UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN

FACULTAD DE ECONOMÍA
DIVISIÓN DE ESTUDIOS DE POSGRADO

"THREE ESSAYS ON LABOR ECONOMICS IN MEXICO"

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Dedicatoria

A mis padres, por su incondicional apoyo en la trayectoria de mi vida, por ser no solo una inspiración, sino por creer en mi incluso cuando yo dudaba.

A mis hermanos, Dany y Edy, porque literalmente no estaría donde estoy si no fuera por su ayuda, gracias por estar siempre para mí.

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This work is the proof that I stayed, I fought, and I finished.

"It's times like these you learn to live again."

Foo Fighters

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Introduction

The first chapter is about how does household structure affects women's labor supply. The main goal is to quantify the impact of living in an extended household on the number of hours worked by women. To ensure the reliability of the results, we analyzed data from the National Occupation and Employment Survey (ENOE) for the first quarter of 2022 and used several models related to labor supply and participation. The key findings show that an extended household does not only increase women's participation in the workforce but also leads to an increase in the number of hours they work.

The second one is related to education and gender identity. This chapter delves into the pervasive issue of discrimination against LGBTI+ individuals and its detrimental effects on their educational success. Using the National Survey on Sexual and Gender Diversity 2021 dataset and a Cox duration model, we have assessed the educational survival rate relative to gender and the Sexual Orientation and Gender Identity of individuals. Our findings reveal that after considering endogeneity and individuals' willingness to disclose their sexual orientation and gender identity, non-conventional groups exhibit a lower risk of dropping out of school than their counterparts. This result holds for both males and females, possibly signaling a positive shift in inclusivity among younger generations. Acknowledging that this outcome might stem from the interplay between school achievement and the openness to disclose sexual orientation and gender identity is crucial. We have incorporated a first stage into the Cox model to address this, instrumentalizing the sexual orientation and gender identity variable.

Finally, the third paper seeks to identify whether Mexican immigrant women work more hours when migrating to the United States. Using data from the 2023 American Community Survey and the 2023 Mexican Employment and Occupation Survey, we use a labor supply model to determine whether a regressive supply curve exists for Mexican immigrant women and a Blinder-Oaxaca decomposition to explain the differences. To address the issue of self-selection, we use a Heckman self-selection correction. The results show that, although Mexican women in the US work less hours per week than Mexican women in Mexico, based on their observable and unobservable characteristics, if they returned to Mexico, they would work more than Mexican women in Mexico. These findings suggest that Mexican immigrants in the United States work less because, although they are self-selected to work more, higher wages in the US cause the income effect to outweigh the substitution effect.

Chapter 1. Family structure on labor supply: An analysis of the impact of extended households in a developing country

1.1 Introduction

During the last decades, multiple social and demographic changes have contributed to the diversification of the traditional household structure, giving way to new schemes, such as DINKS (Double Income No Kids), single-parent, extended, compound, and single-person households. These new organization structures have modified the allocation of domestic work and the labor supply within the household.

Mexico is not exempt from this phenomenon. According to the 2020 National Census, reported by the National Institute of Statistics and Geography (INEGI), 71% of households are nuclear, 1% composite, and 28% extended (a nuclear household with an extra family member living in the house). The percentage of extended households increased from 25.8% in 2010.

The household composition is not the only thing that changed. Last 10 years, the percentage of women at the head of a household increased from 25% to 33%. We can observe this increase in the participation of women as heads of household but also in the educational achievement and labor participation of women. In recent years, the average years of schooling have gone from 7.7 in 2000 to 9.6 in 2020, while labor participation grew from 40.8% in 2005 to 45% in 2022 (INEGI, 2024).

These changes in women's participation pave the way for more inclusive and egalitarian scenarios. However, it is still challenging to be present in the labor market and to continue attending the domestic and child-rearing activities demanded by the household.

Although changes in women's labor participation seem to be related to changes in family structure, it’s important to examine the impact in a more specific context, especially in developing countries where family composition is diversifying to meet the needs of its members.

This research aims to identify how these structures affect labor supply, especially how a member who may shares household responsibilities affects the labor supply (hours worked), especially in Mexico, where close to a third of households are extended. This could be due to the extra members’ income or support in household chores.

The first hypothesis is that living in an extended household increases the likelihood of women working. The second is that living in this type of households increases the number of hours worked for all household members, but especially for women in comparison with nuclear households.

The main contribution of this article focuses on the importance of women's support networks within the household to participate in the labor market.

We found that, after controlling the endogeneity issue (between income, partner labor supply and labor supply), the impact of belonging to an extended household is positive. However, this effect diminishes in the model assessing labor participation and, in the model, examining the labor supply of employed women. Conversely, in the general labor supply model, which

includes all women regardless of employment status, the effect increases after accounting for endogeneity.

The rest of the article is organized as follows. Section 2 discusses the literature review, section 3 presents a theoretical framework, section 4 displays the methodology and section 5 reports the results. The conclusions are presented in section 6.

1.2 Literature review

Women's participation in the labor market is constantly changing due to the dynamism of the cultural, social, and demographic environment. This process of change influences the reasons that drive women to work. Conventional reasons include education (Contreras & Plaza, 2010), changes in the composition of the market (Marjanović et al., 2024) and in intra-household dynamics (Gong, 2002), as well as the flexibilization of labor policy (Glass, 2016) and gender roles (Marjanović et al., 2024).

Factors derived from intra-household dynamics and negotiations include the husband's labor supply (Donni, 2007), the number, age, and schooling of children (Dumas, 2004), fertility decisions (González & Virdis, 2021), and the household structure (Gong & van Soest, 2002); (Gehringer & Klasen, 2016).

The relationship between women's labor participation or supply and household structure has been studied in developed countries, such as France (Gutiérrez, 2022); (Donni, 2007), the United States (Glass, 2016); (Macpherson & Stewart, 1989); (Heathcote et al., 2017)), and the United Kingdom (Cavapozzi et al., 2021); (Finch, 2014), as well as in developing countries, like Chile (Contreras & Plaza, 2010), Malaysia (Ismail & Sulaiman, 2014), and Indonesia (Yusnandar et al., 2020).

In developed countries, extended households have more negotiating power (Gutiérrez, 2022). Marriage can help reduce the risk of income loss (Fehr et al., 2016). Additionally, women's work patterns often adjust to align with more stable work patterns of men (Donni, 2007). Research by (2014) indicates that women often seek to increase their time in the workforce to make up for income loss associated with taking on domestic responsibilities.

In the case of developing countries, results have been oriented to the role of some elements within the household. This elements are household members, sex and age of children (Ismail & Sulaiman, 2014); (Dumas, 2004), structural sexism (Contreras & Plaza, 2010) and the relation with economic development (González & Virdis, 2021).

Likewise, inclusion and labor policies have been key in promoting women's participation (Glass, 2016); (Gehringer & Klasen, 2016). Cunningham (2007) and Cavapozzi et al. (2021) suggest that domestic activities and the surrounding environment have changed gender roles. They found that women working nearby also increases the likelihood of other women working.

In their study utilizing Mexico's Urban Employment Survey from the second quarter of 1991, Gong and van Soest (2002) found that women residing in extended households exhibit higher levels of participation in the labor market. The authors argue that additional members of the nuclear household serve as substitutes for domestic responsibilities and child-rearing tasks. However, it is important to note that in the last decades the family structure has changed, which restricts the ability to generalize the findings beyond the specific context examined.

Unlike previous articles, this study offers a unique perspective by examining the intricate relationship between family structure, labor participation, and labor supply within the context

of a developing country. Notably, the diversity in household composition emerges as a key characteristic that significantly influences the economic landscape and shapes women's workforce decisions. By delving into these dynamics, the research highlights the crucial role of family composition in understanding labor market behaviors and contributes to the broader conversations surrounding gender and economic development.

1.3 Theoretical Framework

The analysis of household decision-making has been a widely explored topic since (Becker, 1981) studied the interaction of households with different organizational structures. Later, Chiappori (1992), incorporated a new concept that captures the bargaining power of household members and a sharing rule that assigns the proportion of collective income allocated to individual spending.

According to Becker's family labor supply model (Becker, 1994), we incorporate the bargaining power element from Chiappori's models (Chiappori, 1992). The family decision-making model considers utility derived from both public and private consumption, as well as leisure time. The following function illustrates this for a two-parent household:

$$\max \ \lambda U_1(C_1, L_1, G) + (1-\lambda)U_2(C_2, L_2, G)$$

$$s.t.$$

$$G + C_1 + C_2 \leq w_1 h_1 + w_2 h_2 + R \qquad a)$$

$$L_{0i} = L_i + d_i + h_i \quad \forall i = 1,2 \qquad b)$$

$$C_1 = \phi(w_1 h_1 + w_2 h_2 + R) \qquad c)$$

$$C_2 = (1-\phi)(\, w_1 h_1 + w_2 h_2 + R) \; 0 \leq \phi \leq 1 \qquad d)$$

$$\bar{D} = \sum_{1}^{i} d_i \qquad e)$$

where U_i is the utility function of each member $i = 1,2$ which depends on own consumption (C_i), own leisure time (L_i), and a common expenditure made in the household (G). The utility of each member is weighted by a ratio $\lambda, (1 - \lambda)$, indicating bargaining power.

This utility function is subject to five budget constraints where a) the sum of consumption and collective expenditure is less than or equal to the sum of income, such that w_i is the wage, h_i the hours worked, and R is the non-labor income. b) a time constraint, where L_{0i} represents the total time in the day, and d_i is the time destinated for domestic activities.

Finally, constraints c) and d) establish the sharing rule, where the proportion of income that corresponds to each member is $\phi, (1 - \phi)$. Constraint e) indicates a certain amount of domestic work in the household, whose marginal change tends to zero when we include an additional member. Adding members to the household would allow for reorganization of the time to work and household activities.

