Women's Employment in Mexico

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ABSTRACT

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Employment rates of Mexican women increased 26 percentage points in the last 23 years. The underlying factors driving this trend are the main motivation for this study. My two explanatory hypotheses are the following: there is a lower 'motherhood penalty,' and a higher preschool enrollment encouraged women's employment. In addition, I estimate the gender gap in weekly wages and wages plus employer-provided benefits. To test these two hypotheses, I decompose changes, over the last two decades, in payoffs and endowments of 'motherhood.' Second, I measure the effect of changes in preschool enrollment on mothers' employment. In addition, I also estimate the gender gaps in wages and wages plus employer-provided benefits, incorporating a more precise measure of job experience than previously used, and measures of cognitive ability and non-cognitive traits (formerly unaccounted for in Mexican studies). My goal is to provide an explanation of the mechanisms that encouraged women's employment in Mexico, and to estimate the possible gender differences in earnings that might prevent a potentially larger progress of women in the Mexican labor market.

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Dedication

I would like to dedicate this dissertation to my mother, my father, and my brother. They have been the main driving force that kept me going. Without their love and support I would not have decided to enroll in graduate school to pursue my dreams. I owe you my happiness.

Introduction

Since the 1990s, the number of Mexican women joining the labor force has increased steadily (Pagán and Sánchez, 2000; De Hoyos, 2006). Employment rates of Mexican women increased 26 percentage points in the last 23 years. It is unclear whether this increase in women's participation has been driven mainly by demographic changes or whether there has also been a change in the factors that incentivize or discourage women's employment. The underlying reasons driving this employment trend are the main motivation for this study. My two explanatory hypotheses of women's increased participation in the labor market are the following: the 'motherhood penalty'[1] on the labor market has decreased over the last two decades, and universal preschool increased children's enrollment, also having a positive effect on mother's employment. In addition, I also explore the contribution of different human capital characteristics on gender differences in earnings among male and female workers. To test the two hypotheses, first, I decompose changes in payoffs and endowments of 'motherhood' on labor force participation, from 1996 to 2012. Second, I measure the effect of changes in preschool enrollment on mothers' employment after universal preschool was implemented in 2002. Lastly, to estimate the gender gap in weekly wages I incorporate a more precise measure of work experience,[2] and measures of cognitive ability and non-cognitive traits to a standard earnings' model that controls for selection into employment. My goal is to provide an explanation of the mechanisms that encouraged women's employment in Mexico and the possible gender differences in earnings that might impede a potentially larger progress of women

[1] The penalty on employment (discrimination) and wages (lower earnings) as a consequence for having less labor market experience during women's childbearing years (Waldfogel, 1997; Budig & England, 2001).

[2] Precision is relative to the measures commonly used in previous literature on gender wage gaps in Mexico. Those measures are potential work experience (i.e. age -years of schooling -5) and age dummies as a proxy for seniority.

in the labor market. The main findings, a short data description, and a summary of the methodology for each hypothesis are described below.

1. Understanding the Evolution of Female Employment in Mexico

Previous research of women's employment in Mexico has focused on single-year analyses or demand-side fluctuations (De Hoyos, 2006). It remained unclear the role of demographic changes and shifts in payoffs to workers' characteristics on employment trends. I hypothesized that over the last two decades, returns to education changed positively and the 'motherhood penalty' decreased improving women's motivation for employment. My empirical strategy to disaggregate the role of these characteristics across years is based on a robust version of the Oaxaca-Blinder decomposition methodology developed by Oaxaca and Ransom (1994). This methodology disaggregates differences in mean levels of employment among periods into 'endowments,' to explain mean differences in predictors, and 'returns,' to explain changes in returns to women's characteristics. To provide estimates invariant to the choice of the reference period, I estimated three separate constrained linear regressions: one regression per period and a pooled regression with a year intercept. Data came from the National Household Income and Expenditure Survey (ENIGH) for years 1996-2012.

Decomposition results showed that in these two decades returns to women's characteristics, rather than endowments, have had a larger explanatory power on employment decisions. The contribution of education to a woman's decision to work has remained stable throughout time. Regarding motherhood, the endowment of children (i.e., number) still accounts for a large share of differences in female employment. However, over the analyzed period, returns to motherhood (payoffs associated to the number of children) account for a larger share

of the employment differences. In adjusted models –accounting for other worker's income within the household and motherhood– it is observed that throughout time women have become less sensitive to other household member's income and the 'motherhood penalty' has decreased.

2. Preschool Enrollment and Mother's Employment

Universal preschool enrollment was implemented in Mexico through a phased in scheme from 2002 to 2008. A subsequent increase in preschool enrollment was observed. In Mexico, mothers represent 58% of the female labor force, and I hypothesized that higher preschool enrollment impacted positively mothers' employment. Prior literature on this topic has mixed evidence. In the US subsidies for universal preschool increased enrollment without affecting maternal employment (Fitzpatrick, 2010). In Argentina, Berlinski and Galiani (2007) found that a higher supply of preschools rose mother's employment by 7-14 percentage points (pp).

Through a difference-in-difference analysis, I exploited the state-year variation in preschool enrollment to measure its association to mother's employment. I compare labor outcomes of mothers of preschool-age children (3– and 4–year olds) to mothers of younger children, mothers of older children and non-mothers. Data came from ENIGH (1996 to 2012), the Mexican Ministry of Education. To account for pre-trends in preschool investment I included a control for ruling party using data from Mexican think tank CIDAC.[3]

Results indicate that universal preschool enrollment increased the employment of mothers of 3– and 4–year old children by 24 to 55 pp, respectively, compared to mothers of younger children. When compared to mothers of older children, universal preschool increased mothers' employment by 18-39 pp and when compared to non-mothers the increased ranged

[3] Centro de Investigacion para el Desarrollo: http://www.cidac.org/esp/Datos_Electorales.php#tab3

from 43 to 51 pp. In adjusted models where treatment is subject to a child's actual preschool enrollment (and age of the child varies), the effects increase for mothers of children enrolled in first year of preschool (comparable to mothers of 3–year olds) across all comparison groups. For mothers of children enrolled in second year of preschool, the effects decrease but remain statistically significant. When predicted enrollment by state and year is used instead of the observed enrollment rate, estimates are consistent.

3. Gender Earnings' Differentials: Disaggregating Human Capital Characteristics

I establish that including a more precise measure of work experience and measures of cognitive ability, and non-cognitive traits increases the percentage attributed to endowments in the estimation of the gender gap in weekly wages in Mexico. The inclusion of these variables decreases the share of the gap attributable to returns. My results show a gender gap of 15% in weekly wages. A quarter of the gender gap in weekly wages is explained by differences in women's and men's endowments. Another quarter is explained by differential returns to employees' characteristics, while half of the gap remains unexplained. The inclusion of the additional measures of human capital increases the share attributable to endowments by eight percentage points, and decreases the share attributable to returns by ten percentage points. The share of endowments explained by human capital increases by fivefold once work experience, and cognitive and non-cognitive traits are included in the model. Previous studies on gender wage differentials have found a similar gap, but fail to include, and consequently, disaggregate the contribution of the different human capital characteristics to the gender gap in weekly earnings.

Paper 1: Understanding the Evolution of Female Employment in Mexico

I. Introduction

Since the 1989, the number of Mexican women joining the labor force has increased at a steady rate (Pagán and Sánchez, 2000; De Hoyos, 2006). According to the Mexican Department of Official Statistics (INEGI), from 1989 to 2012, the labor force participation rate (LFPR) of women, 25 to 54 years of age, increased from 34% to 60%. The driving forces of this trend in the female labor participation are the main motivation for this study.

Over these decades, Mexican women have faced different cultural, political and economic changes that have eased the barriers for their employment. Yet, it is unclear whether this increase in women's participation has been driven mainly by demographic changes (i.e., lower fertility levels and higher education) or whether changes in the returns to some of the characteristics that incentivize or discourage women's employment have also played an important role. The main hypothesis of this study is that returns to education and motherhood have also changed positively at different points in time over the last two decades, further improving women's motivation for employment and increasing their labor supply.

This study differs from previous work in that it disaggregates –through different methodologies– the contribution of the explanatory factors that impact women's labor decisions into endowments and returns. It also complements the literature of employment analyses of the Mexican labor market by extending the period of analysis ten more years in comparison to De Hoyos (2006) –adding observations from 2002 to 2012. The sections are divided as follows. Section two reviews the previous literature in the topic. The third section describes the data, methods, outcome variables and other relevant variables. The fourth section outlines the results. Section five provides a discussion of the results and the concluding remarks are in section six.

II. Prior Research

Previous research on the labor supply of Mexican women has tended to use data from single years (Wong and Levine, 1992; Gong and van Soest, 2000; Pagán and Sánchez, 2000; Pagán and Ulibarri, 2000). In addition, most of these single-year studies have focused on particular sub-samples of Mexican women (e.g. married women, only one or two cities, only rural areas, etc). Thus, their results are neither comprehensive –in terms of years- nor generalizable to the whole Mexican population.

Gong and van Soest (2000) focused on estimating the labor supply of married women in Mexico City. This study uses data from the Urban Employment Survey of 1992. The main assumption is that women take labor decisions conditioned on husband's labor and non-labor income. The authors find evidence that the presence of other female adults reduce the motherhood penalty (i.e. the negative impact of children on women's labor supply). Although, their results are not generalizable beyond their very particular sample that is restrained to married women from Mexico City.

Pagán and Sánchez (2000) explored the determinants of women's labor supply in rural Mexico using a small survey conducted in three cities in 1994. The authors find evidence of within-family gender barriers. The main implication is that the presence of young children has a differentiated impact on the work and self-employment choices of men and women. Thus, gender roles within the family are source of distinctive gender structural barriers to economic equality. As in the case of Gong and van Soest (2000), their results apply only to a subsample of the Mexican women.

