

Measuring the size of the informal economy and the incidence of informal employment has proved to be difficult. Also, different definitions are put forward to perform the concept operational. The appropriate methodology for the statistical measurement of informal employment depends on the users' requirements, measurement objectives, and the organization of the national system information.

There have been several definitions of the dividing line between the formal and informal employment. For statistical proposes, The International Labor Organization (ILO) in *The Fifteen International Conference of Labor Statistician Characterized (15th ICLS resolution)* set up a definition according to the following criteria: "encompasses persons in employment who, by law or in practice, are not subject to national labor legislation and income tax or entitled to social protection and employment benefits" ILO, 2013:4)[10]

Following the methodology recommended by the ILO, in Mexico informal employment is defined as "employees without access to public or private health". This criterion is especially useful in countries where the registration of workers entails the registration of the enterprises employing them with the social security (most notably through the social security agencies, IMSS, ISSSTE, etcetera). Although the employment relationships of workers in informal employment are heterogeneous, they share a basic vulnerability. Namely, they need to be self–supporting and to rely on informal arrangements. [11]

---

[10] For more details see, "*Resolution concerning statistics of employment in the informal sector*", adopted by the Fifteenth International Conference of Labor Statisticians *(15th ICLS resolution)*.

[11] The ILO and international reached a consensus with respect to the concept in two dimensions. First, the type of nature of the economic unit, in other words, if the unit dedicated to the production of goods or services operates using household resources and does not keep basic accounts records. Second, refers to all employment that is not subject to labor law or an institutional framework, regardless of whether the economic units employing the workers are unregistered enterprises or formal enterprises.

2.4.2 The data

The dataset used for the empirical analysis is the 2011 EMOVI *(Social Mobility Survey in Mexico,* EMOVI, for its acronym in Spanish). It is a nationally representative household survey which was conducted in 2006 and 2011.[12]

EMOVI is retrospective socioeconomic data that collects current respondents' information and the comparable retrospective data on their parent's occupation, and household conditions when interviewee's was 14 years old. We use the data from the second wave in 2011, which includes almost 11,001 individuals between 25 to 64 years old (both household heads and non-household heads). This survey track the socioeconomic variables of a given household, each household member is asked detailed questions about age, gender, marital status, educational level, labor market participation, working hours, employment status, as well as household size and other features.

2.4.3 Sample and descriptive statistics

Since our goal is to study the interaction between son and parents' occupation, we define our estimation sample according to the following criteria. Informal work regime is identified by the question. *As part of this job do you receive health care benefits?* This question is consistent with ILO recommendation and it is applicable for sons and their parents.

We exclude unemployment workers, pensioners, students, as well as people with a disability. We restrict to full-time workers –defined for our purpose as those who only have one job and work 30 or more hours per week– who provide information on their earnings and occupation. In the case of earnings, we exclude observations with values smaller than the 1st percentile or larger than the 99th percentile. This cutoff point is of course arbitrary, but it is frequently used in related studies.

Also, we exclude the female population for the subsequent reasons. First, full-time workers are predominantly a male labor participation. Second, the quite restrictive selection is made to prevent the results from being affected by sample selection bias, that occurs if unobservable characteristics, which affect the work

---

[12] This survey is designed by the *Espinosa Rugarcia Foundation and the Center for Studies Espinosa Yglesia*s (CEEY).

decision, are correlated with characteristics that affect the process determining to work. These restrictions are justified by the aim to form a relatively homogeneous sample of employment occupations and wages. The final sample consists of 2,633 individuals where earnings and transitions into employment status can be observed. **Table A1** contains summary statistics of the sample, it includes the maximum, minimum, mean and standard deviation of each variable.

As a starting point, **Table 1** reports intergenerational mobility regime. Each row of the table shows the occupation of the father while columns indicate the occupation category of the sons. If we consider the column percentages instead (that is, the share of each class from each background category); among, 75 percent and 40 percent were immobile (their occupations was the same category as their father's) into informal and formal occupation, respectively. Also, a significant percentage of sons moving into the informal sector, about 60 percent, while a small percentage shifts to the formal sector, about 25 percent. Overall, prevalence is observed towards informality.

Table 1. Intergenerational mobility between occupation

Father's occupation	Son's occupation		Total
	Formal	Informal	
Formal	380	577	957
	40%	*60%*	*100%*
Informal	416	1,260	1,676
	25%	*75%*	*100%*
Total	796	1,837	2,633
	30%	*70%*	*100%*

Source: Author's calculation based on 2011 EMOVI

From **Table 2,** it can be seen that there is a significant difference between individuals working on the informal and formal sector in most respects. The implication of this is that, simply looking at differences in earnings cannot identify the informality wage penalty, but rather regression analysis is required to find the *ceteris paribus* effect of occupation sector upon earnings.

As for other features, individuals educational level is measured by dummy variables that assume the value of one if the individuals have concluded. Significant differences were observed in the levels of schooling. Informal workers observed a lower level of schooling. Regarding the intergenerational factor it is observed that informal workers had parents with lower levels of schooling.[13]

Table 2. Descriptive statistics by employment status

Variable	All informal (Obs=1,837)		All formal (Obs=796)		Mean Diff
	Mean	SD	Mean	SD	
Log hourly wage	2.754	0.691	3.192	0.611	-0.438***
Age	37.458	11.675	35.734	9.775	1.725***
Experience	23.112	13.475	19.09	11.096	4.022***
Less than primary	0.157	0.364	0.054	0.226	0.103***
Primary completed	0.241	0.428	0.146	0.353	0.095***
Secondary completed	0.560	0.497	0.644	0.479	-0.085***
University completed	0.043	0.203	0.156	0.363	-0.113***
Father's completed years schooling	3.507	3.91	5.185	4.411	-1.678***
Mother's completed years schooling	3.475	3.784	5.018	4.075	-1.543***

* $p < 0.1$, ** <0.05, ***$p<0.01$

Source: Author's calculation based on 2011 EMOVI

[13] The Mexican education system is characterized by 6 years of primary education, followed by 6 years of secondary education. Secondary education is divided in 3 years of lower secondary education (*secundaria*) and 3 years of upper secondary education (*preparatoria*). Hence, Less than primary (less than 6 years), Primary completed (6 years of schooling) Secondary completed (less than 15 years completed) Colleague (more than 16 years completed).

2.4.4 Correction for self–selection

The first step is to compute the selection corrected wages. Regression include full–time male workers between 25 and 64 years of age. To compute the 'inverse Mill's ratios' of selectivity correction variables, the reduced form of the regimen employment decision equation (6) includes as independent variables: experience, experience squared, marital status, number of children, father's employment regime, locality size, and seven dummies for region. The estimated coefficients of are reported in **Table A2**.

Subsequently, with the fitted values of equation (7) at hand, we compute both inverse Mill's ratios $H1_i = \left[-f(\hat{\varphi}_i)/F(\hat{\varphi}_i) \right]$ and $H0_i = \left[f(\hat{\varphi}_i)/1 - F(\hat{\varphi}_i) \right]$ for all individuals. Then we use the standard "log level" Mincer equation to wages estimation, this involves regressing the natural log of the hourly wage upon levels of independent variables. The informal workers regime equation (7) and formal workers regime equation (8) also includes the correction selection variable or inverse Mills ratio, H1 and H0, respectively.[14]

In order to observe differences, the exercise is performed for the entire sample and for two groups of workers according to their skill level. Estimated coefficients are displayed in **Table 4**. The coefficient in the wage equation reports the estimate for selectivity correction term in equations (7) and (8). In both cases it is statistically significant. It can be shown that there is both a positive selection into informal and formal regime occupation. That is, those who choose informal regime are better than average of informal workers and those who choose formal are better than average of formal workers.

---

[14] The reduced–form equation contain the selectivity variables which were estimated rather than observed. It is well know that although OLS produces consistent estimates of the parameters this is not true for the standard error. Then, we use the correction to the variance covariance matrix following Lee (1978) procedure.

The finding of positive selection bias for both workers is consistent with the hypothesis that those who have chosen the employee status posses comparative advantage at it.[15]

Note that the positive selection remains for both skill levels for informal workers, while for formal workers positive selection only remains for those with high skill level. Thus, earnings of formal workers with low skill level are not significantly different from what their earnings would have been had they chose to be informal workers.

---

[15] A tighter interpretation is as follows. Consider the subsample of formal and informal workers with the same measured characteristics. Then the earnings distribution actually observed for formal is higher than the distribution that would be observed for the average individual in the subsample had he chosen to be informal (Rees and Shan, 1986 p. 102). In other words, the average earnings of individual with given measured characteristics who have chosen to be formal is greater than what formal earnings would be for those with the same measured characteristics who chose informal. See **Graph A1.** Wage distribution by occupation status.

Table 4. Wage equations corrected by self-selectivity

Variable	Informal workers			Formal workers		
	All workers	**Low skill level**	**High skill level**	**All workers**	**Low skill level**	**High skill level**
Experience	0.016**	0.017*	0.007	0.003	-0.012	0.011
	(0.005)	(0.007)	(0.013)	(0.007)	(0.012)	(0.013)
Experience squared	-0.000***	-0.000**	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1 if married	0.056	0.037	0.140*	0.072	0.083	0.073
	(0.035)	(0.041)	(0.068)	(0.050)	(0.066)	(0.072)
Has a sons	0.074*	0.072	0.097	0.035	-0.038	0.071
	(0.037)	(0.044)	(0.067)	(0.052)	(0.070)	(0.074)
H1	-1.278***	-1.006***	-1.834***			
	(0.102)	(0.223)	(0.189)			
				1.623***	0.356	2.754***
				(0.135)	(0.290)	(0.281)
Constant	2.114***	2.323***	1.657***	3.563***	3.327***	3.675***
	(0.098)	(0.148)	(0.182)	(0.083)	(0.191)	(0.116)
Demographic charts	Yes	Yes	Yes	Yes	Yes	Yes
Family of origin charcs	Yes	Yes	Yes	Yes	Yes	Yes
Locality size	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for region	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,837	1,313	524	796	388	408
R^2	0.167	0.124	0.203	0.177	0.041	0.239

Controls: Demographic characteristics: age, age squared, schooling, schooling squared. Family of origin characteristics: number of siblings, one-parent family. Locality size: Rural. Dummies for region: North, Center North, Center, Capital, Gulf, South and Pacific.