1.4 Methodology

1.4.1 Database

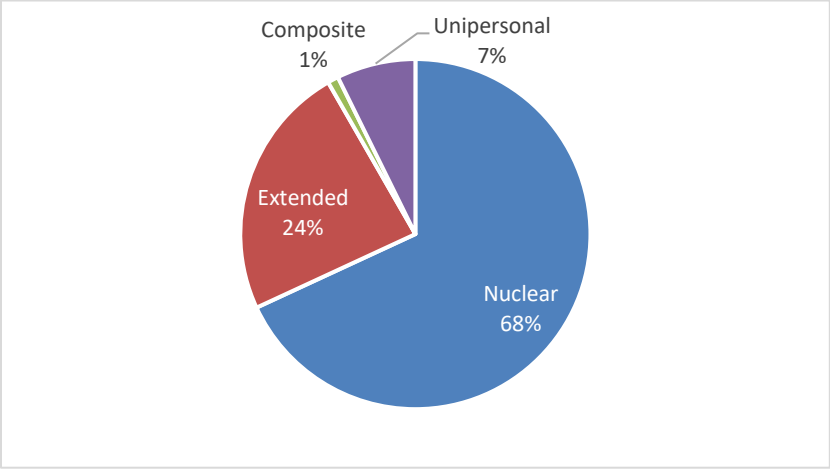
For this chapter, we use the National Occupation and Employment Survey (ENOE) of Mexico reported by INEGI. We worked with the first quarter of 2022 since this period contains information from the extended questionnaire. We use monthly hours to measure the effect of labor supply. Also, we aggregated individuals by household, creating the categories of nuclear, extended, composite, and single-person households.

A nuclear household is one in which one or both parents with children are present, as are couples without children. Extended households are those in which an additional family member of working age joins the nuclear household (for this research, a household is an extended one if any additional family members are older than 15). Composite households are where an unrelated person cohabits with the members of the nuclear household instead of a family member. And finally, single-person households are those with a single economic agent.

1.4.2 Descriptive statistics

Households in Mexico follow a heterogeneous distribution, with nuclear households predominating; extended households are the second largest group, with 23.6%, while compound and single-person households have extremely low percentages (See Figure 1).

Figure 1. Household structure in Mexico



Source: Own elaboration with data from ENOE 2022-I.

To analyze the effect of extended households on labor supply, we focus exclusively on households that include both parents. This consideration is significant as the partner's information is employed as a control variable in our two-stage models. Utilizing this

information helps to address the endogeneity issue associated with the impact that a partner may have on an individual's labor supply decisions.

The target population is 126,678 observations, representing about 31% of the total sample. Table 1 compares mean for men and women in three categories: those who work, those who do not work, and the average by sex.

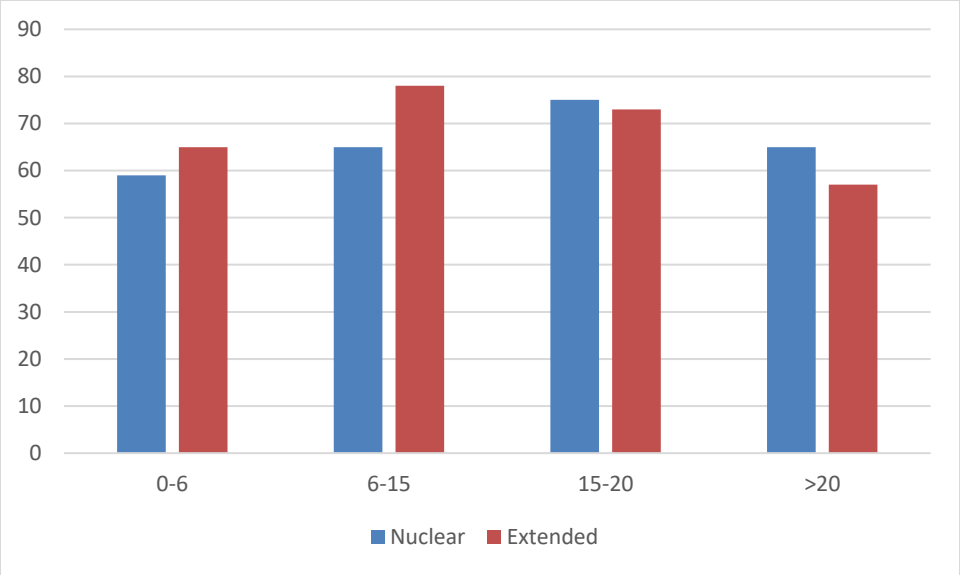
Table 1. Descriptive statistics

Variable	**Women**			**Men**		
	Work	Not-work	Women Average	Work	Not-work	Men Average
Education	13.75	10.92	11.95	12.35	13	12.5
Age	42.18	44.30	43.37	43.95	51.25	45.05
Members	4.1	4.3	4.25	4.3	4.1	4.26
Working hours	150.28	0	65.37	190.04	0	161.48
Number of Children	2.38	2.75	2.59	---	---	---

Source: Own elaboration with data from ENOE 2022-I.

Working women have a higher level of education and fewer children; however, they do not work as much as men on average. The average age of men who do not work is higher than that of women.

Figure 2. Hours worked by age range of eldest child



Source: Own elaboration with data from ENOE 2022-I.

The age of the children is also a determining factor in working women's labor supply. Figure 2 shows that women who belong to an extended household have, on average, a higher labor supply regardless of the age of their children when they are young. In traditional households, younger children harm women's labor supply.

1.4.3 Estimations

We use three models to evaluate the effect of the expanded household; the first is a Probit that measures labor participation, the second is a labor supply model for those already working, and the third is for all individuals, whether working or not.

$$Y_{il}^{*} = \mathbb{X}_{i}\beta + \gamma Extended + \varepsilon_{i}; \qquad l = Men, Women \tag{1}$$

where Y_i^* is a dichotomous variable associated with the decision to work $\{0,1\}$, associated with an unobservable latent variable capturing the decision to work.

Likewise, $\mathbb{x}_i$ represents the independent variables associated with labor participation: education, age, squared age, number of household members; partner's age, schooling years,

and the partner's decision to work, as well as control variables: geographical region and occupation. We added children under six years of age in the household for women and men, and a dummy for salaried. Finally, a dichotomous variable for extended household is defined as *extended* (1=extender, 0 otherwise).

To add the simultaneous decision to work in a household, we use an endogenous Probit model represented as the following system of equations:

$$Y_{iw} = \mathbb{X}_{iw}\beta_w + \gamma_w Extended_{iw} + \phi_w Y_m + \varepsilon_{iw} \quad (3)$$

$$Y_{im} = \mathbb{X}_{im}\beta_m + \gamma_m Extended_{im} + \phi_m Y_{iw} + \varepsilon_{im} \quad (4)$$

- Labor Supply Model

Once we describe the labor participation model, the next step is to observe the effect of an expanded household on those individuals who work through a labor supply model that starts with an Ordinary Least Squares (OLS):

$$H_{il} = \mathbb{Z}_{il}\beta_l + \gamma_l Extended_{il} + \varepsilon_{li}\ ; \qquad l: Men, Women \quad (5)$$

Where H_{il}^{*} represents the hours worked. At this stage, we only consider those individuals who report a positive number of hours. $\mathbb{Z}_{il}$ contains independent variables for the individuals; salary, education, age, square age, number of members; salary and hours worked by the partner; the region, the rural/urban area and the labor informality. As in the previous model, minor children and salaried workers are included for women and men, respectively. Finally, we include a dichotomic extended household variable.

To deal with the endogeneity problem between wages and hours worked, instrumental variables are used to estimate wages by gender, as follows:

$$w_{il} = \mathbb{W}_{il}\beta_l + \upsilon_{il} \quad (6)$$

where $\mathbb{W}$ contains age, age squared, number of members, dichotomous variables for education, and control variables such as region, profession, rural area, and informal activity. With this, the previous equation is re-estimated by substituting wages with the estimated value of $\widehat{w}$.

- General labor supply model

Finally, we extend the labor supply model to examine the effect of the extended household on the hours worked by individuals regardless of their employment status.

When considering those who do not work, the problem of censoring the hours worked arises, so we use a Tobit model to solve it, such that:

$$H_{il}^{*} = \mathbb{Y}_{il}\beta_l + \gamma_l Extended_{il} + \varepsilon_{il} \qquad l: men, women \quad (7)$$

$$H_{il} = \begin{cases} 0, & si\ v_{il}^{*} < 0 \\ H_{il}^{*}, & si\ v_{il}^{*} \geq 0 \end{cases} \quad (8)$$

where $\mathbb{Y}_{il}$ includes the wage, education, age and square age, household members, partner's labor supply and age, children under six, region, rural/urban area and informality.

To account for endogeneity, we estimate the wages (as shown in equation 6) and then substitute the estimated wages into equation 7 to use a Tobit model with instrumental variables. After that, we address selection bias by employing a Heckman model, which accounts for the differences between women who choose to work and those who do not.

1.5 Results

Table 2 presents the results for the labor participation model (probit). Columns (3) and (4) present the results for women. Column (3) illustrates the simple model of labor participation, where a positive effect of belonging to an extended household is observed, amounting to 10.1 percentage points. In column (4), the estimated effect of the partner's participation is included, which causes the effect of belonging to the extended household to decrease; however, it remains positive, reaching 3.77 percentage points. The results also indicate that the inclusion of an additional member discourages labor participation.

On the other hand, equations (1) and (2) pertain to the labor participation of men. Overall, the results indicate that the effect of an extended household has no significant impact on labor participation, whereas having an additional member in the household incentivizes labor participation.