De Hoyos (2006) provides a more complete estimation of the female labor participation in Mexico by including more than one year of data (1994 to 2000), using cross sectional data

from the Mexican Survey of Income and Expenditure (ENIGH). Estimating a multinomial participation model and also analyzing selectivity-adjusted wages through Heckman's procedure, the author finds that in the aftermath of the *Peso* crisis (between 1996 and 1998) female labor participation increased due to higher expected wages in the manufacturing sector. De Hoyos (2006) found that in the aftermath of the *Peso* crisis wages in the manufacturing sector rose around 13% and kept rising until 2000, time during which wages in other sectors began to recover. Moreover, during the first six years of North American Free Trade Agreement (NAFTA) 700,000 more women joined the labor market in Mexico. De Hoyos (2006) and Meza (2001) point out, the employment at *maquiladoras* was mainly low skilled.

III. Data and Methods

Data

Data come from the Mexican Income and Expenditure Household Survey (ENIGH). This survey provides a rich set of labor market indicators and information on socioeconomic and demographic characteristics, and it is representative of the whole urban and rural population. Individuals were surveyed based on a stratified multi-phase sample, which first uses basic geo-statistical areas (AGEB) that are stratified according to five geographic and socioeconomic criteria and then use for urban areas only blocks of dwellings, and finally dwellings from each area or block (Cross-National Data Center in Luxembourg, 2000). The information is cross sectional and has been collected since 1984. From 1989 until 2012 data has been released every two years. However, data on marital status is not available before 1996. In addition, information on number of children is only approximate before 1996. Thus, data from 1989-1994 is only used on descriptive tables and graphs to show trends. In further analysis, models only include years 1996 to 2012. The population of interest is prime-working-age women (25-54 years old) and the

sample size of all the combined years from 1996 to 2012 is 148,352 individuals. From this sample, 75,709 of these women are employed, on average 51% across all years.

Period of analysis in context

The period of analysis captures the aftermath of two important economic shocks: one of the largest financial crises in Mexican history coined by the term of "Peso crisis" in 1994-1995, and trade liberalization through the North American Trade Agreement (NAFTA) in 1993-1994. Between 1994 and 1995 the Mexican current account deficit reached 7% of the gross domestic product (GDP) and the Mexican currency plunged 50% within six months after foreign investment fled the country. As a consequence, local currency value of government's dollar linked debts increased and Mexico fell into a deep recession where Mexican GDP decreased 6.2%. Given the close links of the U.S. and Mexican economies after NAFTA, President Clinton arranged a 40 billion stand-by loan to alleviate liquidity problems in the Mexican economy. Soon after, the Mexican GDP grew 5-6% and wages recovered after the crisis, but only up to their pre-crisis levels. Although a serious problem of low productivity remained for a decade after the Peso crisis.

In addition, the last three available waves analyzed (2008, 2010 and 2012) capture a more nuanced growth of the Mexican economy and this period also reflects the impact of the economic recession that started in developed countries in 2007 and was spread throughout the world. Although this crisis certainly affected women's employment decisions, it mainly affected labor demand and demand-side changes are not analyzed in this study. The rationale is that since all women faced the same demand curve controls for demand-side changes would not make a difference in the decomposition analysis.

Empirical strategy

The main hypothesis of this study is that the increase in women's labor participation in Mexico has not been driven entirely by changes in women's mean endowments (i.e. fewer children or higher levels of education). Instead, I hypothesize that positive changes in the returns to education and a decrease in the motherhood penalty also explain[4] a share of the increase in women's employment rates. The most appropriate methodological strategy to test this hypothesis is a decomposition analysis.

The goal of a decomposition methodology is to quantify the separate contributions of group differences in measurable characteristics. The first step is to calculate a counterfactual mean probability of women's labor participation had their distribution of observable characteristics not changed during the period of analysis (as if women from t_0 had women's t_1 coefficients). Second, differences are compared to the observed mean probability of labor force participation (DiNardo, 2002).

Blinder (1973) and Oaxaca (1973) developed the most commonly used decomposition technique. Their method consists of measuring mean outcome differences –between two groups or for two points in time– and to disaggregate these differences into two components: *i) endowments*: the portion explained by mean differences in predictors and *ii) coefficients*: this component measures the expected change in the returns to women's characteristics from one period to another.

Pooled decomposition methodology

Oaxaca and Ransom (1994) developed a more robust version of the Oaxaca-Blinder (OB) decomposition methodology that provides estimates invariant to the choice of the reference period (unlike the original OB method). This decomposition methodology consists in estimating

[4] The term "explain" is used in an accounting sense and should not be interpreted causally.

three separate constrained linear regressions. One regression for period t_0, one for period t_1 and a pooled regression that includes year intercept shifts along with an identification restriction and constraints for each categorical variable (Fortin, 2008). For simplicity, I will show a more general version of my employment model for the decomposition analysis, following a similar approach to that of Fortin, (2008) and Oaxaca and Ransom (1994, 1999).

$$Y_{it} = \beta_{0t} + \beta_i \underline{X}_{it} + e_{it} \quad , \qquad t=t_0, t_1, p \tag{1}$$

Where Y_{it} is the outcome of interest for the i^{-th} woman at year t, with t_0 indicating the year in the earliest period of comparison and t_1 indicating the latter year compared. The outcome is measured through *i)* a categorical variable of *labor force participation* that will be predicted through a *probit* model; and *ii)* a continuous variable of *weekly hours worked* that will be predicted through an ordinary least squares model. The vector X_i includes relevant predictors of women's employment described in the next section. Time is labeled with t (includes years from 1996 to 2012), and p indicates the pooled model.

Assuming that the expected value of the error term is zero, the difference in the mean outcomes can be expressed as follows:

$$Y_{it_1} - Y_{it_0} = X_{t_1}\beta_{t_1} - X_{t_0}\beta_{t_0} + (\beta_{0t_1} - \beta_{0t_0}) \tag{2}$$

Where $\Delta X = X_{t_1} - X_{t_0}$ and $\Delta\beta = \beta_{t_1} - \beta_{t_0}$

Then it follows that: $Y_{it_1} - Y_{it_0} = \Delta X\beta_{t_1} + X_{t_0}\Delta\beta + (\beta_{0t_1} - \beta_{0t_0})$ (3a)

Analogously:

$$Y_{it_1} - Y_{it_0} = \Delta X\beta_{t_0} + X_{t_1}\Delta\beta + (\beta_{0t_1} - \beta_{0t_0}) \tag{3b}$$

Assuming a "non-discriminatory" pooled structure in which the improvement in women's characteristics at period t_1 would be equal to the average decrease in average characteristics in period t_0 (Oaxaca & Ransom, 1994; Fortin, 2008):

$$Y_{it_1} - Y_{it_0} = \Delta X\beta_p + X_{t_1}(\beta_{t_1} - \beta_p) + (\beta_{0t_1} - \beta_{0p}) - X_{t_0}(\beta_{t_0} - \beta_p) + (\beta_{0t_0} - \beta_{0p}) \quad (4)$$

Where $X_{t_1}(\beta_{t_1} - \beta_p) + (\beta_{0t_1} - \beta_{0p})$ represents the "advantage of period t_1" and $X_{t_0}(\beta_{t_0} - \beta_p) + (\beta_{0t_0} - \beta_{0p})$ represents the "disadvantage of period t_0."

Another alternative is to the include year intercept shifts as well as an identification restriction in the pooled regression of year t_1 and year t_0, which is the case for this study.

$$Y_{it} = \gamma_0 + \gamma_{0t_0}T_{0i} + \gamma_{0t_1}T_{1i} + X_i\gamma + \upsilon_i \qquad s.t.\ \gamma_{0t_0} + \gamma_{0t_1} = 0 \quad (5)$$

$$Y_{it_1} = \gamma_0 + \gamma_{0t_1} + X_{t_1}\gamma + E\ \upsilon_i|T_{0i} = 0\ , \quad (6a)$$

$$Y_{it_0} = \gamma_0 + \gamma_{0t_0} + X_{t_0}\gamma + E\ \upsilon_i|T_{0i} = 1\ , \quad (6b)$$

$$Y_{it_1} - Y_{it_0} = \Delta X\gamma + \gamma_0 + \gamma_{0t_0} + E\ \upsilon_i|T_{0_i} = 0 - E\ \upsilon_i|T_{0_i} = 1 \quad (7)$$

Under the assumption that $E\ \upsilon_i|T_{0i} = 0 - E\ \upsilon_i|T_{0i} = 1 = Cov\ \upsilon_i, T_{0i} = 0$, the decomposition can be written as:

$$Y_{it_1} - Y_{it_0} = \Delta X\gamma + X_{t_1}(\beta_{t_1} - \gamma) + (\beta_{0t_1} - \gamma_0) - X_{t_0}(\beta_{t_0} - \gamma) + (\beta_{0t_0} - \gamma_0) \quad (8)$$

If γ and γ_0 accurately represent a non-discriminatory structure, then the "advantage of period t_1" will be equal to the "disadvantage of t_0". Under these assumptions, it follows that:

$$\gamma_{0t_1} = X_{t_1}(\beta_{t_1} - \gamma) + (\beta_{0t_1} - \gamma_0) \quad \text{and} \quad \gamma_{0t_0} = X_{t_0}(\beta_{t_0} - \gamma) + (\beta_{0t_0} - \gamma_0) \quad (9)$$

In detailed decomposition analyses, coefficients of interest are not invariant to the choice of the base (omitted) category in the case of categorical regressors. Yun (2005) proposed a solution to compute the decomposition based on "normalized" effects in which effects are expressed as deviation contrasts from the grand mean. This study follows Yun's approach and normalization is applied to all categorical variables as well as to interactions. With this technique, the coefficients of interest will not be "contaminated" by the choice of the omitted category (Yun, 2005; Fortin, 2008).