Low skill level: Workers with less than 9 years schooling completed (*secundaria* or less).

High skill level: Worker with more than 9 years schooling completed (more than *secundaria*)

Notes. Standard error in parentheses

*: $p < 0.10$, **: <0.05, ***: $p<0.01$

Source: Author's calculation based on 2011 EMOVI

In addition, **Table 5** reports the corrected predicted wage by schooling level and age. That is, the wage for workers according to employment status, and the wage they would get if they worked in a different regime of their status.

Hence, working in the informal sector, formal workers receive higher wages than informal, but, this gap is statistically significant except for the university complete level. On the other hand, working in the formal sector, formal workers also receive higher wages. Another significant result are the ware returns for each sector. We observe that age have no linear effect to informal workers, increasing relatively slowly at first, and then decreasing later about 35 years. This effect is opposite to the formal sector where a slowly increasing effect is observed.

Table 5. Predicted wage corrected by employment status

Characteristics	Working on informal sector			Working on formal sector		
	To informal workers	To formal workers	Mean Diff	To informal workers	To formal workers	Mean Diff
Less than primary	2.448	2.537	-0.089***	2.796	2.785	0.011
Primary complete	2.643	2.743	-0.100***	2.905	2.945	-0.040**
Secondary complete	2.845	2.954	-0.109***	3.116	3.192	-0.076***
University complete	3.298	3.361	-0.063	3.538	3.564	-0.026
Age = 25 years	2.752	2.915	-0.162***	2.986	3.147	-0.161***
30 years	2.777	2.945	-0.168***	3.003	3.147	-0.144***
35 years	2.837	2.957	-0.120**	3.049	3.190	-0.141***
40 years	2.773	3.058	-0.285***	3.031	3.238	-0.207***
More than 45 years	2.678	2.982	-0.304***	3.098	3.296	-0.198***

*: $p < 0.10$, **: <0.05, ***: $p<0.01$
Source: Author's calculation based on 2011 EMOVI

On average, if those formal workers were allocated to the informal wage regimen, they would have higher wages than those who in fact are informal workers. Intuitively, that is consistent with an informal workers enjoying a significant comparative earnings advantage over a formal workers regime, given a particular set of other observer characteristics. Hence, those who choose to be informal employment have upper endowments of desirable employment characteristics (can be thought of as ability) than those workers who choose formal regime.

2.4.5 The structural probit equation

Finally, using the corrected estimated coefficients of the two wage equations, we compute earnings difference for each individual between informal and formal sector. This is then included in the structural probit to obtain consistent parameters, equation (1). Similar to wage equation correction. We compute for the entire sample and for two groups of workers according to their skill level. Results by skill level are presented in the Appendix. **Table A3** for low skill level, and **Table A4** for high skill level.

The estimated for entire sample are reported in **Table 6**, we show the marginal effects at means of the probability to choose informal work regimen, as we describe in equation (1). Robust standard error are reported in parentheses

The coefficient that related wage differentials is positive and strongly significant coefficient in the models presented, even when family background characteristics are included as controls. That is, due to the difference between wage in the informal and formal sectors the more likely an individual is to decide working in the informal sector. Hence, a one per cent increase in the ratio of the predicted formal wage raises the probability that an individual working in the informal sector about 0.32 percent points. Although there is very little difference between the average wage of the informal and the wage of formal workers, informal workers have inferior human capital characteristics.

The role of education is relevant, that is, it has a direct effect on the wages of workers, however, we found that the probability of working in the informal sector decrease, as schooling improvement. Schooling therefore could embody two aspects of human capital, one is to increase the labor productivity and the other is to reduce the wages variance due to homogenize the skill of workers, mainly for university completed level. Coefficient of marital status, confirm that being married reduce the probability to be informal, that is due to the benefits that social security offers to their family.

Regarding to retrospective data on their parent's when interviewee's was 14 years old. We include parent's occupation, indigenous condition, schooling, preference that son's study, number of siblings, and household size. [16]

As we expected, having a father's with informal work is shown to have positive effect on the probability to choose informal employment. This coefficient is statistically significant in overall models. Mother's coefficient is not significant mainly because of low labor participation of women in Mexico in those years. Also, we found that parent's education also reduces the likelihood of employed in the informal sector. In relation to parents' indigenous conditions, we found a positive effect on both parents. These results support the high correlation between indigenous conditions and low education attainment.

---

[16] One important variable is the position of the interviewee between the brothers, however, this variable is not available in the survey.

Table 6. Structural probit equation to all sample

	Model 1		Model 2		Model 3		Model 4	
	dy/dx	SE	dy/dx	SE	dy/dx	SE	dy/dx	SE
Log hourly difference	0.0374***	(-5.637)	0.0313***	(-4.633)	0.0322***	(-4.813)	0.0302***	(-4.472)
Age	-0.0137	(-1.838)	-0.0174*	(-2.316)	-0.0172*	(-2.291)	-0.0186*	(-2.470)
Age squared	0.000152	(1.669)	0.0001*	(2.096)	0.0001*	(2.056)	0.0002*	(2.243)
Less than primary	0	(.)	0	(.)	0	(.)	0	(.)
Primary completed	-0.0637*	(-2.484)	-0.0452	(-1.583)	-0.0510	(-1.819)	-0.0403	(-1.389)
Secondary completed	-0.199***	(-8.328)	-0.154***	(-5.626)	-0.163***	(-6.104)	-0.147***	(-5.252)
University completed	-0.460***	(-11.40)	-0.368***	(-8.091)	-0.397***	(-8.931)	-0.360***	(-7.808)
1 if married	-0.0666**	(-3.027)	-0.0672**	(-3.042)	-0.0635**	(-2.880)	-0.0662**	(-2.996)
1 if has a sons	0.0339	(1.465)	0.0376	(1.611)	0.0293	(1.256)	0.0352	(1.504)
1 if father's with informal work			0.136***	(7.007)			0.138***	(7.040)
Father's years of schooling			-0.008***	(-3.494)			-0.00428	(-1.310)
1 if father's preference to study			-0.065***	(-3.304)			-0.0653**	(-3.255)
1 if father's indigenous			0.0703*	(2.569)			-0.0174	(-0.370)
1 if mother's with informal work					0.0563	(1.537)	0.0323	(0.871)
Mother's years of schooling					-0.0117***	(-4.448)	-0.00625	(-1.774)
1 if mother's preference to study					-0.0146	(-0.425)	0.0183	(0.520)
1 if mother's indigenous					0.103***	(3.690)	0.109*	(2.243)
Family origin characteristics	Yes		Yes		Yes		Yes	
Locality size	Yes		Yes		Yes		Yes	
Dummies for region	Yes		Yes		Yes		Yes	
Observations	2633		2633		2633		2633	
Log lik.	-1,500.8		-1,457.2		-1,479.9		-1,452.2	
McFadden's R2	0.0699		0.0969		0.0828		0.1000	
Count R	71.48%		72.24%		72.01%		72.92%	

Log hourly difference $= \ln \hat{Y}_{informal} - \ln \hat{Y}_{formal}$.

Controls: Family of origin characteristics: number of siblings, household size. Locality size: Rural. Dummies for region: North, Center North, Center, Capital, Gulf, South and Pacific. Marginal effects; robust standard error in parentheses; discrete change of dummy variable from 0 to 1

*: $p < 0.10$, **: <0.05, ***: $p<0.01$

Source: Author's calculation based on 2011 EMOVI

2.5 Conclusions

This paper motivates the use of a retrospective data EMOVI 2011. Unlike previous studies in Mexico, this survey provides data about family background to understand the relationship between intergenerational occupation status. The contributions of this paper, by focusing on retrospective data, set up a microeconometric framework with expected wages explicitly determining labor occupation decisions, and controlling as much as possible for heterogeneity sample.

The empirical results highlight the following aspects. The finding of positive selection bias for both workers groups is consistent with the hypothesis that those who have chosen the employee status posses comparative advantage at it. Also, significant coefficients show that not correct for self–selection bias might cause wrong results if ignored. That is, structural model of the selection decision show that wage differential between informal and formal workers has a strong and statistically significant effect on the likelihood of choosing informal work. Due to the difference between wage in the informal and formal sectors the more likely an individual is to decide working in the informal sector.

An important finding of this research is the intergenerational transmission of informal work status between sons and parents. This strong probability to choose the same informality father's occupation could be explained by the existence of comparative advantages for those children whose parents were employed in the informal sector, and also wage differences between the two sectors. Hence, individuals with informal parent's occupation have less likelihood to be enrolled in the formal sector.

2.6 Bibliography

Adamchik, V., and Bedi, V. (1983). Wage differentials between the public and the private sectors: Evidence from an economy in transition. *Labor Economics,* 7 (1), 203-224.

Castillo, D., and Vela, F. (2013). Labor mobility and intergenerational transmission of self-employment in Mexico. *Iberoamericana,* 1 (6), 193-235.

Colombier, N., and Masclet, D. (2008). Intergenerational correlation in self-employment: some further evidence from French ECHP data. *Small Business Economics,* 30 (1), 423-437.

Corak, M. (2004). Generational mobility in North America and Europe: an introduction. In M. Corak, *Generational Mobility in North America and Europe* (pp. 1-37). Cambridge.

De Paul, V., Massil, J., and Modeste, K. (2013). *Intergenerational transmission of self-employed status and informal production units performance in Cameroon.* Munich Personal RePEc Archive.

Dustmann, C., and Van Soest, A. (1998). Public and private sector wages of male workers in Germany. *European Economic Review*, 42 (1), 1417-1441.

Eichhorst, W., and Kendzia, M. (2014). *Workforce segmentation in Germany: From the founding era to the present time.* Germany: IZA Discussion Paper No. 8648.

Fairlie, R., and Robb, A. (2006). Families, human capital, and small business: evidence from the characteristics of business owners survey. *Industrial and Labor Relations Review,* 60 (2), 225-245.

Harris, J., and Todaro, M. (1970). Migration, unemployment and development: a two sector analysis. *American Economic Review,* 60 (1), 126-142.

Hout, M., and Rosen, H. (2000). Self-employment, family background, and race. *Journal of Human Resources,* 32 (4), 670-692.