Table 2. Marginal effects of the participation model for men and women

Work	**Probit Men**	**2S Probit Men**	**Probit Women**	**2S Probit Women**
Schooling years	-0.0102*** (-6.41)	-0.00900*** (-5.63)	0.0465*** (22.71)	0.0289*** (13.03)
Age	0.0869*** (17.35)	0.0827*** (15.61)	0.108*** (30.08)	0.0507*** (10.27)
Squared age	-0.00114*** (-21.19)	-0.00109*** (-18.95)	-0.00133*** (-32.64)	-0.000591*** (-9.95)
Household members	0.0169*** (3.71)	0.0132** (2.88)	-0.0474*** (-13.78)	-0.0151*** (-4.06)
Extended household	-0.0252 (-1.26)	-0.0194 (-0.97)	0.101*** (6.79)	0.0377* (2.47)
Partner age	-0.00554*** (-5.07)	-0.00429*** (-3.83)	-0.00382*** (-4.91)	-0.00116*** (-1.44)
Partner education	-0.0100*** (-4.70)	-0.00707*** (-3.30)	0.00170 (1.20)	-0.0110*** (-7.05)

Partner labor participation	0.262*** (18.27)	0.461*** (6.53)	0.261*** (17.90)	2.030*** (19.10)
Children			Yes	No
Salaried	Yes	Yes		
Region (5)	Yes	Yes	Yes	No
Rural	0.238*** (11085)	0.191*** (9.53)	-0.308*** (-21.30)	-0.0620** (-2.35)
Constant	-0.721*** (-6.61)	-0.929*** (-8.24)	-2.173*** (-28.15)	2.050*** (-26.71)
Observations	61,251	61,125	65,004	65,004

T statistic shown in parenthesis
**** p < 0.05, **p < 0.01, *** p < 0.001***

Source: Own elaboration with data from ENOE 2022-I.

Table 3 presents the estimated coefficients for the labor supply model of women, specifically focusing on those who are currently employed (equations (3) and (4)). The results indicate a positive effect of belonging to an extended household across all cases.

The extended household's effect on working women was positive, as it increased labor supply by about 8 hours per month in the early models. When the partner's labor supply is incorporated, the effect decreases to about 3.5 hours but is still positive.

The research also revealed that the presence of children under six years of age continues to have a strong and negative impact on the labor supply of working women, leading to a reduction of around 7 hours of work per month.

Table 3. Results of the work hours model for working women

Working hours	**OLS**	**IV OLS**	**2SLS**
Wage	-7.134*** (0.239)	-16.95*** (1.075)	-20.29*** (1.382)
Schooling years	-1.516*** (0.127)	-1.434*** (0.128)	-0.931*** (0.147)
Age	-0.630* (0.286)	-0.976*** (0.290)	-1.278*** (0.276)
Squared age	0.00502 (0.00331)	0.00624 (0.00335)	0.00871** (0.00305)

Household members	-1.868***	-1.752***	2.454***
	(0.258)	(0.261)	(0.408)
Extended household	7.784***	7.868***	3.670*
	(1.130)	(1.143)	(1.566)
Partner wage	-0.350	-2.701***	-0.227
	(0.230)	(0.214)	(0.400)
Partner working hours	0.115***	0.131***	-0.866***
	(0.00474)	(0.00474)	(0.0861)
Children	-8.735***	-9.497***	-6.775***
	(1.452)	(1.468)	(1.354)
Rural	-5.738***	-7.389***	-19.64***
	(1.204)	(1.227)	(2.018)
Informal	-40.35***	-43.30***	-37.60***
	(0.801)	(0.860)	(1.195)
Constant	203.9***	246.5***	425.5***
	(6.086)	(7.264)	(21.75)

*** p < 0.05, **p < 0.01, *** p < 0.001**

Source: Own elaboration with data from ENOE 2022-I.

We replicated the exercise for men but did not find a significant effect of the extended household on labor supply; however, there was a significant effect for additional members.

Finally, in Table 4, we estimate the work hours model for women, regardless of their employment status. The effects observed across the different models are positive, culminating in an increase of 8.58 additional hours of work for those belonging to an extended household (column (4)). This indicates that women who are already employed tend to increase their labor supply, while those who are not currently working are incentivized to enter the labor market.

Table 4. Results of the labor supply model for women

Working hours	**OLS**	**Tobit**	**Tobit IV**	**Tobit IV SS**
Wage	25.31***	50.40***	46.42***	71.34***
	(0.170)	(0.367)	(0.296)	(1.109)
Schooling years	1.642***	4.258***	0.279**	0.308**
	(0.0937)	(0.185)	(0.0938)	(0.115)
Age	2.809***	9.052***	1.019***	4.891***
	(0.181)	(0.423)	(0.179)	(0.202)

Squared age	-0.0355***	-0.113***	-0.00984***	-0.0666***
	(0.00205)	(0.00485)	(0.00204)	(0.00229)
Household members	-2.172***	-5.018***	-2.097***	-2.961***
	(0.174)	(0.397)	(0.171)	(0.195)
Extended household	**5.945*** **	**11.46*** **	**6.452*** **	**8.584*** **
	(0.769)	**(1.724)**	**(0.758)**	**(0.863)**
Partner age	-5.17***	-14.22***	-1.479***	-1.367***
	(0.154)	(0.347)	(0.148)	(0.169)
Partner working hours	0.112***	0.231***	0.0893***	0.0916***
	(0.00321)	(0.00713)	(0.00316)	(0.00360)
Children	-6.771***	-11.91***	-7.785***	-9.152***
	(1.022)	(2.263)	(1.007)	(1.148)
Rural	-12.12	-34.64***	-5.622***	-13.08***
	(0.727)	(1.758)	(0.721)	(0.823)
Informal	39.60***	101.8***	15.84***	68.26***
	(0.679)	(1.336)	(0.739)	(0.724)
Constant	-24.92***	-263.0***	-19.93***	-402.6***
	(3.852)	(-9.031)	(3.798)	(6.986)

*** p < 0.05, **p < 0.01, *** p < 0.001**

Source: Own elaboration with data from ENOE 2022-I.

We replicated the exercise for men but did not find statistical evidence that belonging to an extended household affects their labor supply. However, an additional member had a positive effect on time worked.

1.6 Conclusions

The effect of an expanded household increases the participation of women and decreases, although to a lesser extent, that of men. Concerning labor supply, it increases by approximately 8 hours per month for women, and there is no evidence of a statistically significant effect for men.

These results are consistent with the findings of Donni, (2007), since men's labor supply presents greater rigidities, and (Gong & van Soest, 2002), since, in the case of Mexico, the extended household structure encourages women's participation in the labor market.

This is related to the conventional assignment of gender roles since, on average, men work independently of the family structure. However, having an additional member does increase women's participation, which may be associated with the reallocation of domestic work and child-rearing activities.

These results have severe implications for the intrinsic value of support networks and the gender roles stereotypes as one of the main obstacles to women's full incorporation into the labor market. This is why it is imperative to promote public policy to support parenting and childcare and the flexibilization of working hours to make it easier for women in Mexico to participate in the labor market, specially, in the support of a care system for kids.

However, the extensive diversity in the construction of households in Mexico leaves the door open for future research that focuses on other types of structures and how they relate to the allocation of households and the labor supply of their members.

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Chapter 2. Education and diversity: an analysis of schooling years in the LGBTQI+ community

2.1 Introduction

Within the framework of inclusion and non-discrimination of people belonging to the Lesbian, Gay, Bisexual, Transexual, Queer, Intersexual (LGBTQI+) community, multiple efforts have been made to guarantee egalitarian scenarios within different spheres, one of them being education. One of the main objectives focuses on promoting education indistinctly and independently of Sexual Orientation or Gender Identity (SOGI) in the case of being non-conventional or non-normative[1].

In the last years, Mexico's Ministry of Public Education (SEP) has been working in the creating of safety places for the community and through educative material, including topics about diversity and inclusion (SEP, 2025)

According to ENDISEG (2021), 1 out of every 20 people in Mexico identify themselves as part of the LGBTI+ community, and about 20.3% of them have reported suffering problems at school, compared to those who do not belong to the community, who report only 8%.

Being a victim of school violence is strongly related to dropout, so education levels could be affected (Stargell et al., 2020). Since the LGBTI+ community is one of the groups most vulnerable to this problem (Gocmen & Yilmaz, 2017), they could have lower levels of

[1] According to INEGI's specification in the presentation of ENDISEG results, "The term "non-normative" is used by the Inter-American Commission on Human Rights (IACHR) to refer to trans and non-heterosexual identities that defy traditional masculine or feminine gender roles and norms (IACHR, Report on Violence against Lesbian, Gay, Bisexual, Trans and Intersex Persons in the Americas). The connotation of "non-normative" or "non-conventional" derives from understanding its antonym, i.e., the "normative," which refers to that which is set by the norm, or the conventional, which abides by the widely observed norms. (definition rae, at: https://dle.rae.es/convencional)".

education. This points out the immediate need to reinforce the inclusion policy to ensure opportunities and access to education for all.

A straightforward question guides this study: Does belonging to the SOGI group pose a risk to educational attainment? We hypothesize that it does, and we aim to identify any disparities in school attainment, particularly the likelihood of obtaining an additional year of schooling. To achieve this, we employ a Cox-type duration model on the ENDISEG. Our findings reveal that individuals with a non-conventional SOGI are more likely to achieve an extra year of education than their conventional counterparts.

The paper is organized as follows: first, we discuss the background, then we conduct a literature review to explore the developments on the subject. Next, we present a theoretical framework. Subsequently, we provide data, descriptive statistics, and the econometric model. Lastly, we conclude the article by presenting the results, having a discussion, and drawing a conclusion that highlights the findings and their alignment with existing literature.