Lastly, I also add a correction selection in which group differentials are adjusted by the contribution of a specified variable before computing the decomposition. The two specific variables for these analyses are i) *additional workers in the household* and ii) *motherhood* (being a mother of one or more children residing in the household).

Non-linear decomposition methodology

A second decomposition methodology used in this study is the one proposed by Fairlie (1999, 2003, and 2005) as an extension to the OB decomposition to generate non-linear decompositions of binary outcome differentials. In order to estimate the total contribution of individual characteristics to labor force participation, Fairlie (2005) follows a similar approach to that of OB and Oaxaca-Ransom (OR), by calculating two sets of predicted probabilities and taking the difference between the averages values of the two. The main difference with the OB/OR methodologies is that Fairlie does not assume that there is a perfect one-to-one match of observations between the two compared groups. To address this problem, Fairlie suggests the use of the pooled coefficient estimates to calculate predicted probabilities, for each of the two compared subsamples. The next step is to draw a random subsample of the larger-sized population (t_1) equal in size to the smaller-sized population (t_0). Each observation for women in

the t_1 subsample and full sample of women in t_0 is then separately ranked by the predicted probabilities and matched by their respective rankings (Fairlie, 2005). The decomposition estimates obtained from this procedure depend on the randomly chosen subsample of women in t_1.

Results from the decomposition should approximate those from matching the entire sample of women in t_1 to the sample of women in t_0. In this study 100 random subsamples of women in t_0 are drawn and matched to the sample of women in t_1 to calculate separate decomposition estimates. Then, the mean value of the estimates from the separate decompositions is used to approximate the results for the entire sample in t_1.

Thus, the decomposition for a non-linear equation Y=F(Xβ) can be expressed as follows:

$$Y^{t1} - Y^{t0} = \sum_{i=1}^{N^{t1}} \frac{F\ X_i^{t1}\beta^{t1}}{N^{t1}} - \sum_{i=1}^{N^{t0}} \frac{F\ X_i^{t0}\beta^{t1}}{N^{t0}} + \sum_{i=1}^{N^{t0}} \frac{F\ X_i^{t0}\beta^{t1}}{N^{t0}} - \sum_{i=1}^{N^{t0}} \frac{F\ X_i^{t0}\beta^{t0}}{N^{t0}} \qquad (10)$$

Where N^t is the sample size for women in period *t*. Fairlie proposes to use this alternative expression for when Y is not equal to $F(X\beta)$. As in OB/OR, the first term represents the portion of the gap due to group differences in distributions of *X*, while the second term captures the portion due to differences in group processes determining the level of *Y* and the portion due to group differences in unobserved endowments (Fairlie, 2005).

Outcomes of interest and control variables

As previously outlined, the main *outcome of interest is labor force participation*. Participation is measured through two variables: *i)* a categorical variable [0-1] of *employment* and *ii)* a continuous variable of *weekly hours worked*. The latter variable will be helpful in detecting more subtle changes in women's labor participation patterns. The sample is restricted to prime-working-age women (25-54 years old). Within this range of age women's education and

retirement decisions should be stable. All the models and analyses will refer only to this population age group.

Controls for education, number of children, marital status, household composition, age and region of residence. Given the distribution of years of schooling in Mexico, and following the categorization of the Mexican Council for the Evaluation of Public Policies (CONEVAL), this analysis uses three distinct categories for education: *less-than-elementary education, complete elementary education or incomplete secondary education* and *secondary education and beyond*, with *less-than-elementary education* as the base category.

Motherhood affects greatly women's decisions to participate in the labor market. A common mechanism through which motherhood hampers employment participation is the lack of access to childcare. It has been hypothesized that those married women that do work, must be those that have enough means to cover childcare costs (Meza, 2001). Four dummy variables are used to measure the impact of having children under 18 years old living in the household (the age at which children are no longer consider minors and parents are no longer obligated to support their children under the Mexican law): *one child, two children, and three or more children* of the same age range, *with no children* as the reference category. Marital status is also crucial in the determination of women's need and willingness to work. Marital status is measured through three categorical variables: *married or cohabitating, single (never married)* and *divorced, separated or widowed*, with *single* as the base category.

Household composition is another key determinant of women's decisions in the labor market. In Mexico, disadvantaged populations are very sensitive to income shocks due to a restrictive access to financial institutions. In addition, Mexican workers do not have unemployment insurance, thus when a household member is unemployed another household

member is sometimes obligated to increase their working hours or to look for employment to reach minimum subsistence levels, as those families do not have enough assets to afford long unemployment spells (Hernandez-Licona, 1995). As a consequence, other household member's employment status and the number of dependents have an important effect on women's labor decisions. Four variables are included to control for household composition: two continuous variables for *number of women*, *number of men* and two dummy variables for *number of additional working members in the family* and whether the individual is the *head of the household.* Even though some of these variables are closely related it is important to include them to detect subtle differences in household dynamics, given the number of household members and position in the family as main, secondary or *n*-breadwinner.

To control for differences between urban and rural labor markets, a variable that takes on the value of one for *urban* and zero for *rural* areas is included. There are also state dummies included to account for regional differences across Mexico. A continuous age variable is included in a linear and in a quadratic form. Models include interactions for age and number of children in order to control for the differences of among young and old mothers.

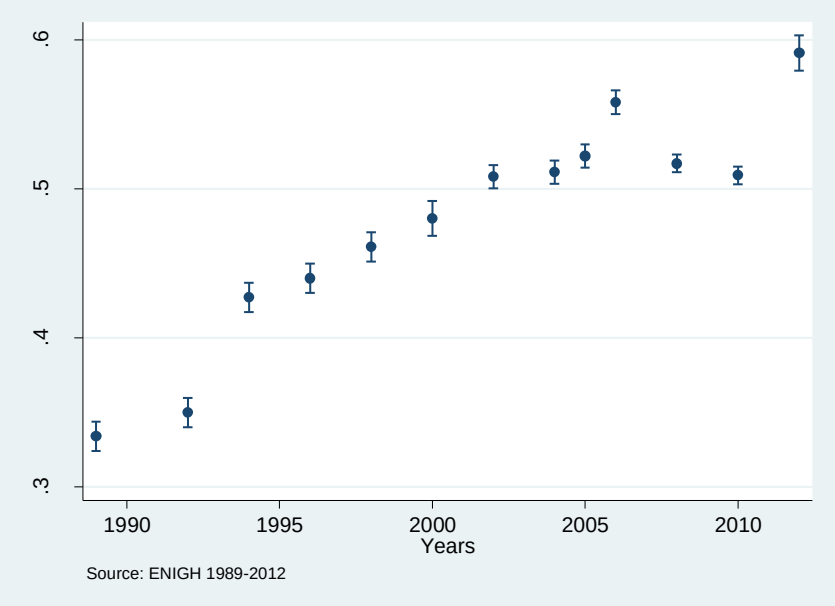
IV. Results

Descriptive Results

All the results described in this and following sections are weighted using the frequency weights provided in the survey and are representative of the Mexican population at large. On figure 1 we can observe the changes in the LFPR of women over the 1990's and on the first decade of the 2000's. In 1989 only 34% of women between the ages of 25 and 54 years old participated in the labor force. At this time equal rights laws and maternity leave legislation (passed in 1974) had already been enforced for over a decade, and yet participation levels

deemed lower than those of men, whose participation for the same age cohort reached almost 90%. Over the last decade, a significant number of women have joined the labor market, reaching a LFPR of 60%, which marks 26 percentage points increase in labor force participation in a period of 23 years.

Figure 1 Changes in women's employment, 1989-2012

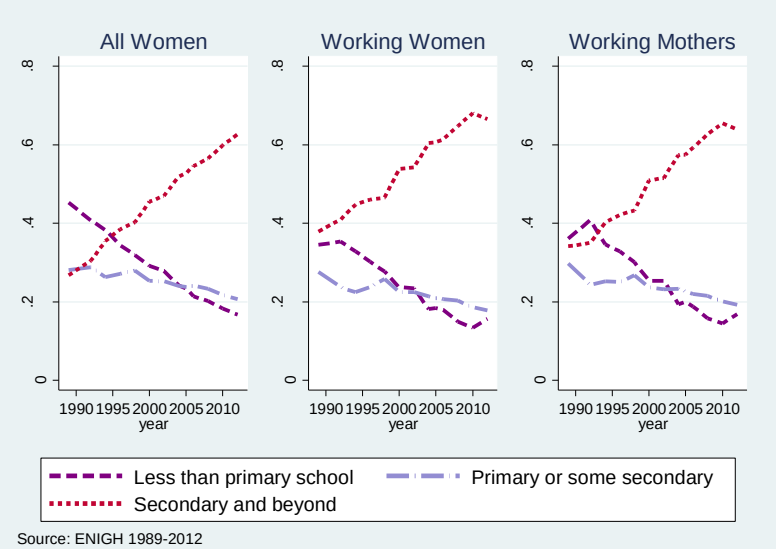


In contrast to the markedly increased in labor force participation, mean weekly hours worked increased at a more modest rate over these two decades, from 37 to 39 hours worked/week, which is an increase of approximately 5%. The combination of these two results points out that the changes in women's employment happened at the extensive margin rather than at the intensive margin. Given the low levels of women's participation in the labor market at the beginning of the 1990s this is a reasonable result.

The two characteristics of working women that have changed more dramatically over the analyzed period are the education trajectories and fertility decisions. In the case of the former,

the percentage of working women that had no primary education in 1989 was 34% by 1996 the percentage was 30% and by 2012 only 16% of the women among 25-54 years of age had no primary education. The percentage of women that reported having an elementary-school diploma or some secondary-school education remained between 28-24% for the 1989-1996 period, but dropped to 18% in 2012. The more educated share of working women, with a secondary-school diploma and beyond, represented 38% in 1989, 46% in 1996 and 67% in 2012. Figure 2 provides a visual contrast of the differences in education for all women in the sample, and for the subsamples of working women, and working mothers. It is worth noting that mothers show lower levels of education in comparison to all working women, but a similar increasing trend in higher education. In 1996 the percentage of mothers with secondary school diplomas or higher was 5 percentage points (pp) below the national average, and by 2012 the gap declined to 3 pp.