Huesca, L., and Padilla A., (2012). Empleo, escolaridad y sector informal en la Frontera Norte de México y Chihuahua: expectativas de ocupación en la crisis. *Ensayos Revista de Economia*, 31 (2), 57-86

ILO. (2013). *Measuring informality: A statistical manual on the informal sector and informal employment.* Geneva, Switzerland: (ILO) International Labour Organization.

Koumenta, M. (2011) Modernization, privatization, and the public services ethos in the United Kingdom. In Marsen, D. *Employment in the lean years. Policy and prospects for the next decade.* Oxford University Press

Leal-Ordoñez, J. (2013). *Tax Collection, The Informal Sector, and Productivity.* Distrito Federal: Banco de México. Working Papers (2013-22).

Lee, L. (1982). Some approaches to the correction of selectivity bias. *Review of Economic Studies* 49 (3), 355-372.

Lee, L. (1978). Unionism and wage rates: A simultaneous equations model with qualitative and limited dependent variables. *International Economic Review,* 19 (1), 415-433.

Lentz, B., and Laban, D. (1990). Entrepeneurial success and occupational nheritance among propietors. *Canadian Journal of Economics,* 23 (3), 563-579.

Lewis, W. (1954). Economic development with unlimited supply of labor. *Manchester School of Economics and Social Studies,* 22 (1), 139-191.

Madala, G. (1983). *Limited-dependent and qualitative variables in Economics.* New York: Cambridge University Press.

Maloney, W. (2004). Informality Revisited. *World Development,* 32 (7), 1159-1178.

Maloney, W., and Ribeiro, E. (1999). *Efficiency wage and union effects in labor demand and wage structure in Mexico.* Washington, DC. : World Bank. Working Paper No. 2131.

Mboutchouang, V., Kenneck, J., and Mbenga, K. (2013). *Intergenerational transmission of self-employed status and informal production units performance in Cameroon.* MPRA Munich Personal RePEc Archive.

Moreno, J. (2007). Los salarios del sector formal e informal en México: Análisis de ganancias y pérdidas por formalización. *Ensayos Revista de Economía*, 31(1), 57-86.

Nurkse, R. (1953). *Problems of capital formation in underdeveloped countries.* United Kingdom: Oxford University Press.

Packard, T. (2007). *Do workers in Chile choose informal employment? A dynamic analysis of sector choice.* Washington, DC: World Bank. Working Paper No. 4232.

Pasquier-Doumer, L. (2012). Intergenerational Transmission of Self-employed Status in the Informal Sector: A Constrained Choice or Better Income Prospects? Evidence from seven West African Countries. *Journal of African Economies,* 22 (1), 73-111.

Rees, H., and Shan, A. (1986). An empirical analysis of self-employment in the U.K. *Journal of Applied Econometrics,* 1 (1), 95-108.

Torche, F. (2013). *How do we characteristically measure and analyze intergenerational mobility?* Stanford Center on Poverty and Inequality (Working Paper) .

Valero, J., and Tijerina, A. (2003). Transmisión intergeneracional del ingreso, empresariado y educación en México. *Ensayos Revista de Economía,* 22 (2), 19-34.

Vélez-Grajales, V., and Vélez-Grajales, R. (2014). The role of entrepreneurship in promoting intergenerational social mobility in Mexico. In Lora, E., and Castellani, F. *Entrepreneurship in Latin America.* Washington, DC: Inter-American Development Bank. 81-104.

2.7 Appendix

Table A1. Descriptive statistics

Variable	Min	Max	Mean	Std. Dev.	N
1 if informal occupation	0	1	0.69	0.46	2,633
Hourly earnings (log)	0.22	5.85	2.89	0.7	2,633
Age	25	64	36.94	11.16	2,633
Age square	625	4096	1488.86	934.51	2,633
Experience	1	58	21.9	12.93	2,633
Experience squared	1	3364	646.65	730.26	2,633
Completed years schooling	0	26	9.04	4	2,633
1 if live with couple	0	1	0.64	0.48	2,633
1 if have sons	0	1	0.61	0.49	2,633
Number of sons	0	13	1.36	1.54	2,633
1 if father's with informal occupation	0	1	0.64	0.48	2,633
Father's completed years schooling	0	23	4.01	4.14	2,633
1 if father's indigenous spoken	0	1	0.16	0.37	2,633
1 if father's preference to study	0	1	0.5	0.5	2,633
1 if mother's with informal occupation	0	1	0.11	0.32	2,633
Mother's completed years schooling	0	22	3.94	3.94	2,633
1 if father's indigenous spoken	0	1	0.15	0.36	2,633
1 if father's preference to study	0	1	0.13	0.33	2,633

Source: Author's calculation based on 2011 EMOVI

Table A2. Employment regimen decision

Variable	dy/dx	SE
Years of schooling	-0.0097***	(-1.261)
Schooling squared	-0.0009***	(-2.565)
Household size	-0.0125***	(-2.609)
1 if living in couple	-0.0273*	(-1.054)
Has a sons	-0.0082	(-0.316)
Father with informal employment	0.1090***	(5.778)
Father's years of schooling	-0.0049***	(-1.546)
Mother's years of schooling	-0.0018***	(-0.537)
1 if rural locality (less than 2,500 hab)	0.0682**	(2.965)
Family of origin characteristics	Yes	
Dummies for region	Yes	
Observations	2,633	
Log lik.	-1438.2	
McFadden's R2	0.109	
Count R	72.35%	

Controls: Dummies for region: North, Center North, Center, Capital, Gulf, South and Pacific.
Marginal effects; standard error in parentheses; discrete change of dummy variable from 0 to 1.
*: $p < 0.10$, **: <0.05, ***: $p<0.01$
Source: Author's calculation based on 2011 EMOVI

Graph A1. Wage distribution by occupation status
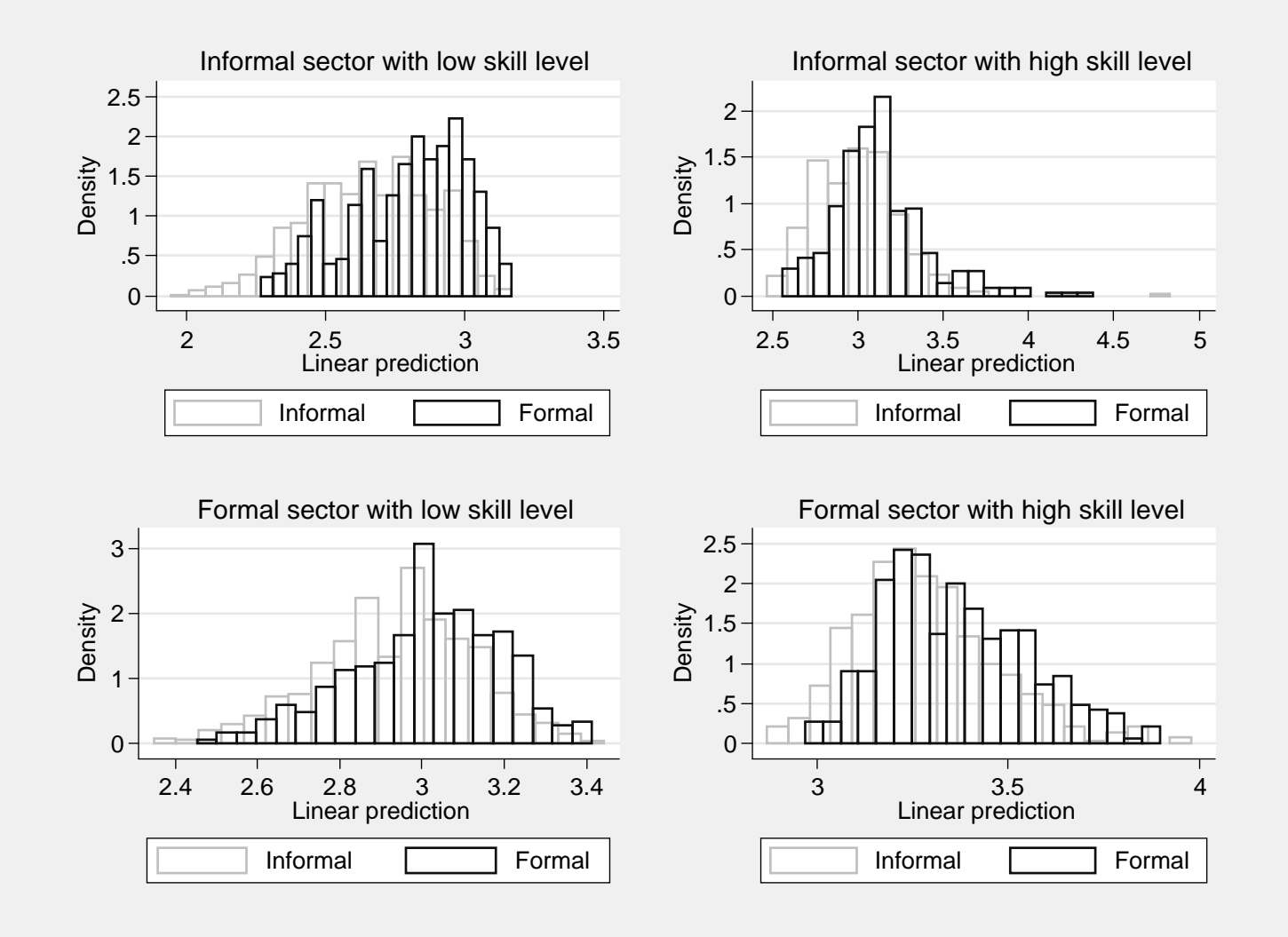
Table A3. Structural probit equation to low skill level workers