2.2 Background

Although the visibility of the LGBTQI+ community in Mexico could be considered a recent phenomenon, the reality is that this movement dates to the 1970s. In 1979, the first gay pride march in Mexico took place. The movement already included transgender people in its ranks, this being the most vulnerable group and with more reprisals from the authorities (Secretaría de Cultura, 2019).

The movement was gaining strength in Mexico, going through obstacles such as the first HIV/AIDS pandemic. The pandemic separated the gay and lesbian movement. Later both groups joined together to form the LGBTQI+ community. This group promoted public

policies and human rights management, legally formalizing the groups and the activism carried out. (Martínez, 2020; Diez, 2011).

In December 2009, Mexico and some other countries achieved the marriage equality milestone, which began with objectives beyond non-discrimination (Quintana, 2017). In January 2017, some states in the republic published a jurisprudence allowing same-sex couples to adopt, which later extended to all states (SCJN, 2021). Similarly, with the inclusion of the transgender community, the Gender Identity Law was approved in 20 states, which aims to recognize and protect their identity (García, 2023).

However, the demographic evolution of the LGBTQI+ community has not been adequately documented. In Mexico, ENDISEG 2021 is the first survey to collect this information. For this reason, there is only relevant data, which indicates that 5.1% of Mexicans belong to the LGBTQI+ community. Of this subgroup, 81.8% have a non-conventional sexual orientation, 7.6% gender identity and 10.6% both.

Additionally, of this population group, 51.7% declare themselves bisexual, 26.5% gay/homosexual, 10.6% lesbian, and 11.2% other; even within the LGBTQI+ community, there are subgroups that face different challenges. Although the historical background briefly portrayed the importance of analyzing whether, in the current scenario, integration within the educational environment continues to represent a challenge or not (ENDISEG, 2021).

2.3 Literature Review

Members of the LGBTQI+ community have been a historically vulnerable group. This situation has impacted different aspects, among them discrimination (Dessel et al., 2017), violence and emotional health (Seelman et al., 2016; Hajo et al., 2024), employment

opportunities (Di Marco et al., 2021; Anastas, 1998), wage gaps (Curley, 2017), access to civil rights (Chaney, 2023), and educational attainment (Gocmen & Yilmaz, 2017).

Concerning educational attainment, abundant research have been done, especially for developed countries, such as the United States and Canada (Seelman et al., 2016), Japan (Clasen & Conrad, 2024), Spain (Ojeda et al., 2023), Italy (Botti & D'Ippoliti, 2014), Australia (Stargell et al., 2020) and United Kingdom (la Roi & Mandemakers, 2018). In all cases, a negative effect of non-conventional sexual orientation on schooling prevails. The main argument is the lack of inclusion and discrimination.

The literature for the case of developing countries is scarce. For the case of Chile (Nettuno, 2024), Turkey (Gocmen & Yilmaz, 2017), and an aggregate for countries in Latin America (Barrientos & Lovera, 2020), the result coincides with the negative impact that SOGI has on education, mainly due to discrimination they suffer and the lack of inclusive policies. However, the effect in developed countries is smaller than in developing countries (Lee & Ostergard, 2017)

The literature on Mexico is very insufficient and has been limited to the application of questionnaires (Baruch-Dominguez et al., 2016) and the statistical analysis of national surveys on discrimination and violence (Valderrábano et al., 2021). Such literature broadly identifies a negative relationship between unconventional SOGI and education.

For both, developed and developing countries, the main reasons for the negative effect of non-conventional sexual orientation on educational outcomes are bullying (Valderrábano et al., 2021; Herry & Mulvey, 2024), discrimination within the school by students, teachers, and administrative staff (Stargell et al., 2020; Baruch-Dominguez et al., 2016), labor market

expectations of discrimination (Shannon, 2022) and the social perception (Lee & Ostergard, 2017).

This effect may also be affected by factor characteristic, such as social environment (Baruch-Dominguez et al., 2016), family environment (la Roi & Mandemakers, 2018), and socioeconomic conditions (Shannon, 2022).

This effect has diminished over time, mainly a consequence of changing social norms (Clasen & Conrad, 2024) and reforms and programs supporting LGBTQI+ inclusion (Phillippi et al., 2020).

Other authors find it important to disaggregate within the LGBTQI+ group, dividing by sex assigned at birth, by sexual orientation, or by gender identity exclusively (Carpenter et al., 2022; Shannon, 2022; Tampellini, 2024; Robinson, 1994). The purpose of this group segmentation is to identify each group's peculiarities.

Due to limited data availability, much of the work has focused on using questionnaires or designing case studies based on observation and descriptive statistics, and a rigorous methodology is needed (Renn, 2010). This work employs a Cox-type duration model since this method allows one to estimate the survival rates for educational achievement of each group and the relative risk they face according to their sexual orientation or gender identity.

Thanks to the information provided by ENDISEG 2021, this paper is one of the first to make quantitative inroads into the effect of sexual orientation and gender identity on schooling in Mexico.

2.4 Theoretical Framework

According to Becker's theory of human capital (1994), individuals seek to promote their human capital through tools such as education, experience, among others, such that:

$$H_t = \psi(x_{t-1}, s_{t-1}, E_t), \qquad \psi_j > 0, \qquad j = x, s, E$$

Where H_t is the individual's human capital in period t. x_{t-1} Represents the parental investments for the individual's development. s_{t-1} is the public investment and E_t is the initial endowments inherited from parents.

It is crucial to note that discrimination against the LGBTQI+ community can significantly impact academic achievement. This discrimination often manifests in the form of bullying and unfriendly environments, which can hinder personal development and make it difficult for LGBTQI+ students to integrate with their peers (Kosciw, et al, 2012). Additionally, the lack of support from both educators and peers can result in unequal opportunities, which impacts the decision to continue facing this problem or, instead, resort to dropping out of school (Craig & Richeson, 2014).

Following Becker (1994), economic agents usually make rational decisions, where they compare the cost of investment and the future return to make the optimal allocation of education and training, such that:

$$\sum_{t=0}^{n-1} \frac{R_t}{(1+i)^{t+1}} = \sum_{t=0}^{n-1} \frac{C_t}{(1+i)^{t-1}}$$

The left side represents the return R_t over time (t), and the right side represents the costs (C_t). i is defined as an intertemporal discount rate.

If this is applied in the context of LGBTQI+ education, two elements must be added; the expected return on investment $(E[R_t])$, and the cost associated with discrimination (ϕ_t).

$$\sum_{t=0}^{n-1} \frac{E[R_t]}{(1+i)^{t+1}} = \sum_{t=0}^{n-1} \frac{C_t + \phi_t}{(1+i)^{t-1}}$$

The expected value of the return may be lower due to potential market discrimination. In the costs, element ϕ_t comprises this cost associated with the bullying and discrimination received by individuals with an unconventional SOGI.

The cost of discrimination can manifest in two ways in education allocations. On one hand, it can act as a deterrent, discouraging investment in education. On the other hand, it can serve as a catalyst, stimulating investment in education to counterbalance the perceived market discrimination. This dual nature of the cost underscores the complexity of the issue. Gutiérrez & Rubli (2024) mentioned that the labor discrimination expectancy does not affect only the investment in education but also the career decision.

2.5 Methodology

2.5.1 Data description

This article uses the National Survey on Gender and Sexual Diversity of Mexico (ENDISEG) 2021. The ENDISEG 2021 was carried out by the Mexican Institute of Statistics and Geography (INEGI)and inquiries into several sociodemographic characteristics and other aspects related to people's daily lives and situations, including their sexual orientation and gender identity.

The analysis is centered on youth and adults over 18, resulting in a robust sample size of 142,619 final observations. Notably, about 5% of the population in this sample have a non-

conventional SOGI. This key statistic reveals that approximately 1 in 20 Mexicans are part of the LGBTQI+ community, highlighting the significance of this research.

The study incorporates several key variables. Education, measured in years of schooling, is the dependent variable. The independent variables are sex assigned at birth, age and age squared, number of members in the household of origin, skin tone (measured as dichotomic variable for each skin tone according to INEGI's skin tone classification), and SOGI (conventional or non-conventional). These variables were chosen to provide a comprehensive understanding of the sociodemographic characteristics of the LGBTQI+ community in Mexico.

However, individuals' willingness to disclose their sexual orientation or gender identity is strongly related to income and some other characteristics. Living in an urban area, being older and less educated, having a higher income, and having a stable partner increase the willingness to declare an unconventional SOGI (Liu et al., 2023). On the other hand, wage gaps (Curley, 2017), skin tone (Whitfield et al., 2014), and religion (Wilkinson, 2022) are variables that discourage disclosure.

Therefore, there is a problem in the choice of declaring the sexual orientation or gender identity of the individuals, so we instrument this variable. For this purpose, in addition to the previously mentioned variables, some income indicators are considered, measured through whether they receive any scholarship or government support, whether they receive remittances, whether they have internet, car and entertainment platforms, number of bedrooms, and additionally, marital status, kinship concerning the head of household and

whether they consider themselves religious or not. As the database shows very little socioeconomic variables, this is the closest instrument we could find.

2.5.2 Descriptive statistics

To study how the data behaves to describe the nature of the situation. It's necessary to consider the distribution of certain socioeconomic characteristics among both conventional and non-conventional SOGI groups.