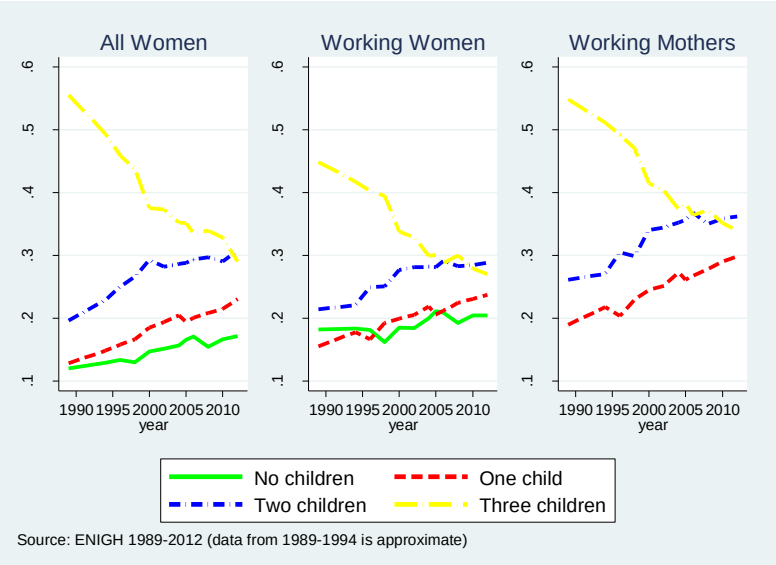
Figure 2 Education trajectories of different groups of women



In the case of fertility decisions, a declining trend in family size is clear from figure 3. Changes were more notorious on the higher end of the distribution of number of children. The percentage of working women that reported having three or more children decreased 13 pp from

1996 to 2012. Whilst the percentage of working women that had on average one or two children increased 11 pp in the same period, the percentage of non-mothers only increased 2 pp. The change in the composition of mothers was led by those who chose to have one child. From 1996 to 2012, the percentage of mothers that had one child increased from 20% to 30%, respectively. In the case of mothers of two children, the percentage increased from 30 to 36% and the share of women that had three or more children decreased from 49% to 34%. Thus, the decreasing trend in the fertility has been driven by shifts to smaller families and not by increases in the share of non-mothers. This could be the consequence of better (cheaper) childcare options, more educated parents and better schooling for children.

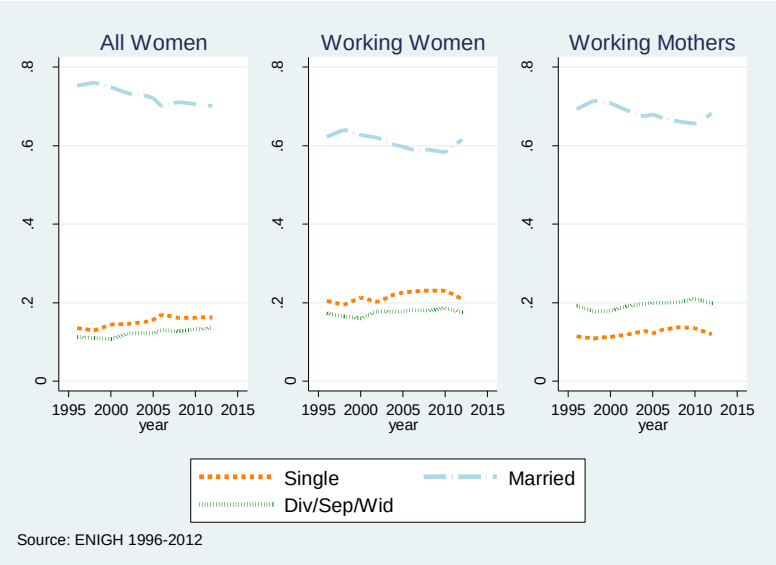
Figure 3 Changes in motherhood for different groups of women



Source: ENIGH 1989-2012 (data from 1989-1994 is approximate)

The difference in marital status of the female working population has had a stable trend between 1996 and 2012. The percentage of working women who were married remained at 62%, while the percentage of working women who were single and divorced remained at 21% and 17%, respectively. Among mothers, the main difference is that the share of single women in this group is below the mean average (see figure 4).

Figure 4 Changes in the marital status for different groups of women



Household composition, presents interesting results. The first result is that, the number of women and men in average households decreased from 2.9 to 2.4 and 2.3 to 1.9, respectively. The second result is that the number of additional workers in the household was stable (around 1.3) until the year 2000 where there was a steady increase until in 2012 the average numbers of additional workers in the household reached 1.98 persons. The third result is that the percentage of women financially in charge of their household has remained fairly unchanged over the last decades around 19%, but the percentage of mothers heading a household increased 2 pp.

The number of additional workers in the household showed a decreasing trend in the labor participation of more family members throughout the years. This could be explained by a rebalance of work-home roles. It can also be the case that in the homes of working women the supplemental income that those women are providing has had a positive effect on other family members such as adolescents or students.

Decomposition Analysis

Table 1 shows the decomposition results for labor force participation. From 1996 to 2000, the LFPR of women stagnated, and then increased slightly between 2000 and 2002. Following the 2001 recession in the U.S. there was a drop in employment from 2002 to 2004. From 2004 to 2006 the LFPR increased 7%. Then, during the great recession, women's employment decreased 4% between 2006 and 2008 and 0.08% between 2008 and 2010. During this period, the number of Mexicans departing from Mexico to the U.S. declined substantially. Thus, a plausible explanation is that the returning migrant men might have crowd out the female labor supply during these years. Between 2010 and2012, female employment shows a remarkable recovery of almost 10%.

The percentage of the differentials in LFPRs explained by endowments had a decreasing trend from 1996-1998 to 2004-2006. During the recession years 2007-2008 there was an increase in the share of contribution of endowments on explaining employment trends (period 2006-2008). One hypothesis could be that during those years workers that were laid off decided to return to school to find better jobs afterwards. On the post-crisis period the share of endowments decreased again reaching its lowest level in the period 2010-2012. In contrast, the share of returns in explaining women's employment decisions had an increasing trend with the exception of the recession period.

Table 1 Oaxaca-Ransom decomposition of the changes in women's employment

	'96-'98	**'98-'00**	**'00-'02**	**'02-'04**	**'04-'06**	**'06-'08**	**'08-'10**	**'10-'12**
LFPR in t_1	0.4769	0.4573	0.4957	0.4697	0.536	0.484	0.476	0.575
LFPR in t_0	0.4687	0.4769	0.4573	0.4957	0.47	0.536	0.484	0.476
Differential	**0.008**	**-0.020**	**0.038**	**-0.026**	**0.066**	**-0.051**	**-0.008**	**0.099**
Endowments								
Motherhood variables	0.0002	-0.0001	0.0018	0.0025	0.001	0.000	0.004	0.004
Education variables	0.0018	0.003	0.0009	0.0047	0.004	0.001	0.006	0.001
Marital status variables	-0.0016	-0.0212	0.0026	0.0009	0.005	-0.003	0.001	0.001
Household composition variables	0.0053	-0.0281	-0.0041	-0.0027	-0.004	-0.020	-0.006	-0.007
Age variables	0.0019	0.0018	0.0008	-0.0021	0.001	0.000	-0.002	-0.004
Region variables	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	0.000
All x's (endowments)	0.0078	-0.0447	0.0019	0.0033	0.006	-0.021	0.003	-0.004
Contribution to differential	95.1%	64.0%	5.0%	10.1%	9.1%	41.2%	20.0%	3.7%
Returns								
Motherhood variables	0.0089	0.019	0.0014	0.0073	-0.002	-0.004	-0.001	-0.016
Education variables	0.0013	0.0039	-0.0033	0.0005	0.000	0.002	0.000	-0.017
Marital status variables	0.0025	-0.010	0.0144	-0.0153	0.003	-0.002	0.008	0.029
Household composition variables	0.0092	0.0451	0.0236	-0.0666	0.053	0.017	0.004	0.027
Age variables	0.1876	0.4098	-0.2646	0.0884	-0.253	0.292	-0.136	-0.044
Region variables	0.000	-0.045	-0.014	0.080	0.029	0.009	-0.024	-0.003
Constant	-0.209	-0.3975	0.2784	-0.1239	0.231	-0.345	0.138	0.130
All b's (returns)	0.0004	0.0251	0.0364	-0.0293	0.06	-0.03	-0.012	0.103
Contribution to differential	4.9%	36.0%	95.0%	89.9%	90.9%	58.8%	80.0%	96.3%
N	19,981	16,683	21,885	32,255	34,924	40,464	45,852	28,582

Source: ENIGH data, 1996-2012.

Once the differentials in employment are calculated, the relative weight of each of motherhood and education on endowments and returns is shown in table 2. We can observe that, on average, changes in motherhood represent a larger share of the total differential explained by changes in the endowments of working women. In the case of education, the share does not show a clear trend and measured from the first to the last available period, the share decreased.

The contribution of motherhood and education in explaining changes in returns to employment showed an increasing trend, growing from low shares. From the period 1996-1998

to 2010-2012 the share of returns to motherhood to overall changes in the returns to employment increased 65% (4 pp). In the case of returns to education, the change was 95% (6 pp). In contrast, the share of the returns of other characteristics decreased 10 pp. Two possible hypotheses that can explain these results are that on these decades the demand for high-skilled workers increased in Mexico as a consequence of trade liberalization and more access to education (and more competition in the labor market). Another hypothesis is that working women could have been affected by policies that decrease the cost of motherhood, namely universal preschool and daycare centers for low income mothers.