	Model (1) dy/dx	SE	Model (2) dy/dx	SE	Model (3) dy/dx	SE	Model (4) dy/dx	SE
Log hourly difference	0.0467***	(5.867)	0.0392***	(4.822)	0.0414***	(5.104)	0.0382***	(4.700)
Age	-0.00614	(-0.774)	-0.0100	(-1.256)	-0.0109	(-1.359)	-0.0120	(-1.499)
Age squared	0.0000395	(0.411)	0.0000859	(0.888)	0.0000909	(0.938)	0.000108	(1.110)
Years of schooling	-0.0229***	(-5.240)	-0.0157***	(-3.433)	-0.0169***	(-3.708)	-0.0144**	(-3.142)
Married	-0.0625**	(-2.582)	-0.0667**	(-2.765)	-0.0609*	(-2.515)	-0.0663**	(-2.744)
Has a sons	0.0234	(0.888)	0.0329	(1.252)	0.0282	(1.070)	0.0351	(1.334)
1 if father's with informal occup			0.128***	(5.896)			0.127***	(5.794)
Father's years of schooling			-0.00979**	(-2.973)			-0.00598	(-1.369)
1 if father's preference to study			-0.0647**	(-2.985)			-0.0634**	(-2.879)
1 if father's indigenous			0.0480	(1.673)			-0.0310	(-0.630)
1 if mother's with informal occup					0.0345	(0.832)	0.0222	(0.529)
Mother's years of schooling					-0.0123***	(-3.667)	-0.00586	(-1.312)
1 if mother's preference to study					-0.0490	(-1.201)	-0.0270	(-0.650)
1 if mother's indigenous					0.0755*	(2.555)	0.0945	(1.871)
Family origin characteristics	Yes		Yes		Yes		Yes	
Locality size	Yes		Yes		Yes		Yes	
Dummies for region	Yes		Yes		Yes		Yes	
Observations	1,701		1,701		1,701		1,701	
Log lik.	-871.9		-843.1		-859.1		-840.1	
McFadden's R2	0.0455		0.0770		0.0595		0.0802	
Count R	77.19%		77.48%		77.72%		77.60%	

Log hourly difference $= \ln\hat{Y}_{informal} - \ln\hat{Y}_{formal}$

Controls: Family of origin characteristics: Number of siblings, one-parent family. Locality size: Rural. Dummies for region: North, Center North, Center, Capital, Gulf, South and Pacific. Marginal effects; robust standard error in parentheses; discrete change dummy variable from 0 to 1

*: $p < 0.10$, **: <0.05, ***: $p<0.01$

Source: Author's calculation based on 2011 EMOVI

Table A2. Structural probit equation to high skill level workers

	Model (1)		Model (2)		Model (3)		Model (4)	
	dy/dx	SE	dy/dx	SE	dy/dx	SE	dy/dx	SE
Log hourly difference	0.0398***	(4.516)	0.0338***	(3.774)	0.0350***	(3.932)	0.0330***	(3.678)
Age	-0.0267*	(-2.487)	-0.0287**	(-2.665)	-0.0271*	(-2.516)	-0.0290**	(-2.689)
Age squared	0.000311*	(2.315)	0.000330*	(2.455)	0.000310*	(2.304)	0.000333*	(2.478)
Years of schooling	-0.0374***	(-8.390)	-0.0311***	(-6.604)	-0.0337***	(-7.296)	-0.0309***	(-6.523)
1 if married	-0.0766**	(-2.603)	-0.0804**	(-2.715)	-0.0752*	(-2.547)	-0.0804**	(-2.708)
1 if has a sons	0.0525	(1.730)	0.0599	(1.955)	0.0503	(1.646)	0.0576	(1.872)
1 if father's with informal work			0.153***	(6.086)			0.156***	(6.117)
Father's years of schooling			-0.00626*	(-2.062)			-0.00381	(-0.957)
1 if father's preference to study			-0.0686**	(-2.675)			-0.0706**	(-2.705)
1 if father's indigenous			0.0747*	(1.972)			-0.0236	(-0.368)
1 if mother's with informal work					0.0142	(0.307)	-0.0206	(-0.435)
Mother's years of schooling					-0.00878**	(-2.704)	-0.00383	(-0.890)
1 if mother's preference to study					-0.0144	(-0.341)	0.0268	(0.617)
1 if mother's indigenous					0.111**	(2.862)	0.122	(1.855)
Family origin characteristics	Yes		Yes		Yes		Yes	
Locality size	Yes		Yes		Yes		Yes	
Dummies for region	Yes		Yes		Yes		Yes	
Observations	1,744		1,744		1,744		1,744	
Log lik.	-1084.5		-1056.5		-1074.8		-1054.3	
McFadden's R2	0.0526		0.0771		0.0611		0.0790	
Count R	65.65%		67.49%		65.88%		67.60%	

Log hourly difference $= \ln \hat{Y}_{informal} - \ln \hat{Y}_{formal}$

Controls: Family of origin characteristics: Number of siblings, one-parent family. Locality size: Rural. Dummies for region: North, Center North, Center, Capital, Gulf, South and Pacific. Marginal effects; robust standard error in parentheses; discrete change dummy variable from 0 to 1

*: $p < 0.10$, **: <0.05, ***: $p<0.01$

Source: Author's calculation based on 2011 EMOVI

Chapter 3.

Leaving the nest or living with her parents: Evidence from Mexican millennia's generation

3.1 Introduction

In Mexico, 2010 census enumerated that 67 percent young adults aged 20 to 29 years still living with their parents, 29 percent living with a partner and about 4 percent living alone. Why young adults co-residence with her parents beyond mature age has several issue. By way of illustration, implication of the delay in independence is related to the delay in cohabitation, marriage and fertility with negative effect of birth rate; also, it has important implications on the economic independence of adult's children in the labor market Chiuri and Del Boca (2008).

Living with parent's serves as an important mechanism through with parents transfer resources to their adult's sons. Usually, these resources are fundamental in enabling young people to complete their education, or establish families of their own Cobb-Clark (2008). Also, living with parents might affect the decision to enter the labor market, consisting with this hypothesis, Chiuri and Del Boca (2008) found that children living in household where both parents are working may experience low unemployment rates, whereas those living in household where the mother is not working, or she is just a discourage seeker, will be experience high unemployment rates.

In addition, Becker et al., (2008) test whether co–residence is associated with higher job insecurity, in other words, young adults when facing income risk are more likely to postpone irreversible choices, such as household formation and decision to enter the labor market

Given the background, millennia's generation is especially interesting. As an illustration, 2010 U.S. Census data shows that Millennia's are significantly worse off economically than either Gen Xers of Baby Boomers at a similar stage of life. Their poverty rate is nearly double than other generations, more live with their parents, and the home ownership rate is nearly 10 percent lower than other groups (APA, 2014 p. 7) –unfortunately, in Mexico there are no studies comparing economic performance across generations–.[17]

The case of Mexico presents some considerations. According to 2015 Mexican Intercensal Survey, Millennia's Generation (individuals aged 15 to 35 years) represents the main generation in Mexico, comprising roughly 35% of the total population. This generation presents some relevant socio economic characteristics', for example, millennia's have more educational outcomes than previous generations, and however, it is also a generation that may have affected their economic performance due to episodes of economic crisis.[18]

This paper adds to the literature by examining the determinants of children's propensity to live with their parents. First, analysis focuses on the educational achievement of children, from this perspective, parents are helping to finance their sons and daughters' investment in human capital by providing them with shelter, and possibly other goods and services, while co residing. Second, we have specific interest other individual characteristics such as gender differences, marital status, and siblings'. Third, we incorporate retrospective information about household conditions and parent's characteristics such as, schooling and labor participation when the interviewee was 14 year old.

---

[17] Generational cohorts are just one way to categorize a group of people with similarities. Following Eddy and McGinnis (2015) cohorts for generations are as follow: Baby boom (1946–1965); Generation X (1965–1979); Millennia's Generation (1980–1999); Generation Z (2000–today).

[18] For example, 1995 pesos crisis had differential impacts on income and consumption across groups, more highly educated heads and those living in metropolitan areas experienced much larger declines in income than unschooled heads and rural household. Income per capita is estimated to have fallen by 17 per cent in agriculture, compared to 35 per cent in constructions and in comer, and 48 per cent in financial services (Pereznieto, 2010 p. 15). Similarly, income per capita of rural laborers fell by less than of non–agricultural workers McKenzie (2003).

In this paper, we take advantage of the rich micro data sets available for Mexico. 2011 EMOVI (*Social Mobility Survey in Mexico,* EMOVI for its acronym in Spanish) contains nationally representative sample of individual aged 25 to 64 years, ant its retrospective information that allows to connect comparable data from parent's, when the interviewee's was 14 years old. In other words, out data provide information for both cohabiting and non cohabiting children.[19]

The paper proceeds as follows. Section 2 reviews the related literature. Section 3 describes a theoretical model of living arrangements between sons and their parents. Section 4 describes the data and presents summary statistics. Section 5 outlines the econometric methodology and results. Section 6 concludes.

---

[19] This survey is designed by the *Espinosa Rugarcia Foundation and the Center for Studies Espinosa Yglesia*s (CEEY).

3.2 Literature review

Multi–generational household (MGH henceforth) is a family unit where the head of household lives with their sons or daughter and their grandchildren or when the householder is living with their child and their parent or parent-in-law. A MGH includes at least two adult generations (for example, parents and adult children ages 25 or older were either generation can be the household head) or two non-sequential generations (for example, grandparents and grandchildren of any age).[20]

Leaving the parental home is a fundamental demographic transition related to other demographic transitions including partnering and parenting. In recent decades, co residence and the age of leaving home have increased, mainly due to the weak labor market, escalating housing costs and increased educational opportunities Cobb-Clark (2008).[21]

Co residence allows young adults to consume, save and keep certain benefits that perhaps living away from home they could not have, even with parental financial transfers. Co residence allows parents to transfer resources to their adult children and enable them to complete their education, enter the labour market, and establish families of their own (Cobb-Clark 2008, p. 3). Also, co residence might be considered a form of non-employment insurance Becker et al., (2005), McElroy (1985).

Parent's income level and its influence on leaving home are a well-studied variable, and its effects are diverse. For example, high parental income could either support the setting up of adult children's own household. In the case of parental transfers, they may be at least as important as public transfers in supporting young adults Rosenzweig and Wolpin, (1993).

---

[20] Historically, Ruggles, (2003) suggest that the decline of the multigenerational family in the twentieth century is connected to the labor market and the diminishing importance of agricultural and occupational inheritance. Usually, elderly farmer needed an adult child or child–in–law to do heavy work when they were no longer capable of doing it themselves.

[21] In the Western world, after the Great Depression and World War II, and up to the 1970s, more people experienced independence living before marriage, though in certain countries leaving home remained closely tied to it DaVanzo and Goldscheier (1990).