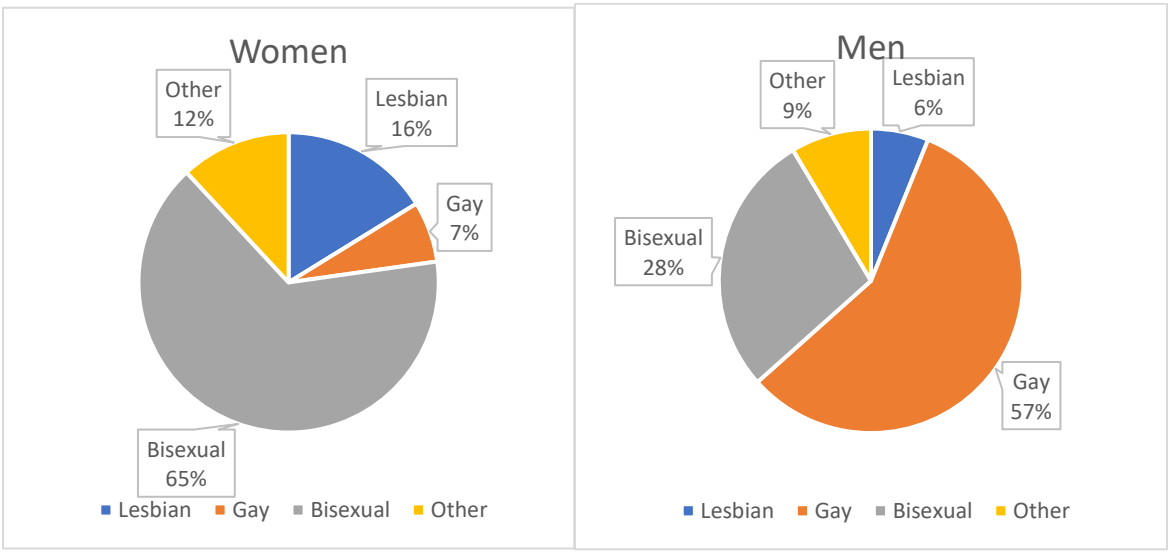
Table 1. Sex and Sexual Orientation and Gender Identity

Sex/SOGI	Conventional	Non-Conventional
Men	42.49%	2.06%
Women	52.79%	4.72%

Source: Own elaboration with data from ENDISEG 2021.

According to Table 1, women are more than two times more likely to report having a unconventional SOGI than men.

Figure 1. Distribution of sexual orientation



Source: Own elaboration with data from ENDISEG 2021.

Figure 1 includes the SOGI distribution just for non-conventional groups. It shows that men mostly report being gay while women report being bisexual. In second place for men is bisexuality and for women is being lesbian. The category of "others," which includes pansexuality and asexuality, occupied the fourth place.

Table 2. Age and education by SOGI

Variable/ Group	Conventional Women	LGBTI+ Women	Conventional Men	LGBTI+ Men
Observations	75,285	3,803	60,600	2,931
Age	42.47	28.53	42.35	33.06
Education	9.65	11.37	9.94	11.32

Source: Own elaboration with data from ENDISEG 2021.

Table 2 shows that men and women with conventional SOGI, the average age is 42 years old. In the case of education, the non-conventional groups report an average level of education of 11.3 years, while the non-conventional groups report that it is between 9.5 and 10 years.

2.5.3 Econometric model

We use a Cox's duration model to analyze the effect of unconventional SOGI on education achievement for individuals aged 18 to 65 in Mexico. The advantage of using a duration model is that it allows us to calculate each group's probability of achieving a certain level of schooling (proportional survival) and to know the conditional probability of attending an additional year of schooling, but, as a first step, we estimate Ordinary Least Squares (OLS) models to know the direct effect of a non-conventional SOGI on education.

Due to the structure of our data, which includes individuals still studying, it is recommended to start the analysis with a general model, as a benchmark, as follows

$$h(t, X_1, \dots, X_n) = h_0(t)e^{(\sum_{i=1}^{n} \beta_i X_i)}$$

where $h(t)$ is the instantaneous risk function over time, $h_0(t)$ is the base risk, which represents the risk rate when the variables (X) have zero value, and β_i are the coefficients associated with these variables, which explain how each of them affects the relative risk at time t.

This is why it is essential to perform theoretical validation on the true impact of belonging to the LGBTI+ community on investment in human capital, such that:

$$Scholar\ Years_i = \beta \mathbb{X}_i + \delta SOGI + u_i$$

where $\mathbb{X}$ represents a series of control variables including gender, age, age squared, household members, religion, access to internet and entertainment platforms, owning a car, being single, receiving remittances and dummy variables for skin tone[2] as income controls.

To estimate the predicted probability of having unconventional SOGI we use a probit model as follows:

$$Y^* = \beta_o + \mathbb{X}\beta + u_i$$

where Y is a dummy variable that takes the value of 1 if the individual has an unconventional SOGI, 0 otherwise. β_o represents the intercept. $\mathbb{X}$ is a vector of the independent variables that influence the probability of reveling unconventional SOGI, such as sex, age, age squared, household members, religion, internet access and entertainment platforms, owning a car, being single and receiving remittances.

$$P(Y = 1|\mathbb{X}) = \Phi(\beta_0 + \mathbb{X}\beta)$$

[2] According to the Skin Tone A-K from INEGI

The predicted values of this Probit regression are used to construct a predicted SOGI variable ($\widehat{SOGI_i}$), which takes the value of 1 if the predicted probability of the individual i is larger than the average predicted probability, and 0 otherwise (See Appendix 1).

2.6 Results

First, we estimate Ordinary Least Squares (OLS) to identify the overall effect of having an unconventional SOGI on the number of years education achieved. Table 3 compares two specifications, the left column specification considers the observed SOGI variable, while the right column specification replaces it with the instrumented SOGI variable from the probit regression.

The effect of having an unconventional SOGI on school achievement is positive and significant. Results indicate that people with an unconventional SOGI achieve, on average, between half and one more year of schooling[3]. The signs of the estimated coefficients for the rest of the variables are consistent with the literature.

Table 3. Results for OLS

Variable	OLS SOGI	OLS $\widehat{SOGI}$
Age	0.0871***	0.172***
	(24.23)	(37.05)
Age²	-0.00178***	-0.00246***
	(-46.62)	(-54.89)
SOGI	**0.565*** **	**1.134*** **
	(11.10)	**(30.01)**
Men	0.418***	0.436***
	(19.31)	(20.19)
Scholarship	-1.277***	-1.244***
	(-32.72)	(-31.95)
Household Members	-0.227***	-0.222***
	(-58.31)	(-57.30)
Skin Tone B	-0.224***	-0.219***
	(-57.74)	(-56.73)

[3] We analyzed the results by sex and age groups but found no significant differences.

Skin Tone C	0.548***	0.544***
	(67.50)	(67.11)
Skin Tone D	0.206	0.240
	(1.00)	(1.17)
Skin Tone E	0.548***	0.544***
	(67.50)	(67.11)
Skin Tone F	0.221	0.328
	(1.22)	(1.82)
Skin Tone G	0.548***	0.544***
	(67.50)	(67.11)
Skin Tone H	0.385**	0.402**
	(2.70)	(2.83)
Skin Tone I	0.548***	0.544***
	(67.50)	(67.11)
Skin Tone J	0.987***	1.179***
	(7.04)	(8.42)
Skin Tone K	0.548***	0.544***
	(67.50)	(67.11)
Constant	1.265***	1.320***
	(9.22)	(9.64)
Observations	141,882	141,882

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

Source: Own elaboration with data from ENDISEG 2021.

To estimate the marginal probability of achieving an additional year of schooling, we use Cox's Duration model. As in the previous table, the columns I to IV includes the observed SOGI, while the right column replaces it with the instrumented SOGI variable (we try to explain the decision to revel their sexual orientation or gender identity. Results indicate that individuals with a non-conventional SOGI have a lower hazard ratio than in their counterparts. This group presents a 13.5% less risk of interruption in their studies. The similarity on the estimated coefficients for both specifications indicates that the effect of some people not revealing their unconventional SOGI does not bias the results, and hence, the results for the original variable are considered from this point on (see Table 4).

Table 4. Cox for SOGI

Variable	**(I)**	**(II)**	**(III)**	**COX**	**COX $\widehat{\text{SOGI}}$**
Age	1.007***	1.000	1.014***	1.007***	0.992***
	(7.11)	(0.03)	(14.21)	(7.19)	(-6.52)