Table 2 Contribution of motherhood and education to changes in women's LFPR

	'96-'98	**'98-'00**	**'00-'02**	**'02-'04**	**'04-'06**	**'06-'08**	**'08-'10**	**'10-'12**
Endowments								
Contribution of motherhood variables	1.9%	0.2%	17.6%	19.2%	6.7%	0.0%	20.0%	23.5%
Contribution of education variables	16.7%	5.5%	8.8%	36.2%	26.7%	4.2%	30.0%	5.9%
Other variables	81.5%	94.3%	73.5%	44.6%	66.7%	95.8%	50.0%	70.6%
Returns								
Contribution of motherhood variables	2.1%	2.0%	0.2%	1.9%	0.4%	0.6%	0.3%	6.0%
Contribution of education variables	0.3%	0.4%	0.6%	0.1%	0.0%	0.3%	0.0%	6.4%
Other variables	97.6%	97.5%	99.2%	98.0%	99.6%	99.1%	99.7%	87.6%

Notes: These percentages are based on the results of pooled models for the decomposition of LFPRs described earlier. To obtain the relative contribution of each group of characteristics, first the absolute value of all the variables was added by group (i.e., "motherhood" includes all the dummies for number of children), and then the ratio of group/total differential explained by endowments (or returns) was calculated.

Non-linear decomposition

Table 3 shows the disaggregated results for the non-linear decomposition differentials in women's employment. The estimates from the non-linear decomposition models do not differ substantially from those of the OR decomposition except for the years 1998-2000. For instance between 2002 and 2004 the differential calculated through the OR methodology is -0.026 and the share explained by changes in endowments is 0.003. For the same years, the employment

differential calculated through the Fairlie methodology is -0.024 and the share explained by changes in endowments is 0.003. The years following this period show a similar pattern in employment differentials and in the share explained by endowments. Similar to the OR results, Fairlie's disaggregated decomposition shows that changes in fertility decisions (grouped in motherhood variables) had an increasing share of changes in endowments that explain women's employment from 1996 to 2012. In year-to-year comparisons within this period, fertility changes did not unambiguously explained a larger portion of changes in endowments. Motherhood explained 4-18% of changes in endowments throughout this period.

In the case of education's weight on changes in endowments, the trend is less clear. Changes in education had a similar explanatory share in most of the compared periods within 1996-2012. This result is the main difference between OR and Fairlie's decomposition results.

Table 3 Non-linear decomposition of employment differentials

	96-'98	**98-'00**	**00-'02**	**02-'04**	**04-'06**	**06-'08**	**08-'10**	**10-'12**
LFPR in t_1	0.4765	0.4832	0.5181	0.4941	0.5586	0.5128	0.5042	0.5982
LFPR in t_0	0.4684	0.4765	0.4832	0.5181	0.4941	0.5586	0.5128	0.5042
Differential	**0.008**	**0.007**	**0.039**	**-0.024**	**0.064**	**-0.046**	**-0.009**	**0.094**
Endowments								
Motherhood variables	0.0014	0.0063	0.0011	0.0013	0.0015	-0.001	0.0009	0.0022
Education variables	0.0016	0.0049	0.0015	0.0038	0.0026	0.0016	0.0031	0.0019
Marital status variables	-0.0013	0.0019	0.0031	0.0005	0.005	-0.0019	0.0006	0.0007
Household composition variables	0.0046	-0.0249	-0.0047	-0.0028	-0.0055	-0.0172	-0.0027	-0.0057
Age variables	0.0018	-0.0029	0.0016	0.0003	0.0015	-0.0019	0.0005	-0.0015
Region variables	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
All x's (endowments)	0.008	-0.015	0.003	0.003	0.005	-0.020	0.002	-0.003
N	19,981	16,683	21,885	32,255	34,924	40,464	45,852	28,582

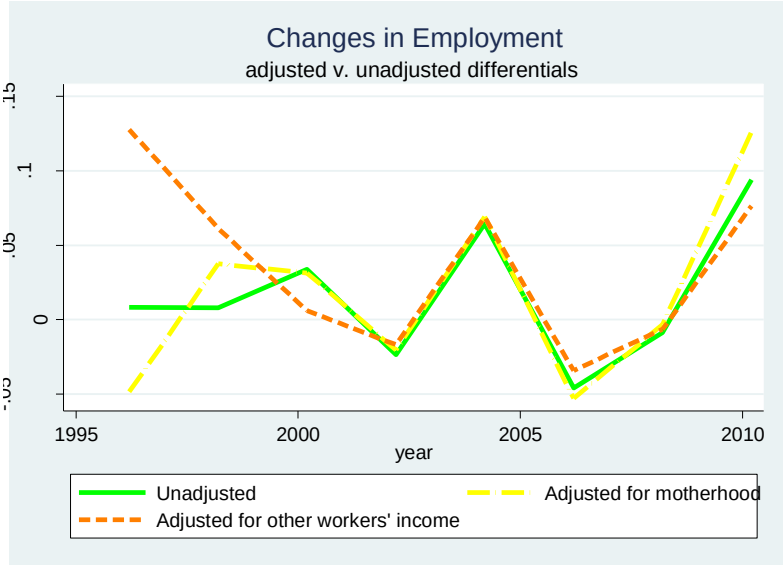
Source: ENIGH data, 1996-2012.

Adjusted differentials

As described earlier, for women a husband's income or work status might bias their decision to remain or to enter the labor market. In order to control for this fact, the OR model is adjusted for the number or additional workers in the household. There is a possible problem of reverse causality between fertility and labor force participation, in which women that have stronger job attachments might delay fertility decisions and not vice versa. Thus, in a separate analysis I also control for selection into motherhood. These adjusted results show that if women did not have an additional safety net from within-household workers, the labor force participation of women would have been close to 4 pp higher in 1996. If mothers had behaved as non-mothers their employment would have been 7 pp higher. In addition, women's LFPR would have risen over 60% under no selection into motherhood and accounting for the influence of within-household workers.

Figure 5 below shows the trajectory of adjusted and unadjusted models. The adjusted and unadjusted models start converging after years 2000-2002. Differences in both models are not significantly different for the last 3 out of 4 compared years (2004-2006, 2006-2008 and 2008-2010). For the last period, the model adjusted for within household workers presents the smallest increase in women's employment. This result might indicate that women are less responsive to their husband's income (or other household members' income) which is a more common behavior of workers with higher qualifications and more stable jobs and in developed countries. If there had been no selection in motherhood, employment would have risen further as portrayed in the last period compared.

Figure 5 Observed and adjusted differentials in labor force participation



Working hours

In the case of working hours, the changes are more nuanced (see appendix table 4). On average, working hours had a stable trend until 2004. In 2004-2006 there was a 10% increase in working hours, but after this period working hours decreased. Changes in endowments had a stable explanatory trend on changes in working hours. On average, changes in endowments explained 39% of total changes in working hours, while returns had an average explanatory power of 61% between 1996 and 2012.

In order to detect more subtle changes in working hours, I analyze changes in the density of hours worked controlling for different characteristics. Graphs 1-4 in the appendix show the counterfactual (kernel) densities of working hours for each of the explanatory variables, comparing years 1996 and 2012. For instance, graph 1 compares the distribution of hours worked for women with a secondary school diploma and beyond, with all other characteristics constant at their mean. Then, these factual and counterfactual distributions are compared among years. The same is repeated for all the characteristics.

Among all the comparisons only the changes in the distribution of hours worked between mothers and non-mothers are significant. In graph 2 it is observed that in 1996 there are large differences between mothers and non-mothers with non-mothers working, on average more hours than if those women would have been mothers. However, by 2012, the distribution of hours between non-mothers and mothers would have been similar.

V. Discussion

Descriptive statistics show a significant progress for female Mexican workers when looking at human capital characteristics. There has been an increase of more than 20 pp in the share of working women graduating from secondary school or more over the last 20 years. Now the vast majority (more than 67%) of the female labor force has at least a secondary school diploma, while in 1996 only 38% of working women had such level of education. Fertility decisions have also changed starkly among the employed women. Large families are less common in Mexico, and statistics show that from 1996 to 2012 the proportion of employed women with three or more children decreased from 40% to 27%. Other characteristics such as proportion of married or single women, age and household composition have maintained a more constant trajectory.

Once LFPRs are decomposed year by year, models show that changes in women's employment in Mexico are increasingly explained by returns to the characteristics that influence women's employment. The contribution of motherhood and education in explaining changes in returns to employment showed an increasing trend. From the period 1996-1998 to 2010-2012 the share of returns to motherhood to overall changes in the returns to employment increased 65% (4 pp). In the case of returns to education, the change was 95% (6 pp). In contrast, the share of the returns of other characteristics decreased 10 pp. The share explained by endowments showed a

decreasing trend in the same period. However, changes in the average number of children (motherhood endowments) account for a larger share of the differences in female employment.

In adjusted models that control for selection in within-household workers and motherhood, employment differentials diverged at the beginning of the comparison period, but then converged. The main conclusion drawn from this result is that if women had not had the additional income of workers in the household and mothers had behaved as non-mothers, the female LFPR would have been higher over the analyzed period. Interestingly, these effects are mainly observed in the period prior to 2000-2002, and after this period changes in the observed and adjusted differentials in LFPRs converge. The implications of this convergence are two. First, the cross-income elasticity of Mexican women was higher in the 1990s and in the following decade women's cross-income elasticity decreased. This means that women were more sensitive to changes in other workers income within the household in the former period and then became less sensitive in the latter period. This behavior is commonly observed in developed counties where women's behavior in the labor market resembles to that of men's (Blau & Kahn, 2007). Second, returns to motherhood may have improved over the last years and as a consequence mothers and non-mothers started behaving more similarly.