There are several channels that influence leaving home decision. For example, most countries with weak welfare state evidence more dependence of adult children from their parents, Aasve et al., (2002). In this context, youth's actual or expected employment status and labor income are determining factors in the decision to leave or stay in the parental home Ermisch (1999).[22]

Conversely, countries with more generous welfare states –high public support for youth–, there seems to be little effect of employment and earnings in the decision to leave home. Results are questionable due to the fact that most young people leave too early, mainly to continue their education, sheltered by public resources. Aasve et al., (2002),

In addition, labor, housing, education and income-support policies are relevant in the decision to leave home Cobb-Clark (2008). Countries with high enrolment ratios in higher education explain the early departure from the parental home Ermisch (1986).

Based on socio demographic approach, family composition and other characteristics as gender, religion and ethnicity are determinants in living arrangements. Co residence is an important mechanism through which different generations transfer resources between them. In most developed countries, resources predominantly flow from parents to their adult children. However, there are cultures where resources and support are bidirectional. This is common in countries such as Spain and Italy Cobb-Clark (2008). Also, co–residence serves as an insurance mechanism against entry into poverty. Recent papers examine the interactions between leaving home and entry into poverty, that is, how far poverty entry is the result of leaving home, rather than arising from heterogeneity or selection Aasve, et al (2002).[23]

---

[22] However, current income does not necessarily predict potential earnings. Researchers typically model the relationship between predicted wages and living arrangements (Cobb-Clark, 2008 p. 17).

[23] Also, there are studies related to the wellbeing and feelings of parents while they live with their adult children and reports on higher marital satisfaction after children have left the nest Aquilino and Supple (1991).

3.3 Theoretical model

Models of co-residence with parents involve a theoretical framework in which the sons compare their utility living with parents and their expected utilities outside the home. However, in case of co residence parents and children share income, as well as housing and domestic goods. Thus their final optimal choice would also depend on respectively parents and children utility levels in the outside option, i.e., the case of separate living arrangements Chiuri and Del Boca (2008). This section is based on Manacorda and Moretti (2005) children's housing arrangement model.[24]

3.3.1 Assumptions

For simplicity, consider a single surviving parent who has only one child. First, assume that parent derive some utility from cohabiting with their son while the son value their independence. Second, parent can transfer money to their sons in order to provide an incentive for them to stay at home, also, we assume that parent are selfish and possess all the bargaining power, so the parent appropriate the whole surplus if they get their children to cooperate. Third, the parent offers an income transfer to his child but only if he decides to live in a home; in other words, parents are not altruistic if the child decides to leave home.

Finally, we assume a Stone–Geary utility function, this function offers a convincing argument that the consumer's optimal behavior for allocation of his budged takes places only after he secures the minimum necessary amount of each good (Chung, 1994 p. 29). Hence, the system is characterized by the marginal budget–share and subsistence level parameters.[25]

---

[24] The motivation of the model is not specifying a structural equation to be estimated, the submission is to illustrate the implication of different assumptions to contextualize the results.

[25] The expenditure system conforms to certain conditions. The first condition is additivity separable function of the form $U(x_1, x_2, ..., x_n)$ and can be represented, after a monotonic transformation, as the sum of a set of partial utilities functions, hence, the sum of expenditures or individual goods must equal the total expenditure. The second condition is homogeneity in prices and total expenditure: the sum of income and price elasticities equals zero (Chung, 1994 p. 28). The third condition is regularity, which implies quasi concavity of the utility function Chang and Fawson (1994).

3.3.2 Children utility function

We assume that children's utility is a function of consumption (C_c) and (a_c) term representing the disutility of living at home (with $0 < a_c < 1$). The child's problem can be written as:

$$\text{Maximize} \quad U_c(C_c, H) = \log (C_c) + H \log (a_c) \tag{1}$$

subject to

$$Y_c + b_1 H = C_c + R(1-H) \tag{2}$$

Equation (2) represents the children budget constraint. Their resources are a function of their income (Y_c), and the compensation they receive from their parents if living at home (b_1). In the right hand side of the equation, the first term (C_c) is the child consumption and (R) their housing cost they will have to pay if living on their own, it can be observe if H=0. In other words, we assume that housing cost is borne by children if they live away from home and by parents if children cohabit.

3.3.3 Parent's utility function

The parent's problem can be written as:

$$\text{Maximize} \quad U_p(C_p, H) = \log (C_p) + H \log (a_p) \tag{3}$$

subject to

$$Y_p = C_p + b_1 H \tag{4}$$

In equation (3), parent's maximize consumption (C_p), and (a_p) represents the happiness of cohabitation with their son (with $a_p \geq 1$), The coefficient (H) describe the parent and child preference for shared living, $\in[0,1]$, hence, H=1 if the child is living at home, H=0 otherwise. Equation (4), the father's has an amount (Y_p) of income to spend in consumption (C_p) and any transfer to their child (H), the parameter ($b_1) \in (0,1)$ is the transfer to cohabiting children.

Hence, father's and children's consumption can be expressed as:

$$C_p = \begin{cases} C_p = Y_p - b_1 & \text{if} \quad H = 1 \\ C_p = Y_p & \text{if} \quad H = 0 \end{cases} \tag{5}$$

$$C_c = \begin{cases} C_c = Y_c + b_1 & \text{if} \quad H = 1 \\ C_c = Y_c - R & \text{if} \quad H = 0 \end{cases} \tag{6}$$

3.3.4 Equilibrium

In equilibrium, parents set (b_1^*) to make children indifferent between living with them or living on their own:

$$U_c(Y_c + b_1, 1) = U_c(Y_c - R, 0) \tag{7}$$

Replacing children's utility function and solving by (b_1^*), the optimal transfer is:

$$b_1^* = \frac{(Y_c - R)}{a_c} - Y_c \tag{8}$$

Conditional on (b_1^*), parents are willing to bride their children into staying at home if the utility they derive from cohabitation is higher than the utility from living on their own.

$$U_p(Y_p - b_1^*, 1) \geq U_p(Y_p, 0) \tag{9}$$

Replacing father's utility function and solving by Y_p, we have.

$$Y_p \geq \frac{a_p}{(a_p - 1)} b_1^* \tag{10}$$

Replacing equation (9) on (10).

$$Y_p \geq A_1 Y_c - A_2 R \quad \text{where:} \quad A_1 = \frac{(1 - a_c)a_p}{a_c(a_p - 1)} > 0; \quad A_2 = \frac{a_p}{a_c(a_p - 1)} > 0 \tag{11}$$

In equilibrium:

$$P(H=1) = \Pr(Y_p \geq A_1 Y_c - A_2 R) \tag{12}$$

The model predicts that if cohabitation is a good for parents and bad for children. From equation (12) in equilibrium the propensity of children to live with their parents depends directly on parent's income (Y_p) and inversely on their income (Yc) and any housing cost they will have to pay if living on their own (R). Conditional to children's income and outside housing cost, an increase on parent's income is associated with a rise in cohabitation rates (Manacorda and Moretti 2005, p. 806)

3.4 Data and descriptive statistics

3.4.1 Data sources

The dataset used comes from 2011 EMOVI *(Social Mobility Survey in Mexico, EMOVI for its acronym in Spanish)*. 2011 EMOVI contains nationally representative samples over a long two generations. It collects a wide range of the data for individuals aged 25 to 64 years. Different to previous surveys in Mexico, 2011 EMOVI is a retrospective data that allows us to connect current respondent's information and their comparable retrospective data from parent's and family conditions when the interviewee's was 14 years old. This allows us to recover data for cohabiting and non-cohabiting children.

We determine whether they "co reside" or live "independently" based on whether they consider any of the adults in their household a parental figure, and on whether they consider themselves to be living independently or not. Although 2011 EMOVI data is well suited to this research, there are also some limitations. First, there is no retrospective information about the individuals who left the parental home prior to the first wave; and we do not know at what time they left, so we cannot associate time variables of these individuals and the interviewee. Second, other important variable is the birth order of the sons, there is substantial literature showing that birth order is a relevant precondition of social mobility; however, this variable is not available. Third, information on parental income is not available; however, parent's education and household conditions are a good proxy for permanent income.

The analysis is limited to millennia's generation cohort (1980–1999). In total, there are 5,192 individuals aged 25–35 years in the sample. Other conveniences in this sample are the follow: More old individuals stay in home to care of their parents in old age Reher (1998), and children less than 25 years live with parents in successfully completing their education and entering the labor market.

3.4.2 Descriptive statistics

An overview of residence between sons and parent's is explored in **Table 1**. As can be seen, the majority of sons lived with both parents at the age of 14 years, about 86 percent, in second place; about 11 percent lived with his mother. Regarding the first group, we note that 49 percent still share a home with their parents, 37 percent with both parents, 4 percent with father, and 8 percent with mother. About 51 percent of respondents no longer live with their parents.