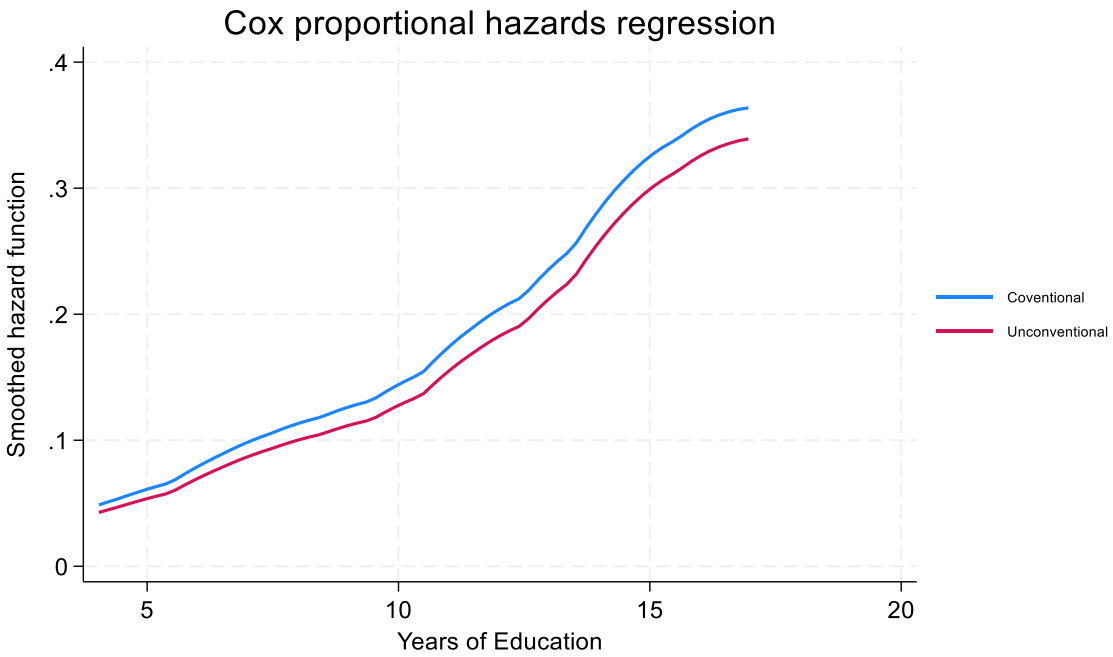
Age²	1.000***	1.000***	1.000	1.000***	1.000***
	(5.81)	(15.38)	(1.72)	(5.75)	(15.07)
SOGI	0.865***	0.865***	0.865***	0.864***	0.815***
	(-10.45)	(-10.46)	(-10.46)	(-10.53)	(-20.79)
Men	0.899***	0.896***	0.893***	0.901***	0.898***
	(-18.67)	(-19.30)	(-19.81)	(-18.22)	(-18.77)
Scholarship	1.327***		1.327***	1.322***	1.316***
	(27.08)		(27.03)	(26.69)	(26.30)
Household members	1.046***	1.046***		1.046***	1.046***
	(46.33)	(46.40)		(46.21)	(45.73)
Skine Tone B	1.132*	1.100	1.165**	1.119*	1.090
	(2.22)	(1.71)	(2.72)	(2.00)	(1.54)
Skin Tone C	1.117*	1.111*	1.146**	1.117*	1.066
	(2.22)	(2.10)	(2.73)	(2.21)	(1.28)
Skin Tone D	1.062	1.049	1.087*	1.059	1.036
	(1.48)	(1.18)	(2.05)	(1.42)	(0.86)
Skin Tone E	0.930	0.916*	0.946	0.928	0.879**
	(-1.81)	(-2.20)	(-1.39)	(-1.86)	(-3.21)
Skin Tone F	0.877***	0.866***	0.897**	0.875***	0.849***
	(-3.33)	(-3.67)	(-2.78)	(-3.39)	(-4.16)
Skin Tone G	0.745***	0.733***	0.754***	0.744***	0.715***
	(-7.50)	(-7.93)	(-7.21)	(-7.55)	(-8.54)
Skin Tone H	0.651***	0.640***	0.656***	0.650***	0.628***
	(-10.92)	(-11.37)	(-10.74)	(-10.95)	(-11.81)
Skin Tone I	0.637***	0.624***	0.637***	0.637***	0.613***
	(-10.31)	(-10.78)	(-10.31)	(-10.32)	(-11.19)
Skin Tone J	0.604***	0.590***	0.605***	0.604***	0.579***
	(-10.33)	(-10.82)	(-10.29)	(-10.34)	(-11.18)
Skin Tone K	0.567***	0.554***	0.557***	0.568***	0.581***
	(-8.62)	(-8.97)	(-8.89)	(-8.60)	(-8.25)
Remittance		1.185***	1.180***	1.174***	1.194***
		(13.67)	(13.29)	(12.88)	(14.20)
N	136945	136945	136945	136945	136945

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

Source: Own elaboration with data from ENDISEG 2021.

Differences in the probability of surviving one more tear at school between both groups can be seen in Figure 2, where the survival function adjusts for each year of schooling but maintains a higher probability of survival for the group with unconventional SOGI. These results suggest that the likelihood of pursuing further education increases annually and remains consistent at important milestones, such as transitioning between educational levels.

Figure 2. Survival function



Source: Own elaboration with data from ENDISEG 2021.

Table 5 shows the hazard function values for each of the years of education by group, as well as the confidence intervals. This allows us to observe that the difference is significantly sustained at all educational levels but that the gap is smaller at the beginning and during the last years.

Table 5. Survivor function and confidence interval

Year	**Survival Function**	
	Conventional	Non-Conventional
1	98.51	99.94
2	96.35	99.19
3	93.04	97.99
4	91.44	97.45
5	89.86	96.74
6	76.98	89.93
7	75.89	89.27
8	73.76	87.37
9	47.11	63.86
10	45.09	61.38
11	42.13	58.42

12	25.31	37.05
13	24.30	35.81
14	22.75	34.53
15	18.63	29.99
16	10.36	15.70
17	2.94	4.51
18	2.74	4.16
19	0.81	1.21
20	0.001	0.008

Source: Own elaboration with data from ENDISEG 2021.

These results allow us to observe the probabilities that students face to continue their studies based on their SOGI. The difference between both columns is statistically significant according to the long rank test (see Appendix).

2.7 Analysis and discussion

Although the issue of LGBTI+ inclusion has recently gained momentum, a theoretical precedent has already been established based on multiple qualitative studies, which allows us to contrast the preliminary results with the results obtained.

One of the most significant differences is that students with a non-conventional SOGI were found to have a higher school survival rate than conventional ones, contrary to the findings of Salas Guzmán & Salas Guzmán, (2016); Botti & D'Ippoliti, (2014); y Barrientos & Lovera, (2020), who posited that the effect on educational achievement tends to be negative.

Notably, authors Carpenter, (2009) and Waite et al., (2020), concur that the circumstances of LGBTI+ students, coupled with their perception of the labor market's obstacles, lead them to prioritize their education. This shared perspective, along with the intensive work on inclusion issues, could potentially explain why the non-conventional SOGI group reported better survival rates over the years than the conventional group.

2.8 Conclusions

Literature across multiple social studies has examined how LGBTI+ students have fared in the academic landscape and how this environment has influenced their decisions, grades, and other aspects related to their education. However, because of the limitations inherent in the information available, more needs to be examined quantitatively.

This article allows us to explore the real impact that having a non-conventional sexual identity or gender orientation has on the education of young people in Mexico. Through a Cox-type survival model, we found the probabilities of continuing to study over the years for individuals who reported having a conventional and a non-conventional SOGI.

The main results showed that even though both men and women from the LGBTI+ community are considered a vulnerable group, their risk of dropping out of school is considerably lower than that of conventional groups. This is not only a reflection of the community's struggle but also the fact that, over time, the risk reasons they face have decreased.

Additionally, this is related to the different challenges faced by the LGBTI+ community in social terms throughout this stage, but mainly to the fact that the perceived return to schooling expectations is higher despite the costs associated with the discrimination they may suffer during the years of education.

However, there are still many limitations concerning the information available to cover not only the educational issue but also other challenges faced by individuals with a non-conventional SOGI, mainly related to income issues or labor expectations, and especially in identifying whether the market effectively rewards the human capital they accumulate through education even though theory indicates that this has higher associated costs, We

expect to explore this further and continue working on inclusion as a public agenda item, creating safe spaces with equal opportunities for all Mexicans.

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Appendix 1

Figure A1 shows the results of the Probit model from which the variable $\widehat{SOGI}$ is estimated.

Figure A1. Probit estimation first stage

Variable	Coefficient
Religion	-0.194***
	(-12.15)
Internet	-0.0403*
	(2.55)
Platform Access	0.045**
	(2.82)
Age	-0.0444***
	(-19.41)
Age^2	0.000238***
	(8.94)
Men	-0.0151
	(-1.21)
Single	0.255***
	(19.28)
Household members	-0.0144***
	(-4.68)
Car	-0.237
	(-1.75)
Laptop	0.0217
	(1.42)
Scholarship	0.0191
	(0.80)
Remittance	0.0809**
	(3.06)
Skin Tone B	-0.116
	(-0.95)
Skin Tone C	-0.187
	(-1.68)
Skin Tone D	-0.0564
	(-0.66)
Skin Tone E	-0.284***
	(-3.35)
Skin Tone F	-0.114
	(-1.38)
Skin Tone G	-0.185*
	(-2.25)
Skin Tone H	-0.156
	(-1.89)
Skin Tone I	-0.234*
	(-2.49)
Skin Tone J	-0.259*
	(-2.43)

Skin Tone K	0.230 (1.82)
Constant	-0.175 (-1.82)
Observations	142,619

***t* statistics in parentheses*** ***p* < 0.05,** ** ***p* < 0.01,** *** ***p* < 0.001**

Source: Own elaboration with data from ENDISEG 2021.

Table A2. Log-Rank Test

SOGI	Observed Events	Expected Events
Conventional	123,386	121,608.75
Non-Conventional	5,555	7,332.25
Total	128,941	128,941
	Pr>Chi2	0.000

Source: Own elaboration with data from ENDISEG 2021.

Chapter 3. Do Mexican migrant women work more when they migrate to the United States?

3.1 Introduction

Women's labor participation in Mexico has undergone significant changes in recent years. These changes range from the increase in female participation to the economic boost provided by the increase in the labor force. This increase has been a key factor in Mexico´s economic growth (IMCO, sf). Several factors hinder women's insertion in the Mexican labor market. These factors may be social, labor discrimination, gender gaps, and access to opportunities (OCDE, 2021).

According to the Mexican Institute of Statistics (INEGI, 2024), female participation in Mexico reached 46.7% by 2024. Around 5.2% of women work without being paid, and 43.5% receive up to a minimum wage as income. Additionally, 55.4% of women work in the informal sector, and the gender wage gap in 2024 was around 20% in favor of men.

In the United States, female labor participation is much higher, reaching 57.4% by 2024. Labor participation among Mexican immigrant women is 52.4 in 2021 (American Immigration Council, nd). The gender wage gap in the U.S. is also around 20%, although it is 13% for Hispanic women (US Labor Department, 2025). These numbers highlight that Mexican women who migrate to the United States face a smaller gender wage gap than in their country of origin.

These differences, coupled with the lack of opportunities, have been one of the main factors driving Mexican women to leave their places of origin, migrating within the country or abroad, to the United States.