One of the main limitations of this study is that there was no consistent data (for all the years analyzed) on number of family members migrating from Mexico to the U.S. As previously mentioned, a slowdown in the number of Mexican immigrants going to the U.S. might be related to the decrease in female employment during the recession period. Another limitation is that this study only focuses on supply-side factors that affect women's employment and it does not analyze general equilibrium effects. The analytic sample is restricted to prime-working age women and women of younger and older ages are not analyzed in this study. It is possible that

the age composition of female workers might also explain employment changes. It is also possible that male wage stagnation has discouraged male workers and women are taking those jobs. Future work should focus in addressing these general equilibrium effects that can shed more light on other possible factors that have driven female employment in Mexico.

VI. Conclusions

Labor force participation of Mexican women has grown remarkably over the past two decades. The observed LFPR of women increased from 33% in 1989 to 59% in 2012 (after a brief stagnation between 2008 and 2010). Decomposition analyses show that returns to women's characteristics that affect their employment decisions have had an increasing trend in explaining these changes in working decisions, when compared to their changes in endowments. Changes at the extensive margin (to join or not join the labor market) are more significant, while changes at the intensive margin (measured through weekly working hours) are more nuanced. Adjusted models show that had women not count on additional income from other workers in their households, female LFPR would have been 4 pp higher in 1996. If mothers had behaved as non-mothers LFPR would have been 7 pp higher. Under these assumptions, female LFPR would have risen over 60% by 2012. Two main conclusions are derived from the outlined results. First, changes in endowments do not explain entirely the large increase in women's employment and changes in returns represent a larger and more significant share of changes in women's employment in Mexico. Second, the more drastic changes on female employment in Mexico happened at the extensive margin.

Through a better understanding of the characteristics that influence women's employment decisions, effective public policy programs can be created to encourage further women's participation in the Mexican labor market. On a micro-level, since women provide a crucial

source of income and family support an increase in working women's standard of living could result in less stress for children, families and governments. An overall improvement in women's working conditions would signify an increase in labor participation and possibly a more efficient utilization of the labor force, which have been linked to increases in national wealth, and development, as well as reductions in poverty rates and inequality.

This study provides a more comprehensive review of female employment in Mexico that the ones that exist to date, however, I mainly focus on supply-side changes of the labor market. In addition, further analysis is needed to explore the changes in wages and other labor market indicators, in order to assess women's improvement in the labor market.

Paper 2: Preschool Enrollment and Mother's Employment in Mexico

I. Introduction

During 2002 a change in the Mexican law included preschool as part of compulsory education. The constitutional change stated "no children would be able to enroll in primary school without having 3 years of preschool education." The policy's goal was to improve children's cognitive development outcomes by exposing them to more years of education. Prior to the policy change, preschool education was optional and available at private and public institutions. After this policy change, significant increases in preschool enrollment were observed. The effect of this policy change on preschool enrollment remains unexplored. Under the assumption that the policy had a positive impact on preschool enrollment, I hypothesize that sharp increases in preschool enrollment also impacted positively the employment of women with preschool age children.

For women with young children, labor participation and childcare are jointly determined, thus, a policy change that affects a child's enrollment represents an ideal opportunity to analyze some of the possible mechanisms that incentivize mother's employment in Mexico. In particular since 58% of workingwomen in Mexico have at least one child.

First, I estimate the effect of the policy on a child's probability of preschool enrollment. I find a positive and progressively more significant increase in preschool enrollment each year after the policy change. Then, I estimate the effect of increased preschool enrollment on maternal employment, finding significant and positive effects when mothers of preschoolers of 3- and 4-years of age are compared to mothers of younger and older children, and to non-mothers. Effects vary depending on the comparison group. Although the effect of preschool enrollment on the

employment of mothers of 5 year old preschoolers is also positive and significant after adjustments in the specification of the treatment are made, an additional policy change that affected this group of mothers complicates the analysis. For this reason, the case of mothers of 5-year old preschoolers is analyzed separately in the appendix.

This paper is organized as follows: section II presents the main findings of previous studies. Section III outlines data and methods. Section IV describes results, limitations are found in section V, and section VI concludes.

II. Prior Research

For women with young children, labor participation and childcare are jointly determined (Berlinski and Galiani, 2007). There is a large literature that has explored the effects of subsidies, changes in preschool laws and increases in the supply of schools and its relationship to maternal employment. Evidence on this topic is mixed. Schlosser (2005) found that in Israel the a gradual implementation of compulsory pre-k laws for children 3 and 4 years old in Arab towns increased maternal employment. The effect was larger among more educated mothers. Using children's quarter of birth, Gelbach (2002) found that in the United States access to a child care subsidy in 1980 increased the employment probability of single and married mothers whose youngest child was 5 years old by 6-24%. In similar a fashion, Cascio (2009) found that, in the U.S., an increase in kindergarten funding (in 1960s and 1970s) increased employment of single mothers with 5-year olds without younger children by 12%. Baker et al. (2008) studied the effect of subsidized childcare for children under 5 years old in Quebec, Canada. Their results showed a positive effect of this subsidy on maternal employment for married mothers of the magnitude of 8pp. Lafebvre and Merrigan (2005) also found an increase in hours and weeks worked in the Canadian case. In Argentina, Berlinski and Galiani (2007) explored the effect of increasing the

supply of preschools on female employment. Through a difference-in-difference analysis these researchers found that the program did have a statistically significant effect on mother's employment of 7 to 14 percentage points.

On the other side of the spectrum, Fitzpatrick (2009) re-estimated Gelbach's (2002) results and found null effects on the employment of single mothers and positive effects on the employment of married mothers. Lastly, subsidies for universal preschool in Georgia (1993) and Oklahoma (1998), in the U.S. resulted in an increase in enrollment but had no effect on maternal labor supply (Fitzpatrick, 2010). The main hypothesis behind these findings is that recent cohorts of women have changed their preferences and female labor supply is less responsive than it used to be some decades ago (Blau and Kahn, 2007; Heim, 2007). Blau and Kahn (2007) found that in the 1990s women's own elasticity decreased in 50-56%, while their cross-wage elasticity fell by 38-47%. This theory predicts that only those women that work less than the number of hours of care provided by the programs would indeed increase their labor supply (Fitzpatrick, 2010). No such studies have tested the Mexican case.

III. Preschool enrollment and the policy changes in Mexico

On November 2002 the Mexican government modified the compulsory education laws to include the completion of preschool education. Prior to the change, the "basic" compulsory education laws in Mexico included six years of primary education and three years of middle school. The new legislation phased in universal preschool across the whole country. In the first phase, it would be compulsory to all 5 year-olds to enroll in the 3rd grade of preschool by school year 2004-2005. Subsequently, during the second phase the compulsory law reached all the 4 and 5 year olds eligible for the second and third grades of preschool by the academic year 2005-

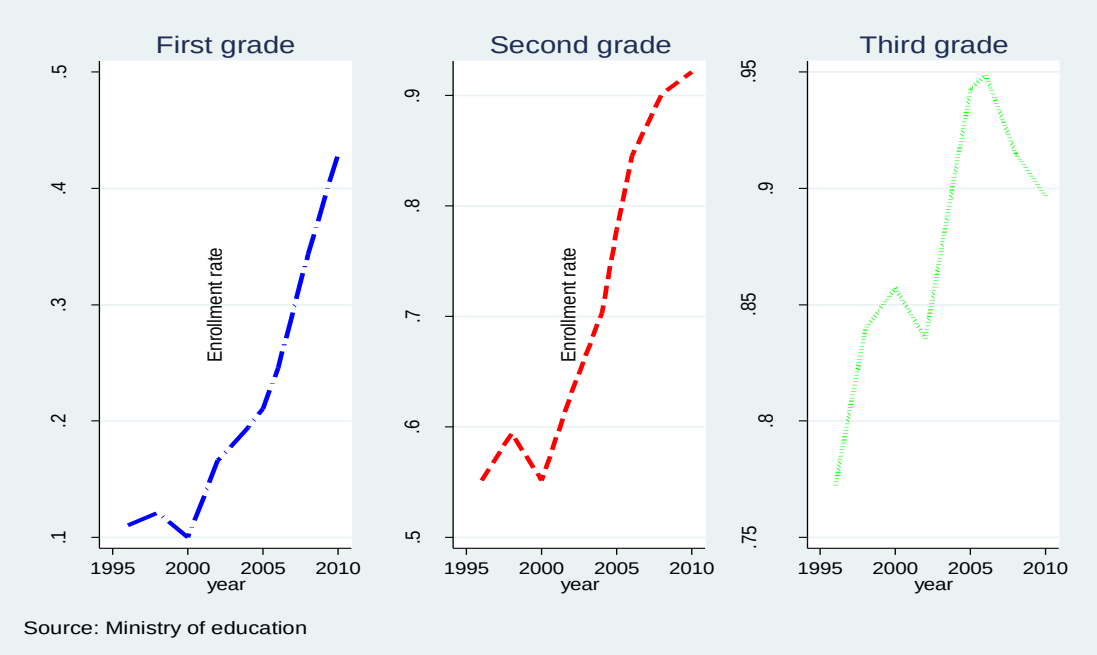
2004. The third phase compelled all eligible children to enroll in the first and all the consecutive grades of preschool by school year 2008-2009.

The year the reform was passed (2002), national enrollment rates were, on average, 19%, 61% and 81% for the first, second and third grades of preschool, respectively. After that year, gradual changes occurred between 2004 and 2008, but not all the parents were able or willing to enroll their children in preschool. Given the low levels of preschool enrollment prior to the reform, by 2008 the roll out was not successful (see figure 1 in the appendix), thus the government relaxed the policy and it required that children had at least one year of preschool in order to enroll in elementary school.