Table 1. Sons currently living with their parent's

Co–residence in the original household	Sons currently living with their parent's				Total
	With both parent's	With father's	With mother's	Don't co reside	
With both parent's	1,679	172	337	2,294	4,482
	(37%)	(4%)	(8%)	(51%)	(100%)
With father's	6	53	1	48	108
	(6%)	(49%)	(1%)	(44%)	(100%)
With mother's	14	10	290	288	602
	(2%)	(2%)	(48%)	(48%)	(100%)
Total	1,699	235	628	2,630	5,192
	(33%)	(5%)	(12%)	(51%)	(100%)

Note: Only includes children living with both parents at the age of 14 years.
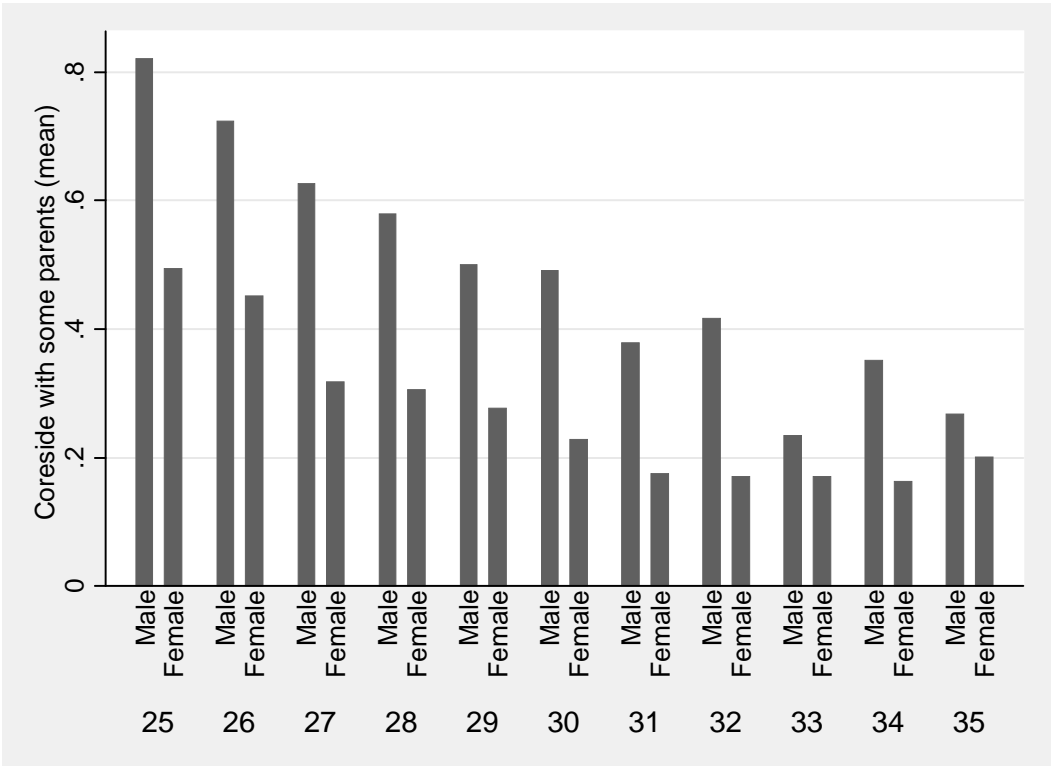**Source:** Author's calculation based on 2011 EMOVI

Table A1 shows descriptive statistics for the sample. Around 33 percent of them currently live with both parents and 49 percent currently live with some parent's. Fourth percent of the sample are female, average age is around 28 years, and educational attainment is around 9.90 years of completed schooling, 28 percent are married and around 49 percent have sons. In relation to the siblings, 32 percent are currently living at home and around 59 of them live away from home.

In the case of parent's characteristics, father's and mother's age are about 55.9 and 53.18 years, and educational attainment is about 5.10 and 5.13 completed years schooling, respectively. Household size is also shown, average household includes about 5.1 members, and 51 percent of households are overcrowded.[26]

---

[26] The most common measure of overcrowding is persons per room. We define overcrowding household if currently live 2.5 or more habitants per bedroom.

Graph 1 illustrates co residence with parents for both sexes by age. It is observed a higher percentage of men living with their parents for all ages. This relationship is inversely correlated with age, especially for sons between 25 and 33 years old. However, this trend changed after 34 years, this advice than older individuals stay in home to care of their parents in old age, as suggest Reher (1998).

Graph 1. Co residence with parent's by age

Source: Author's calculation based on 2011 EMOVI

Table 2 summarizes group averages and provides the p-values of a hypothesis test, testing against the null hypothesis that the two groups have equal means of the particular observation. Similar rates of co residence are observed for both sexes in some characteristics. The average age for those living with their parents, and those who do not live with their parents are about 27 years and 29 years, respectively. We also observe significant differences in marital status; married children have less residing with their parents.

An important difference between the sexes is observed in employment. While for women is a similar percentage in both categories. Men have higher labor participation; this participation is even greater for men who do not live with their parents. It is also observed that children with higher education attainment have higher rates of co residence. A possibility is that differences may be attributable

because parents support their children to keep studying. However, simply looking at differences in schooling cannot draw conclusions, but rather regression analysis is required to find the effect of co residence.

In relation to the siblings, it is found that rates of co residence maintain a similar brother's preferences behavior. In other words, having siblings in the home is associated with high rates of co-residence. On the other hand, as a generation conforms to more siblings, children tend to live away from home.

Table 2. Co residence with parents by sex

Variable	Female (n=2,056)			Male (n=1,136)		
	Living (n=662)	Non living (n=1,394)	Mean Diff	Living (n=1,900)	Non living (n=1,236)	Mean Diff
Age	27.511	29.242	-1.731***	27.184	29.439	-2.255***
Married	0.094	0.459	-0.365***	0.090	0.464	-0.374***
1 if has sons	0.329	0.852	-0.523***	0.156	0.675	-0.519***
1 if employment	0.409	0.405	-0.005	0.614	0.807	-0.194***
Less than primary	0.060	0.081	-0.021*	0.051	0.075	-0.025***
Primary completed	0.127	0.216	-0.089***	0.147	0.199	-0.052***
Secondary completed	0.702	0.647	0.055**	0.683	0.644	0.039**
University completed	0.110	0.056	0.054***	0.120	0.082	0.038***
Number of siblings	1.977	3.030	-1.053***	1.868	2.716	-0.848***
1 if siblings living at home	0.387	0.838	-0.451***	0.351	0.805	-0.454***
1 if siblings living away home	0.538	0.052	0.485***	0.589	0.093	0.496***

Source: Author's calculation based on 2011 EMOVI

3.5 Methodology

3.5.1 Probit model

In our empirical analysis, we compare the utility of children living with their parents (U^1) and non living with their parents (U^0). More formally, suppose that the underlying latent variable y_i^* reflects the propensity of the individual to live with their parents, and is a linear function of a vector of variables x_i, with coefficient vector β. In this model we use currently individual data –schooling attainment, employment, sex, marital status–, retrospective information about parents' characteristics, and data at regional and country level to describe the environment adult children face. The utilities for individual i are defined by

$$U_i^1 = x_i' \beta_0 + \varepsilon_{0i}, \qquad U_i^0 = x_i' \beta_1 + \varepsilon_{1i}, \tag{13}$$

Where ε_i an unobserved individual–specific component and x_i is is vectors of variables determining the decision to co reside with their parents. The alternative with maximal utility is chosen, so that

$$y_i = \begin{cases} 1 & \text{if} \quad U_i^0 \leq U_i^1 : \text{living with their parents} \\ 0 & \text{if} \quad U_i^0 > U_i^1 : \text{non} - \text{living with their parents} \end{cases} \tag{14}$$

In this case the choice depends on the differences in the utilities $U_i^1 - U_i^0 = x_i' \beta + \varepsilon_i$, where $\beta = \beta_1 - \beta_0$ and $\varepsilon_i = \varepsilon_{1i} - \varepsilon_{0i}$. Again, if the individual specific term ε_i are assumed to be independent and identically distributed with symmetric density f, it follows that

$$P[y_i = 1] = P[\varepsilon_i \geq -x_i' \beta] = P[\varepsilon_i \leq x_i' \beta] = F(x_i' \beta) \tag{15}$$

Where F is the cumulative distribution of ε_i. Assuming that F is differentiable with derivative f (the standard normal density function corresponding to F), the marginal effect of the jth explanatory variable is given by

$$\frac{\partial P[y_i = 1]}{\partial x_{ji}} = f(x_i' \beta) \beta_j, \qquad j = 2,..., k \tag{16}$$

This shows that the marginal effect of changes in the explanatory variables depends on the level of these variables.

3.5.2 Empirical results

Table 3 and **4** reports average marginal effect of estimates of probit models for the probability of living with their parents. We estimate separately each of the equations for females (**Table 3**) and males (**Table 4**) to reflect differences by gender. As previously stated, the socio economic variables allow us to identify the parameter of interest, in particular, if the child performs economic activity, and educational achievements, the set of controls included are marital status and if the respondent has children.

In Model 1 (Column 1) for both sexes, we estimate the impact of schooling. Surprisingly to the results in other papers, we do not find evidence of the effect of schooling of children on the propensity to co reside with their parents. This result is still maintained for the different specifications. Contrary as we expect, the effect of education attained on the propensity to remain living with parents is absent.

In relations to employment rate, we found that working reduce the propensity to co residence with parents only for male sample, this is explained in part by labor participation –female employment rate is only 40% as opposed to 80% for males– for children not living with their parents. This results is similar to previous papers that suggest women's labor force participation, more than men's, is affected by family composition. (Connelly, et al., p. 2). In addition, research on women's labor force participation has often found that the need to care for children reduces women's labor market employment. However, these coefficients should be considered with caution due to the possible endogeneity between labor participation and co residence. There could be unobservable factors related to stronger preferences for working as opposed to co residence with parents. On the contrary, it could be also that components of the error term reflect high propensities to work inducing a positive correlation (Crespo, 2008 p. 12).[27]

---

[27] Hence, resulting marginal effect of the co residence variable can be interpreted as the exogenous portion of the effect, while the marginal effect of the residual can be interpreted as a measure of the relationship of the unobserved characteristics correlated with the choice to co residence and participation in the labor markets (Connelly, 2014 p. 14). IV procedure could be the follow: the first stage is a reduced form co residence equation, while the second stage is a labor force participation equation, which includes both co residence with adult children and the residuals of the co residence equation as independent variable.

Also, we found that age is significant in most equations, as we expect we found a positive relationship between the leaving parent's household and aging of the children, these results are largely consistent with Flatau et al., (2003) who also find a gradual rise in the age at which those under the age of 30 are leaving home. The positive sign of the quadratic term suggests that for the final years as the generational court, children have to observe inferior rates of co residence with their parents. In **Graph A1** we report the predicted probabilities to living parent's house by age.

The other variable of interest is the effect of co residing observed in siblings. In column (2) dummies variables are included to capture this dimension. In this case, the coefficients suggest that having brothers away from home and living at home is associated with households where the brothers have similar preferences of co residence. However, since in the database is not possible to determine the birth order, we cannot associate preferences to leave the parental home between older siblings to younger siblings or vice versa.

In columns (3), (4) and (5) controls for parent's education and occupation are added (proxies for permanent income). In households where mothers have a higher education it is less likely that adult children co reside. This interpretation here is twofold: in higher educated households potentially greater resources are available to the household which allow children to move out earlier. In relation to father's schooling, the effect is not significant.