According to the Mexican Survey of Demographic Dynamics 2023 (ENADID-2023), 87.9% of international migrants were to the United States. 40.6% of them lacked legal documentation to enter the U.S. The main reasons to migrate were to look for work or change jobs (82.4%) and to reunite with family (5.8%). 33% of international migrants were women. Also, according to the ENADID-2023, 18.2% of all Mexicans live in a state other than where they were born, and 3.3% migrated during the last 5 years. The main reasons for internal migration were reuniting with family (37.7%) and change of work or job offer (13.9). In Mexico, the states with the highest positive net flow of migrants are Quintana Roo, Baja California Sur, and Querétaro. People between 18 and 29 years old migrate the most, representing 47% of the total flow.

Given the differences in the labor markets conditions between Mexico and the United States, do Mexican women in the United States work more than Mexican women in Mexico? To answer this question, it is necessary to correct for a severe problem of self-selection. Mexican immigrant women in the United States may not be necessarily comparable with Mexican women who stay in Mexico. To try to control this problem, we employ a Heckman self-selection correction model (for the decision to migrate). However, the lack of appropriate instruments can pose a significant challenge. As an alternative, we use internal migrants as a comparison group as a strategy to minimize bias.

The main objective of this paper is to identify whether differences in the labor market (especially wages) are a factor in determining the amount of work Mexican women offer. We combine the American Community Survey (ACS) of 2023 and the Mexican Survey of Occupation and Employment (ENOE) for the first quarter of 2023 to confirm the existence of the effect.

The article is organized as follows: Section 2 presents the literature review. Section 3 includes the theoretical framework. Section 4 describes the data, descriptive statistics, and the model. Section 5 shows and discusses the results. Finally, limitations and conclusions are presented in section 6.

3.2 Literature Review

Researchers have exhaustively studied women's labor supply due to the multiple factors that influence how much time women dedicate to work and household activities. These factors include education (Bardhan et al., 2013), age (Bellou & Cardia, 2021), marital status (Aughinbaugh, 2010), household composition (Deseran et al., 2019), and opportunity costs (Basbug & Fernandez, 2024). Opportunity costs fluctuate based on wage (Bracha), market evolution (Olivetti & Petrongolo, 2016), gender roles (Castellano & Rocca, 2014), and social dynamics (Elson, 2023), which in turn affects the reservation wage. Additionally, women's reservation wage varies depending on their place of residence, both within their country of origin and abroad (Sanderson & Kentor, 2020; Aguayo-Téllez et al., 2010). Historically, increased schooling and changes in family structure have driven shifts in women's labor participation (Orraca Romano, 2024). Many women have found opportunities in self-employment, while men more commonly turn to informal work (Heckl, 2024). This shift has also influenced migration patterns (Conover et al., 2021).

The situation for women in Mexico reflects a significant migratory flow that allows them to engage in various labor markets with distinct characteristics (Orraca Romano, 2024). Mexican women in the USA show higher labor participation rates than those in Mexico (King, 2006), and the wage differences are notable. However, these women encounter challenges in achieving this participation, including legal hurdles (Massey et al., 2016),

varying market structures, social roles, and acculturation difficulties (Foner, 2014) (Grzywacz et al., 2009; Whitfield et al., 2021). Mexican women in the United States work in domestic and care roles, low-paying positions, or seasonal agricultural jobs (Camou et al., 2017). Another aspect of migration to the U.S. is the health paradox, where Mexican women often report better health than their counterparts in the U.S. upon arrival (Hennessy-Burt et al.). Nonetheless, their health levels decline over time as they adjust to the new culture (Horevitz & Organista, 2013; Waldstein, 2008). The most significant difference lies in wages, which are higher in the U.S. This wage disparity can lead to two effects: first, it can reduce the labor supply, a phenomenon illustrated by the backward-bending labor supply curve (Grossbard-Shechtman, 1984), where earning a higher income enables individuals to work fewer hours while still achieving the same wage.

Higher salaries incentivize women to enter the labor market and increase their working hours, as the opportunity cost of leisure time rises with the salary (Doerrenberg et al., 2023). Therefore, it is essential to analyze how the differences between national and international labor markets positively or negatively affect the labor supply of Mexican women who have migrated within or outside the country.

3.3 Theoretical Frame

Differences in the labor supply react to different incentives. This relation can be observed in the labor supply model, where individuals seek to maximize their utility (U) as a function of their consumption (C) and the time devoted to leisure (L), such that:

$$U = f(C, L)$$

Economic agents face a strong constraint as follows:

$$C = wh + V$$

Where w is the income, h is the time spent working and V is the non-labor income. Likewise, their labor supply responds to the time constraint of the day (24 hours.) defined by T, so we have the following equation:

$$C = w(T - L) + V$$

Therefore, consumption depends entirely on the potential income, as shown in the following equation:

$$C = (wT + V) - wL$$

Considering this, wage changes can affect the labor supply differently, either increasing or decreasing it due to the backward-bending effect (Grossbard-Shechtman, 1984). It is going to depend on the signs of the wage in the function for each group.

This model is suitable for explaining how the income effect or substitution effect derives from changes in income that women may experience when they decide to migrate to a different labor market.

3.4 Methodology

3.4.1 Data

We used two databases for the analysis: one for Mexico and one for the United States. For Mexico, we used the National Occupation and Employment Survey (ENOE) for the first quarter of 2023, and for the United States, we used the American Community Survey 2023. We combined both databases and kept hours worked, years of schooling, age, marital status, household size, and hourly income.

We construct three groups of interest for comparison. With the ACS we created one group: Mexican-born Mexican women currently living in the United States (international migrants). With the ENOE we generated two more groups: Mexican women living in Mexico in general, and Mexican women who live in a Mexican state other than the one in which they were born (internal migrants).

3.4.2 Descriptive Statistics

The pooled database contains 99,614 observations: 21,734 are women who live in the United States (international migrants) and 77,880 are women who live in Mexico. Of the women who live in Mexico, 63,139 are internal migrants and 14,741 live in the same state where they were born. Table 1 shows the averages of the observable variables for each of the interest groups:

Table 1. Descriptive Statistics

Variable	**International Migrants**	**Non-migrants**	**Internal Migrants**
Labor supply (hours a week)	35.98	38.78	38.55
Married	56.22%	50.60%	49.20%
Education (in years)	10.81	10.77	10.81
Age (in years)	44.23	38.76	38.15
Family size	3.86	4.01	4.15
Observations	21,743	14,741	63,139

Source: Author's Elaboration with data from the ENOE I-2023 and ACS 2023

Table 1 shows that Mexican women who live in the United States work less hours a week than Mexican women who live in Mexico. Also, international migrants are older and more likely to be married. Concerning education, three groups have similar levels of schooling.

3.4.3 Econometric model

As the main goal is to compare the labor supply of women who migrated to the United States with women who remained in Mexico, we define the groups to compare. The first one considers the international migrants: these women who live in the US but were born in Mexico. The second is for the women who still live in Mexico, and the third is a subgroup for the internal migrants (women who moved inside the country).

To measure differences in labor supply, first, we follow a Heckman (1976) self-selection correction procedure. We estimate the probability of migrating to the United States for all Mexican women (both in Mexico and in the U.S.) using a Probit model. And, with the estimated probabilities in hand, we construct a self-selection correction variable (the inverse Mill´s ratio) to calculate imputed wages for both Mexican women in the U.S. and Mexican women in Mexico. Then, we estimate the labor supply of each population group using a OLS model, and finally, apply the Blinder-Oaxaca decomposition to compare differences in labor supply.

As an alternative to the Heckman´s self-selection correction process, we add a robustness exercise where, instead of comparing the labor supply of Mexican women in the U.S. with that of Mexican women in Mexico, we compare the labor supply of Mexican women in the U.S. with a subgroup of Mexican women in Mexico: women who migrated within Mexico. We assume that this subgroup is more alike to Mexican women who migrated to the U.S. and may share some unobservable characteristics that make them similar. In the end, both groups of women decided to leave their place of origin to search for a better life.

Self-selection correction procedure.

As mentioned, the decision to migrate is not a random choice, so we have a self-selection issue. As migrant women are different from those who stay, we use a Probit model to measure the probability of migrating to the United States. As we are working with two different databases, the lack of a good instrument complicates the analysis; we use the presence of kids under 12 years old and age controls to estimate the probit:

$$Pr(migrate = 1) = \delta_1 Age + \delta_2 Age^2 + \delta_3 Kids12 + u \qquad (1)$$

With this model, we calculate the Invers Mills Ratio (IMR). The IMR is calculated using the ratio of the probability density function to the cumulative distribution function of a normal distribution, and we use this term to correct the self-selection in the following regressions.

Once we have the IRM, we make a regression to generate imputed wages through a Mincer equation. We use the hourly wages explained by education (measured by years), age, and squared age as dependent variables as follows:

$$\ln(wage_i) = \phi_1 Education_i + \phi_2 Age_i + \phi_3 Age_i^2 + \gamma IMR_i + \varepsilon_i \qquad (2)$$

We replicated this estimation for each group: Mexicans in Mexico, internal migrants, and international migrants. Only for the last group, we include the self-selection correction term (IMR_i). We created the imputed wages to use with the results in the next step to explain the labor supply.

Also, we include an extra step to simulate the estimated wages for the international migrants if they were in Mexico. To simulate this, we create a variable using the coefficients obtained from the Mexican regression (ϕ_i) but multiplied for the international migrant observables (education, age, and squared age) and replicate the procedure to simulate the wages if the

international migrants were internal migrants. We replied this exercise to simulate the wages if Mexican women were living in the United States.

The next stage is a regression model to explain the labor supply (weekly worked hours) with an Ordinary Less Squared (OLS) as described below:

$$supply_i = \varphi\mathbb{X} + \beta_1\widehat{Wage}_\iota + \beta_2\widehat{Wage}_i^2 + \gamma IMR_i + v_i \qquad (3)$$

Where $\mathbb{X}$ contains controls such as education, marital status, household size, and the logarithm of household income, also included the imputed wages (from equation 2). We estimate the model separately for each group. However, we use γIMRi only in the regression for international migrants to solve the self-selection related to the decision to migrate to the US.