In 2006 another education law change took place. Starting school year 2006-2007, the minimum entry age for first grade of elementary school changed from being 6 years old by September (when school year starts) to 6 years old by December of the corresponding school year. This change would allow 5-year old children to be enrolled in the first year of primary school four months prior to their 6^{th} birthday. This complicates the analysis of the employment outcomes of mothers of 5-year old preschoolers, because after 2006, a 5-year old child could either be enrolled in preschool or in primary school. For this reason, the impact of universal preschool on the employment of mothers of 5-year olds is analyzed separately from the outcomes of mothers with 3- and 4-year olds.

Additionally, as shown in figure 1 in the appendix, there is wide state variation in preschool enrollment in Mexico. I will exploit this state-year variation to identify the effect of universal preschool on maternal labor supply. The trend of preschool enrollment per grade is shown in the figure below.

Figure 1 Preschool enrollment rates by grade



IV. Data and Methods

Data

Cross section data come from the *Mexican Income and Expenditure Household Survey* (ENIGH). This survey provides a rich set of labor market indicators and information on socioeconomic and demographic characteristics, and it is representative of the urban and rural population. This data is collected since 1984, although information on marital status is only included since 1996. This database also includes information on individual school enrollment for all the people of 6 years of age or older for all survey years. However, information of preschool enrollment (for children younger than 6 years of age) was collected only after 2004. Thus, I can only include observations from 2005-2012 in the estimation of the probability of preschool enrollment. In order to ensure comparability across the different models, I also restrict my sample to include observations from 2005 to 2012 in the estimation of female labor force participation.

In addition, I appended a file with enrollment rates by year, state, and age of the children using yearly reports from the Ministry of Education for years 1996 to 2012. Finally, I also added data on ruling party at the state level collected by the *Research Center for Development* (CIDAC) that is publicly available. [5]

Empirical strategy

In order to test the effect of the policy change on preschool enrollment I calculate the probability of enrollment for each of the three grades of preschool. To contrast the effect of the two policies that affected mothers of 5-year old children after 2006, I also calculate the probability of enrollment in the first grade of primary school for 5-year old children. The probabilistic models have the following functional form:

$$P_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \beta_1 Year_t + \lambda_j + \partial_a + \varepsilon_{ijta} \quad (1)$$

$$E_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \beta_1 Year_t + \lambda_j + \varepsilon_{ijt} \quad (2)$$

Where *i* indexes the individuals; *j* indexes state of residence (1-32), *a* indexes child's age, and *t* indexes year. In model (1), the probability of preschool enrollment (P_{ijt}) is calculated for children of 3-6 years of age. This model includes age of the child fixed effects. In model (2), the probability of primary school enrollment (E_{ijt}) is calculated only for 5-year old children. Both models include controls for number of working adults in the house (as a proxy for wealth level), number of elderly (proxy for family caregivers), state fixed effects and state-year trends. In these models I include five *year* dummies from 2005-2012 (2005 being the omitted category) to show the impact of the policy change on the probability of enrollment. After the estimation of this model I calculate the average predicted probability in preschool enrollment per year and grade to show the effect of the policy on individual enrollment. As Bertrand, Duflo, and Mullainathan

[5] CIDAC: http://www.cidac.org/esp/Datos_Electorales.php#tab3

(2004) point out, conventional standard errors often understate the standard deviation of the estimators. Thus, errors in these two models are clustered at the state level.

Once it has been established that universal preschool did have a significant effect on preschool enrollment, I estimate the effect of changes in preschool enrollment on maternal employment through a difference-in-difference (DD) model that takes advantage of the state-year variation in enrollment. The specification of the probabilistic model is the following:

$$Y_{ijt} = \alpha_0 + \alpha_1 Z_{ijt} + \beta_1 Enroll\ rate_{jt} + \beta_2 Treatment_i + \beta_3 Enroll*Treatment_{ijt} + \mu_j + \lambda_t + \partial_m + \varepsilon_{ijtm} \quad (3)$$

Where Y_{ijt} represents a dichotomous variable of employment status for the *i-th* woman, in *j* state (1-32), in period t (2005-2012). The *enrollment rate*$_{jt}$ is a continuous variable that takes advantage of the state-year variation in the rate of enrollment for each of the three preschool grades. First, the enrollment rates of all preschool grades are analyzed together, and then separately. Coefficient β_1 captures the effect of changes of aggregate preschool enrollment by year and state on maternal employment.

Mothers with a preschool age child are potential beneficiaries of provisions that affect preschool enrollment. Thus, the *treatment*$_i$ variable indicates that a woman of 20-40 years of age has a child of preschool age (3-5 years of age). The "treatment" status is based solely on the age of the child, thus this should be considered intend-to-treat estimates. Since there is no random assignment of the treatment, there is no perfect comparison group. In light of this, three comparison groups of women of a fertile age (20-40 years old) are included. *C_1:* women with *younger* children (0-2 years of age), *C_2:* women with *older* children (7-9 years of age) and *C_3:* women with *no children*. The threshold for comparison group two was chosen such that these mothers had similar employment outcomes and characteristics to mothers of preschoolers, to

achieve better comparability. Mothers of 6 year old children are not included in this group because there is a non-negligible overlap of 6 year olds enrolled in preschool.

In this analysis, the difference-in-difference estimate is given by β_3 and this represents the coefficient of interest. I hypothesize that in absence of universal preschool and the consequent sharp increase in preschool enrollment, the employment trajectories of mothers of preschoolers would have been the same as those of mothers of children of other ages (and those of non-mothers). Since I use the age of the child to determine the treatment status and not actual preschool enrollment, β_3 provides an intention-to-treat (ITT) estimate. Thus, β_3 captures the effect of universal preschool on maternal employment for potential beneficiaries (mothers of preschoolers) when compared to women that should have not been affected from increases in preschool enrollment in states were preschool enrollment increased sharply. Traditional DD analyses usually use a dummy of pre- post-policy to test the effect of a policy change. In this analysis, I use enrollment rate which is a continuous variable and captures more subtle changes of the policy across years.

The vector Z_{ijt} contains controls for *education* (less-than-primary education, primary education and some secondary education, and complete secondary education and beyond), *marital status* (married or cohabitating, single and divorced, separated or widowed), *region* (urban and rural), *family status* (i.e. whether the woman is head of the household), *number of women, number of men, number of additional workers in the household*.

During the legislative discussion of the change in compulsory education laws there were party differences in budget allocation and disbursement. To control for these differences I control for local party in power, creating one dummy variable for each of the three ruling parties across states in Mexico (-PRI, *Partido Accion Nacional* -PAN and *Partido de la Revolucion*

Democratica -PRD). In order to account for pre- and post-trends in state preschool investment I also added a variable for when the state and federal party coincide.

This model includes a state fixed-effect μ_j that removes fixed differences in maternal employment across states, a year fixed-effect λ_t that absorbs variation for common shocks to maternal employment, an age-of-the-mother fixed effect ∂_m that controls heterogeneity of labor decisions across different ages, and ε_{ijtm} is an individual error assumed to be distributed independently across states and independently from μ_j, ∂_m, and λ_t.

In order to estimate the treatment-on-the-treated (TOT) effect of the policy change, I used a different specification of the treatment. The model used to measure the TOT is analogous to model (3), which estimates the ITT, but it differs in that the treatment is not subject to a child's age, but it is subject to a child's actual preschool enrollment. Model (4) has the following functional form with the same control specifications and fixed effects.

$$Y_{ijt} = \alpha_0 + \alpha_1 Z_{ijt} + \gamma_1 Enroll\ rate_{jt} + \gamma_2 Treatment_i + \gamma_3 Enroll*Treatment_{ijt} + \mu_j + \lambda_t + \partial_m + \varepsilon_{ijtm} \quad (4)$$

In this case, γ_3 is the coefficient of interest and provides the TOT effect of preschool enrollment on maternal employment. In this model I let the age of the child vary because as observed in table 1, there is a certain degree of age variation in each grade of preschool. Age ranges from 3 to 7 years of age in 99.8% of the cases, thus this is the range that I use for the analysis. In the case of the comparison group I only change the age threshold of the comparison group of mothers with older children in order to avoid an overlap, thus mothers of older children only include children of 8 and 9 years of age. The period also includes years 2005-2012.

Table 1 Age distribution of children enrolled in preschool by grade

Age	Grade 1	Grade 2	Grade 3
3	60.5%	6.8%	0.1%
4	28.8%	69.2%	6.0%
5	8.5%	22.6%	87.7%
6	1.5%	1.0%	5.9%

7	0.48%	0.17%	0.17%
Total	99.8%	99.9%	99.9%

Source: ENIGH 2004-2012

V. Results

Descriptive characteristics of women among 20-40 years of age of *treatment* and *comparison* groups are found in table 2. Average labor force participation rate (LFPR) of mothers of preschool-age children is 44%. Both mothers of older children and non-mothers have higher LFPRs at 51% and 62%, respectively. Mothers of younger children have a lower LFPR at 35%. The age composition of mothers of preschoolers is very different from the three comparison groups, among the former 16% are 20-25 years old, and 22% are 36-40 years old.

Table 2 Average characteristics of women 20-40 years of age (1996 to 2012)

Mothers grouped by child's age	Child 3-5	Child 0-2	Child 7-9	No children
Labor force participation rate	0.444	0.349	0.514	0.624
Age groups 20-25	0.167	0.306	0.043	0.322
26-30	0.310	0.327	0.176	0.227
31-35	0.300	0.233	0.366	0.155
36-40	0.223	0.134	0.415	0.142
Marital status				
Single	0.036	0.028	0.043	0.377
Married	0.907	0.940	0.882	0.548
Divorced/separated/widowed	0.057	0.032	0.076	0.076
Education				
Less than primary	0.170	0.177	0.160	0.119
Primary and some secondary	0.246	0.247	0.246	0.167
Secondary and beyond	0.584	0.576	0.594	0.714
Number of children				
One	0.218	0.215	0.164	n/a
Two	0.348	0.336	0.399	n/a
Three or more	0.434	0.448	0.437	n/a
Household composition				
Head of household	0.124	0.087	0.155	0.207
Additional workers	1.552	1.492	1.963	1.423
Number of women	2.350	2.409	2.400	1.755
Number of men	2.260	2.323	2.244	1.038
Urban residence	0.775	0.748	0.761	0.857
Observations	21.5	25.9	6.1	13.3

Note: 1. Data come from ENIGH for the years 1996-2012 2. Observations are weighted and expressed in millions.