Hence, the working status of parents, especially the mother's one, appears to be the most important factor, robust coefficients show a positive relationship in the departure of the children home. There might be several explanations supporting this view. On one hand a working mother reduces the amount of goods and services produced in the household, rendering less appealing living with parents; on the other, her status increases the household income, providing a better insurance to all members. In this respect, the coefficient can also be interpreted as a proxy for family culture of women's independence which coherently is greater for woman than for man.

In addition, mother's working status can also be interpreted as a proxy for family attitude towards women independence Chiuri and Del Boca (2008). Similary, Diaz and Guillo (2005) found that children living in household where both parents are working may experience low unemployment rates, which is associated with independence of children at a younger age. [28]

Finally, some of the contextual variables do affect individual co residential rates, such as, home owners, housing cost and overcrowded home, these variables do not have effect.

---

[28] In McElroy (1985) theoretical model the reservation wage of young adults who live with their parents, and their utility as a member of their parent's household, decrease with their mother's wage. Therefore, as their mother's wages increase, their probability of moving out increases as well

Table 3. Average marginal effect for female sample

	(1)	(2)	(3)	(4)	(5)
1 if employment	-0.0227	-0.00366	-0.00382	-0.00482	-0.00508
	(-0.947)	(-0.142)	(-0.148)	(-0.186)	(-0.197)
Years of schooling	0.00767*	0.00707	0.00514	0.00124	0.00117
	(2.210)	(1.900)	(1.306)	(0.308)	(0.288)
Age	-0.237**	-0.191*	-0.184*	-0.213**	-0.208**
	(-3.233)	(-2.446)	(-2.360)	(-2.724)	(-2.655)
Age square	0.00385**	0.00304*	0.00294*	0.00344**	0.00335*
	(3.090)	(2.300)	(2.220)	(2.591)	(2.524)
1 if married	-0.272***	-0.211***	-0.208***	-0.215***	-0.212***
	(-9.790)	(-7.101)	(-7.043)	(-7.219)	(-7.120)
1 if have children	-0.328***	-0.200***	-0.192***	-0.195***	-0.193***
	(-8.897)	(-5.091)	(-4.905)	(-4.970)	(-4.913)
Number of children	-0.0358*	-0.0200	-0.0190	-0.0210	-0.0212
	(-2.278)	(-1.224)	(-1.166)	(-1.286)	(-1.299)
1 if has siblings living in home		0.436***	0.435***	0.429***	0.426***
		(10.588)	(10.578)	(10.420)	(10.376)
1 if has siblings living away home		-0.143**	-0.155**	-0.157**	-0.162**
		(-2.666)	(-2.872)	(-2.903)	(-3.016)
1 if father used to work			0.00221		0.0293
			(0.070)		(0.896)
Father's years of schooling			0.00383		-0.00303
			(1.221)		(-0.759)
1 if mother used to work				0.0947***	0.0970**
				(3.312)	(3.265)
Mother's years of schooling				0.0115***	0.0134**
				(3.360)	(3.068)
Number of siblings	YES	YES	YES	YES	YES
Father's with some disabilities	YES	YES	YES	YES	YES
Father's indigenous condition	YES	YES	YES	YES	YES
Household socioeconomic index	YES	YES	YES	YES	YES
1 if they were home owners	YES	YES	YES	YES	YES
1 if overcrowded home	YES	YES	YES	YES	YES
Housing cost	YES	YES	YES	YES	YES
Dummies: locality size, state	YES	YES	YES	YES	YES
Observations	2,056	2,056	2,049	2,048	2,042
Log lik.	-904.9	-761.4	-754.3	-738.1	-732.7
McFadden's R2	0.300	0.411	0.413	0.425	0.426
Count R	81.96%	85.56%	85.60%	85.60%	85.80%

Notes. Marginal effects, parentheses contain the mean of the estimated standard errors.

*: p < 0.10, **: <0.05, ***: p<0.01

Source: Author's calculation based on 2011 EMOVI

Table 4. Average marginal effect for male sample

	(1)	(2)	(3)	(4)	(5)
1 if employment	-0.109***	-0.0847***	-0.0827***	-0.0828***	-0.0818**
	(-4.650)	(-3.452)	(-3.340)	(-3.346)	(-3.278)
Years of schooling	0.00568	0.00528	0.00375	0.00253	0.00251
	(1.942)	(1.749)	(1.148)	(0.777)	(0.754)
Age	-0.230***	-0.221**	-0.223**	-0.222**	-0.223**
	(-3.390)	(-3.147)	(-3.164)	(-3.137)	(-3.148)
Age square	0.00343**	0.00337**	0.00341**	0.00338**	0.00341**
	(2.968)	(2.819)	(2.842)	(2.819)	(2.832)
1 if married	-0.281***	-0.206***	-0.206***	-0.209***	-0.206***
	(-10.708)	(-7.613)	(-7.552)	(-7.679)	(-7.529)
1 if have children	-0.286***	-0.153***	-0.159***	-0.150***	-0.155***
	(-7.722)	(-3.944)	(-4.076)	(-3.844)	(-3.946)
Number of children	-0.0640***	-0.0567**	-0.0564**	-0.0566**	-0.0567**
	(-3.489)	(-2.975)	(-2.941)	(-2.958)	(-2.950)
1 if has siblings living in home		0.408***	0.408***	0.406***	0.408***
		(11.908)	(11.831)	(11.812)	(11.794)
1 if has siblings living away home		-0.129**	-0.131**	-0.130**	-0.133**
		(-3.112)	(-3.138)	(-3.123)	(-3.186)
1 if father used to work			0.0283		0.0374
			(0.949)		(1.220)
Father's years of schooling			0.00321		-0.00234
			(1.170)		(-0.662)
1 if mother used to work				-0.00584**	0.00182**
				(-0.212)	(0.064)
Mother's years of schooling				0.00781**	0.00972*
				(2.644)	(2.538)
Number of siblings	YES	YES	YES	YES	YES
Father's with some disabilities	YES	YES	YES	YES	YES
Father's indigenous condition	YES	YES	YES	YES	YES
Household socioeconomic index	YES	YES	YES	YES	YES
1 if they were home owners	YES	YES	YES	YES	YES
1 if overcrowded home	YES	YES	YES	YES	YES
Housing cost	YES	YES	YES	YES	YES
Dummies: locality size, state	YES	YES	YES	YES	YES
Observations	3,136	3,136	3,126	3,122	3,114
Log lik.	-1,466.0	-1,273.9	-1,266.8	-1,265.2	-1,258.3
McFadden's R2	0.303	0.394	0.396	0.396	0.398
Count R	79.34%	83.29%	83.43%	83.47%	83.46%

Notes. Marginal effects, parentheses contain the mean of the estimated standard errors.
*: $p < 0.10$, **: <0.05, ***: $p<0.01$
Source: Author's calculation based on 2011 EMOVI.

3.6 Conclusions

This paper adds to the literature by examining the determinants of children's propensity to live with their parents. Why young adults co-residence with her parents beyond mature age has several issue. i.e., living with parent's serves as an important mechanism through with parents transfer resources to their adult's sons. We focus on Millennia's Generation (1980–1999) in order to consider some relevant characteristics' in this generation such as more educational outcomes than previous generations, however, economic achievements may have affected due to episodes of economic crisis–.

Based on Manacorda and Moretti (2005) I develop a theoretical model to illustrate children's and parents living arrangements. Conditional to children's income and outside housing cost, an increase on parent's income is associated with a rise in cohabitation rates.

Regarding the empirical results, comparing utility levels for sons living with their parent's and non living I found that labor participation reduce the propensity to co residence only for males, this is explained in part by lower labor participation for female sample, however, this results should be considered with caution due to endogeneity between labor participation and co residence. Surprisingly to the results in other papers, the effect of education attained on the propensity to remain living with parents is absent.

In addition, controlling by working status and schooling of parent's we found that mother's appears to be the most important. There might be several explanations supporting this view. On one hand a working mother reduces the amount of goods and services produced in the household, rendering less appealing living with parents; on the other, her status increases the household income, providing a better insurance to all members. Similar to other papers, we found that children living in household where both parents are working may experience low unemployment rates, which is associated with independence of children at younger age.

3.7 Bibliography

Aasve, A., Billari, F., Mazzuco, S., and Ongaro, F. (2002). Leaving home: A comparative analysis of ECHP data. *Journal of European Social Policy,* 12 (4), 259-276.

APA. (2014). *Two generations' view on the future of communities: millennials, boomers, and new directions for planning and economic development.* Washington, DC: American Planning Association. Investigation Place.

Aquilino, W., and Supple, K. (1991). Parent-child relationship and parent's satisfaction with living arrangements when adult children live at home. *Journal of Marriage and Family,* 53 (1), 13-27.

Becker, S., Bentolila, O., Fernandes, S., and Ichino, A. (2005). *Job insecurity and youth emancipation: A theoretical approach.* IZA Discussion Paper No. 1836.

Becker, S., Bentolila, S., Fernandes, A., and Ichino, A. (2008). *Youth emancipation and perceived job insecurity of parents and children.* Bonn: IZA Discussion Paper No. 1836.

Chang, T., and Fawson, C. (1994). *An application of the Linear Expenditure Systems to the pattern of consumer behavior in Taiwan.* Utah State University: Economic Research Institute Study Papers. Paper 37.

Chiuri, M., and Del Boca, D. (2008). *Household membership decisions of adult children: Does gender and institution matter?.* IZA Discussion Paper No. 3546.

Chung, J. (1994). *Utility and production functions: theory and applications.* Oxford UK and Cambridge USA: Blackwell .

Cobb-Clark, D. (2008). *Leaving home: What economics has to say about the living arrangements of young Australians.* IZA Discussion Paper No. 3309.

Connelly, R., Maurer-Fazio, M., and Zhang, D., (2014). *The role of co residency with adult children in the labor force participation decisions of older men and women in China.* IZA Discussion Paper No. 8068.

Corak, M. (2004). Generational mobility in North America and Europe: An introduction. In M. Corak, *Generational Mobility in North America and Europe.* Cambridge.

Crespo, L. (2008). Caring for parents and employment status of European mid–life women. (unpublished paper)

DaVanzo, J., and Goldscheier, F. (1990). Coming home again: Returns to the parental home of young adults. *Population Studies,* 44 (2), 241-255.