Once again, as an extra step, we simulated the labor supply for the international migrants as if they were Mexicans. To do this, we took the coefficients from the labor supply regression ($\varphi_i, \beta_1, \beta_2$) for Mexicans) and multiplied them by the variables of the international migrants. Then, we replicated the exercise to simulate the labor supply if the international migrants were internal migrants. Then, we simulated the labor supply for Mexican women if they were living in the United States.

Finally, we use the Blinder-Oaxaca decomposition to observe whether the difference in the labor supply (Y) of international migrants (I) and Mexicans (M) is due to observables (X) or to the difference in the returns to characteristics (B), such that:

$$\bar{Y}^M - \bar{Y}^I = (\bar{X}^M - \bar{X}^I)\hat{\beta}^I + \bar{X}^M(\hat{\beta}^M - \hat{\beta}^I) \qquad (4)$$

However, it also decomposes the difference in labor supply between international migrants (I) and internal migrants (N). This step is important in comparing two groups with a similar characteristic: migration decision. This decomposition is the following:

$$\bar{Y}^N - \bar{Y}^I = (\bar{X}^N - \bar{X}^I)\hat{\beta}^I + \bar{X}^N(\hat{\beta}^N - \hat{\beta}^I)$$

3.5 Results

First, we estimate the Probit model to obtain the IMR. The variables are significant, including the instrument for children under 12 years old. This model allows us to estimate the probability of migration for the general population. Also, we can subsequently (through the IMR) correct the self-selection problem present in women's decisions to migrate, as shown in Table 2.

Table 2. Probit estimation

	Migration
Age	0.0509***
	(20.04)
Age^2	-0.000373***
	(-12.22)
Kids under 12	-0.172***
	(-17.00)
Constant	-2.136***
	(-42.82)
N	99614

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Authors' elaboration

Once we have obtained the IMR, we can move on to the next step: generating the imputed wages. Table 3 shows the results, where the first column (I) shows the estimated coefficients of the Mincer regression for Mexican women, the second (II) for internal migrants, and the third (III) for international migrants. Finally, column (IV) shows the results for international

migrants without including the self-selection term (lambda) to evaluate the difference between the self-corrected model and a normal one.

Table 3. Imputed wages

wage=	(I) Mexican	(II) Internal Migrants	(III) International Migrants	(IV) International Migrants w/o SS
Education	0.147***	0.141***	5.980***	5.980***
	(24.04)	(26.44)	(9.17)	(9.17)
Age	0.115***	0.126***	5.782*	5.827***
	(7.83)	(9.93)	(1.97)	(3.42)
Age^2	-0.00109***	-0.00125***	-0.0611*	-0.0611*
	(-5.90)	(-7.80)	(-2.27)	(-3.11)
IMR			2.699	
			(0.02)	
Constant	-0.442	-0.589*	-32.21	-32.12
	(-1.59)	(-2.49)	(-0.88)	(-0.88)
N	77880	63139	20966	20966

Source: Authors' elaboration

The results show that education and age explain wages in all cases. However, the coefficient on IMR_i is not significant in explaining the wages of international migrants. With these regressions, we calculated the imputed wages that we included in the labor supply model shown in Table 4.

Table 4. Labor supply estimation

Hours Worked=	Mexicans	Internal Migrants	International Migrants
Education	-0.237***	-0.307***	-0.752***
	(-9.05)	(-10.74)	(-10.46)
Married	-3.702***	-3.830***	-1.658***
	(-27.79)	(-25.85)	(-10.08)
Family size	-0.189***	-0.116**	-0.362***
	(-5.39)	(-3.02)	(-8.27)
Ln (Household income)	3.592***	3.474***	2.333***
	(46.95)	(41.14)	(25.78)
Imputed wage	9.579***	10.24***	0.0843**
	(14.12)	(13.20)	(3.04)
Imputed $wage^2$	-1.124***	-1.166***	0.000184*
	(-12.60)	(-11.12)	(2.27)

IMR			-5.451**
			(-3.10)
Constant	0.374	-0.358	4.131
	(0.27)	(-0.23)	(1.77)
N	65115	53075	20964

Source: Authors' elaboration

Table 4 presents the estimated coefficients of the labor supply regression (equation 3). According to the coefficients of Estimated Wage and Estimated Wage Squared, for Mexican women in general and for internal migrants (Mexican women working in Mexico), there is an inflection point in labor supply, beyond which, as wages increase, their labor supply begins to decline.

For all women working in Mexico, this point is at $4.26, and for internal migrants working in Mexico, this point is at $4.39, slightly higher than for Mexican women in general. For international migrants, this behavior does not hold; the labor supply of Mexican women working in the United States never goes backwards.

Once we have the labor supply results, we can run simulations. These simulations help us calculate how much international migrants would work if they returned to Mexico. Table 5 shows the results.

We run three different simulations to check for consistency. The first column takes the coefficients from the labor supply regression and multiplies them by the observable characteristics of international migrants. The second row shows this same exercise but includes a correction for self-selection (IMR_i). The third row shows the coefficients of internal migrants multiplied by the observable characteristics of international migrants to simulate the labor supply of international migrants if they were migrated within Mexico.

Table 5. Simulations of labor supply for International Migrants

Variable	Obs	Mean	Std. dev.	Min	Max
International migrants if working in Mexico	20,964	54.46018	3.41264	26.89734	75.33323
International migrants if working in Mexico (corrected for self-selection)	20,964	50.31155	4.10157	23.40475	73.23236
International migrants if working as an internal migrant	20,964	55.42597	3.430344	28.10096	76.1916
Mexicans if working in United States	64,115	21.64788	2.923511	4.675877	31.79208

Source: Authors' elaboration

Table 5 shows the results of simulations of international migrants under different circumstances. Row one shows that if international migrants were working in Mexico, they would work an average of 54.46 hours, which is higher than the average for Mexican women. Row two indicates that, once we correct the self-selection effect, if international migrants were working in Mexico, they would work 50.31 hours. Once we control the self-selection effect this amount is still higher than that of Mexican women. Finally, in row three, if international migrants were internal migrants (moving within Mexico), they would work 55.42 hours.

Also, we simulated the labor supply for Mexicans if they were working in the United States in the last row of Table 5. The results shows that if these Mexican women were dropped in the United States, they would be working less hours than the current international migrants.

Finally, we perform a Blinder-Oaxaca decomposition to identify whether the differences in labor supply are primarily due to differences in the payments each group receives based on their observable characteristics or to a difference in such observable characteristics.

Figure 6 shows the decomposition results for Mexican women and international migrants. On average, women in Mexico work 2.552 hours more than Mexican women in the United

States. On the one hand, Mexican women working in the U.S. have better observable characteristics than Mexican women working in Mexico, but in Mexico, each unit of observed characteristics "requires" more hours of work. The "price effect" for women working in Mexico offsets the "endowment effect" of women working in the U.S., causing women in Mexico to work more than Mexican women in the United States.

Table 6. Blinder-Oaxaca decomposition for Mexicans and international migrants

	Labor supply
Mexican	38.44***
	(596.21)
International	35.89***
	(453.29)
Difference	2.552***
	(25.00)
Endowments	-10.71***
	(-25.36)
Coefficients	19.05***
	(50.83)
Interaction	-5.786***
	(-10.41)

Source: Authors' elaboration

We repeated the Blinder-Oaxaca decomposition to see if the results hold when comparing international migrants with internal migrants.

Table 8. Blinder-Oaxaca decomposition for internal and international migrants

	Labor supply
Internal	38.19***
	(535.41)
External	35.89***
	(453.27)
Difference	2.305***
	(21.63)

Endowments	-10.79***
	(-21.63)
Coefficients	18.33***
	(44.22)
Interaction	-5.230***
	(-8.96)

Source: Authors' elaboration

Table 7 shows that the labor supply of internal migrants is higher on average than the labor supply of international migrants, resulting in a difference of 2.3 hours. Results do not change considerably when comparing international migrants with internal migrants.

3.6 Conclusions

Although Mexican workers in Mexico are known for working long hours (OCDE, 2023), there are significant differences in the number of hours worked between women who migrate to the United States and those who remain in Mexico. Our results show that women in Mexico have a greater labor supply (worked hours); they work more than those who migrate to the United States. The main reason could be the differences in wages, especially the higher wages international migrants earn in the US, indicating a significant income effect.

However, the counterfactual analysis reveals that if those women who migrated to the United States would have stayed Mexico, they would report higher levels of labor supply than those who stayed in the country, even after controlling for self-selection.

Also, to validate this result, in the other counterfactual simulation, where we identified the labor supply for Mexican women if they were working in the United States we found the opposite. If the Mexican women were working in the U.S. labor market, they would be working less than the international migrants.

The gap in the current labor supply between Mexican women who migrated to the United States and those who stayed in Mexico strongly relates to differences in observable

characteristics and how the market rewards such characteristics. These results show that systematic differences between the labor markets in Mexico and the United States strongly influence the difference in the number of hours worked. The differences in the endowments for international migrants could be beneficial for entering the Mexican labor market and taking advantage of these endowments.

These results are particularly relevant in the current political and economic environment, where an increasing number of Mexicans are returning to Mexico because of immigration policy. It highlights the importance of establishing public policies that allow for greater adaptation to the labor market, including the design of programs that facilitate job placement, as well as incentives for entrepreneurship and, consequently, the exploitation of this increase in labor supply.

This study expands the lines of research on the differences between women who migrate by considering two comparable groups besides the traditional way to correct self-selection, but also highlights areas of opportunity to explore, such as the cultural and institutional factors that influence these outcomes.

3.7 References

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