DeVos, S. (1990). Leaving the parental home: Patterns in six latin american countries. *Journal of Marriage and Family,* 44 (1), 241-255.

Diaz, A., and Guillo, M. (2005). Family ties and labor supply. *Investigaciones Economicas*, 34 (2), 289-329.

Eddy, S., and McGinnis, J. (2015). Millennials: who are they, how are they different, and why should we care? In R. Burke, C. Cooper, and A. Antoniou, *The multi-generational and aging workforce. Challenges and opportunities* (pp. 121–137). Cheltenham, UK: Edward Elgar.

Ermisch, J. (1986). Impacts of policy actions on the family and household. *Journal of Public Policy,* 6 (3), 297-318.

Ermisch, J. (1999). Prices, parents and young people's household formation. *Journal of Urban Economics,* 45 (2), 47-71.

Flatau, P., Hendershott, P., James, I., Watson, R., and Gavin, W. (2003). *Leaving the parental home in Australia over the 20th century: Evidence from the household income and labor dynamics in Australia.* HILDA conference 2003.

Goldsheider, F., and Goldsheider, C. (1989). Family structure and conflict; nest-leaving expectations of young adults and their parents. *Journal of Marriage and the Family,* 51 (2), 87-97.

Manacorda, M., and Moretti, E. (2005). Why do most Italian young men live with their parents? Intergenerational transfers and household structure. *Journal of the European Economic Association,* 4 (4), 800 –829.

McElroy, M. (1985). The joint determination of household membership and market work: The case of young men. *Journal of Labor Economics,* 3 (3), 293-316.

McKenzie, D. (2003). How do households cope with aggregate shocks? Evidence from the Mexican peso crisis. *World Development*, 31 (7), 1179-1199.

Pereznieto, P. (2010). *The case of Mexico's 1995 peso crisis and Argentina's 2002 convertibility crisis. Including children in policy responses to previous economic crises.* NY: UNICEF Social and Economic Policy Working Paper.

Reher, D. (1998). Family ties in Western Europe: Persistent contrasts. *Population and Development Review,* 24 (1), 203-234.

Rosenzweig, M., and Wolpin, K. (1993). Intergenerational support and the life-cycle incomes of young men and their parents: Human capital investment, co residence, and intergenerational financial transfers. *Journal of Labor Economics,* 11 (1), 84-112.

Ruggles, S. (2003). Multigenerational families in nineteenth-century America. *Continuity and Change,* 18 (1), 139-165.

Torche, F. (2013). *How do we characteristically measure and analyze intergenerational mobility?* Stanford Center on Poverty and Inequality (Working Paper).

5 Appendix

Table A1. Descriptive statistics

| Variable	Min	Max	Mean	SD	N
1 if living with both parent's	0	1	0.33	0.47	5,192
1 if living with some parent's	0	1	0.49	0.50	5,192
1 if living only with father's	0	1	0.37	0.48	5,192
1 if living only with mother's	0	1	0.45	0.50	5,192
1 if female	0	1	0.40	0.49	5,192
1 if employed	0	1	0.57	0.49	5,192
Age	25	35	28.32	3.13	5,192
Age squared	625	1,225	811.55	184.43	5,192
Completed years schooling	0	26	9.90	3.62	5,192
1 if married	0	1	0.28	0.45	5,192
1 if have sons	0	1	0.49	0.50	5,192
Number of sons	0	7	0.92	1.18	5,192
1 if have siblings	0	1	0.82	0.38	5,192
Number of siblings	0	14	2.40	2.22	5,192
1 if siblings living away home	0	1	0.59	0.49	5,192
1 if siblings living at home	0	1	0.32	0.47	5,192
1 if father's household head	0	1	0.85	0.36	5,192
Father's currently age	35	100	55.91	9.04	4,351
1 if father used to work	0	1	0.82	0.38	5,192
Father's completed years schooling	0	25	5.10	4.52	5,192
1 if father's indigenous	0	1	0.13	0.33	5,192
1 if father's with some disabilities	0	1	0.00	0.06	5,192
Mother's currently age	31	97	53.18	8.20	4,611
1 if mother used to work	0	1	0.21	0.41	5,192
Mother's completed years schooling	0	24	5.13	4.21	5,192
1 if mother's indigenous	0	1	0.12	0.33	5,192
1 if mothers with some disabilities	0	1	0.00	0.06	5,192
1 if they are home owners	0	1	0.64	0.48	5,192
Number of people living in home	1	22	5.14	2.05	5,192
1 if overcrowded housing	0	1	0.51	0.50	5,192
Housing costs	363	6,750	1,875	912	5,192

Source: Author's calculation based on 2011 EMOVI

Graph A1. Predicted probabilities to living with some parent's by sex
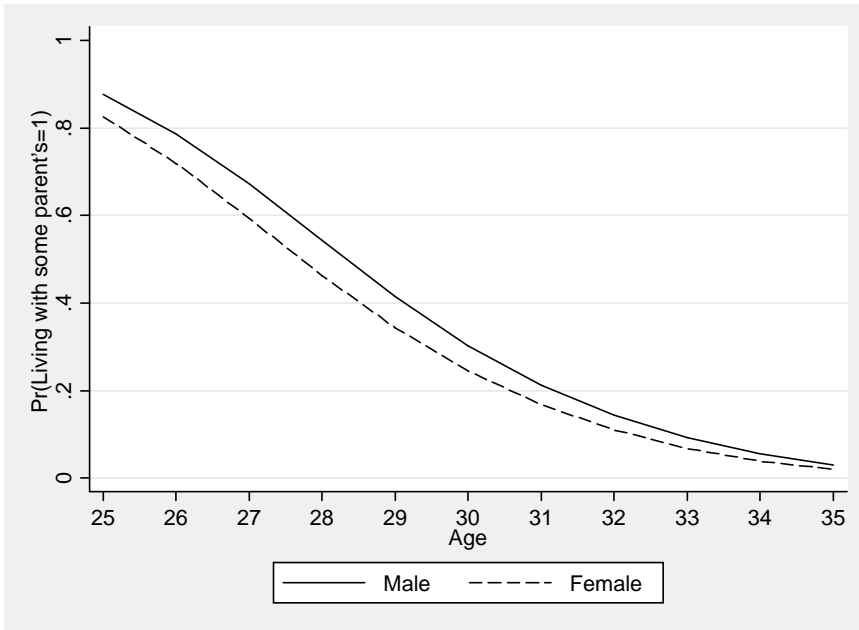
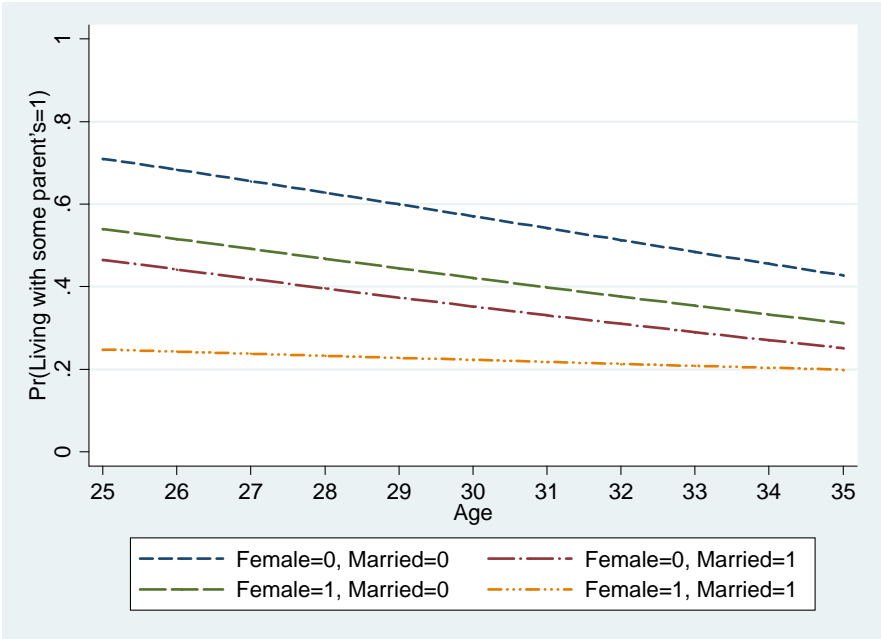**Source:** Author's calculation based on 2011 EMOVI

Graph A2. Predicted probabilities to living with both parent's by sex
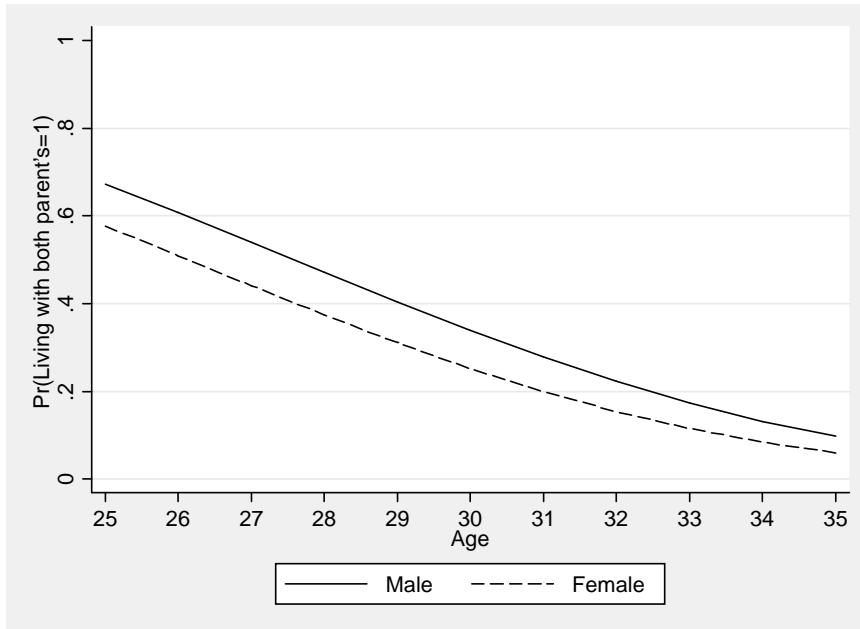
Notes. Only include children with both parent's alive.
Source: Author's calculation based on 2011 EMOVI

Graph A3. Predicted probabilities to living with parent's by marital status

Source: Author's calculation based on 2011 EMOVI