Women with younger children and non-mothers are in comparison younger, 31-32% are 25 years old or younger and 13-14% are 36 years of age or older. It is interesting to note that women of older children represent a significantly older cohort, 42% are 36 years of age or older and only 4% are in the youngest age group. The composition of marital status is similar among mothers. In general 3-4% of all mothers are single, 88-94% is married, and 3-8% is divorced or widowed. The composition differs greatly for non-mothers, whom in general present a significantly lower marriage rate (55%) and as a complement a much higher percentage of non-married women (45%). Education levels between mothers of preschoolers and mothers of young children are very similar: 17% have less-than primary education, 24% have primary or some secondary education 58% have a secondary diploma and beyond. Women with older children are slightly less educated than other mothers, but show a similar education distribution. Women with no children have the highest level of education level, 71% have secondary diploma or more. Among mothers, the majority (54- 57%) has one or two children. There are a lower percentage of women with young and preschool children who are the head of the household (9-12%). For mothers of older children and childless women these percentages are 16% and 21%, respectively.

Lastly, the distribution of party ruling at the state level is the following: 28% for PAN, 15% for PRD and 57% for PRI. In the period analyzed there was a party transition. From 1996 to 2000 PRI ruled the country, and from 2000 to 2012 the PAN rules. On average, in 32% of the state the federal and state parties coincided at some point.

Effect on preschool enrollment

Results from model 1 indicate that preschool reform had a significant effect on increasing a child's probability of enrollment on the first and second grades of preschool after 2006. After calculating the probit models for all preschool years, changes in the marginal probabilities of

enrollment were calculated. Table 3 shows these marginal probabilities. Results show that a child's probability of being enrolled in the first grade of preschool increased by 16% in 2008, and by 19% in 2010 and 2012. The probability preschool enrollment for second graders increased 22-24% across 2008-2012. No statistically significant changes were observed for the year 2006.

The case for children in the third year of preschool (usually 5-year olds) showed a different trajectory. The probability of preschool enrollment in the third grade increased by 3% in 2008, by 4% in 2010, and in 2012 this probability decreased by almost 3%. As previously discussed, in 2006 the minimum entry age for primary school changed allowing some 5-year children to be enrolled in primary school. This effect is reflected on model 2 that shows the probability of a 5-year old to be enrolled in primary school. The probability of a 5-year-old to be enrolled in elementary school increased gradually over the years. In 2006 the probability of enrollment increased by 5%, in 2008 by 9%, in 2010 by 10% and in 2012 by 11%. These contrasting results for 5-year olds show that when a mother of a 5-year old was presented with the alternative of enrolling her child in either primary school or preschool, on average, mothers chose to enroll their child in primary school. The implication of these results on the employment outcomes of mothers of 5-year olds and preschoolers on the third grade of preschool is further discussed in the appendix.

Table 3 Marginal probability of preschool and first grade elementary enrollment

	Preschool			*Elementary school*
	(1)	(2)	(3)	(4)
Year	First grade	Second grade	Third grade	First grade: 5-year-olds
2006	0.0081	-0.0023	-0.0146	0.0572*
	(0.0063)	(0.0067)	(0.0118)	(0.0248)
2008	0.1587***	0.2430***	0.0304**	0.0961***
	(0.0091)	(0.0119)	(0.0113)	(0.0184)
2010	0.1913***	0.2404***	0.0433***	0.1021***
	(0.0136)	(0.0121)	(0.0122)	(0.0161)
2012	0.1992***	0.2245***	-0.0252*	0.1124***

	(0.0173)	(0.0131)	(0.0126)	(0.0191)
Observations	22.1	28.8	33.1	8.4

Note: 1. Data includes years 2005-2012 (where there is available information on individual enrollment for children of 5 years of age and younger) 2. Weighted observations are in millions. 3. Robust standard errors clustered at the state level. 4. Significance level: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 5. Models 1-3 include children of 3-6 of age; model 4 includes *only* 5-year olds. 6. Controls include child's gender, urban residence, presence of elderly in the household and number of working adults within the household.

Preschool enrollment and maternal employment

Table 4 shows the results of model (3) that includes preschool enrollment for the three preschool grades combined and additionally results for mothers of 3- and 4-year olds. As previously described, only observations from 2005-2012 are included. Analyses including prior years were run separately and results do not change substantially. In the first case, universal preschool increases the probability that a mother with a preschool-age child is employed by 46 pp, in comparison to mothers of younger children. When the comparison groups are mothers of older children and non-mothers, the effect on the employment is not statistically significant. Thus, when all potential beneficiaries of the policy are combined, the effect is not indistinguishable from zero, except when mothers of preschool-age children are compared to mothers of younger children. These results could portray the significant weight of mothers of 5-year old preschoolers whom were influenced by different policy changes in addition to universal preschool.

When model (3) is disaggregated by preschool grade, the effects of universal preschool are positive and significant for mothers of 3- and 4-year of age. For mothers of 3-year olds, universal preschool enrollment increased a mother's probability of employment by 18-24 pp when compared to mothers or older or younger children, respectively. The analogous effect for mothers of 4-year olds is higher, and ranges from 39-55 pp. When compared to non-mothers, the effect of universal preschool on employment for mothers of 3- and 4-year olds is also positive and significant (43-51 pp).

Table 4 Preschool enrollment and female employment (ITT estimates)

	(1) Younger child	(2) Older child	(3) No children
ITT estimate (all grades)	0.4667+	0.2769	0.5972
	(0.263)	(0.351)	(0.388)
ITT estimate (mother of a 3-year old)	0.2357***	0.1834***	0.5108***
	(0.003)	(0.004)	(0.003)
ITT estimate (mother of a 4-year old)	0.5520***	0.3862***	0.4315***
	(0.004)	(0.005)	(0.004)
State fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Mother's age fixed effects	yes	yes	yes
Observations	41.1	27.7	70.5

Note: 1. Weighted observations are in millions. 2. Household composition, education, marital status, family status, and political environment controls are included. 3. Robust standard errors in parentheses. 4. Significance level: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 5. Sample is restricted to years 2004-2012 to assure comparability with TOT estimates.

Under the second specification of the treatment, that uses individual preschool enrollment, effects are statistically significant for the pooled group of all-age preschoolers. Effects are stronger across all comparison groups for mothers of first grade preschoolers. In the case of second grade preschoolers, effects are consistently smaller in magnitude but the effect remains positive and statistically significant. The TOT estimate ranges from 35- to 84 pp for mothers of first grade preschoolers and for second grade preschoolers the effects ranges from 8- to 33 pp.

Table 5 Preschool enrollment and female employment (TOT estimates)

	(1) Younger children	(2) Older children	(3) No children
TOT estimate (all preschool grades)	0.0427***	0.3983***	0.7084***
	(0.002)	(0.012)	(0.012)
TOT estimate (child enrolled in first-year)	0.3662***	0.3472***	0.8351***
	(0.006)	(0.006)	(0.006)
TOT estimate (child enrolled in second-year)	0.1360***	0.0831***	0.3273***
	(0.005)	(0.006)	(0.006)
State fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Mother's age fixed effects	yes	yes	yes
Observations	20.5	7.6	10.7

Note: 1. Weighted observations are in millions. 2. Household composition, education, marital status, family status, and political environment controls are included. 3. Robust standard errors in parentheses. 4. Significance level: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 5. Sample includes years 2004-2012.

A mother's decision to enroll her child in preschool might be endogenous. Mothers might select to enroll their children in preschool based on information about preschool quality, other indicators of child development or other idiosyncrasies. In order to address the possible effect of endogeneity in a mother's decision to enroll their children in preschool, I use the results from predicted preschool enrollment (model 1) per state and year in lieu of the observed enrollment rate per grade. I then estimate the effect of predicted enrollment on female employment of mothers who have a child of 3- or 4-years of age. These models also include state, year, and age fixed effects. Across all comparison groups, effects for mothers of 3-year olds are larger than the ITT and TOT estimates. For mothers of 4-year olds, effects are consistently smaller in magnitude than the ITT estimates, and similar to the TOT estimates.

Table 6 Predicted preschool enrollment and female employment

	(1) Younger child	(2) Older child	(3) No children
Estimate for mothers of a 3-year old	0.6580***	0.7488***	0.8165***
	(0.005)	(0.005)	(0.005)
Estimate for mothers of a 4-year old	0.2467***	0.0826***	0.1762***
	(0.004)	(0.004)	(0.003)
State fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Mother's age fixed effects	yes	yes	yes
Observations	17.08	12.76	19.39

Note: 1. Weighted observations are in millions. 2. Household composition, education, marital status, family status, and political environment controls are included. 3. Robust standard errors in parentheses. 4. Significance level: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 5. Sample includes years 2004-2012.

VI. Limitations

One important limitation of this study is the availability of data. There is no available data on the construction of preschools by state and year. The only data available is for existing elementary schools at the national level or disaggregated data for a couple of states. Had these data been available at the state-year level, this analysis would have been included the constructions of schools as an instrument to more precisely measure the effect of universal

preschool on maternal employment. Another data limitation is found in the information of individual preschool enrollment that is only available from 2005 and after. A richer data set with this information unfortunately does not exist. Thus, to the best of my ability I constructed variables on individual enrollment only for the 2005-2012 periods.

VII. Conclusions

Preschool enrollment increased sharply after compulsory education laws changed in Mexico. At the same time minimum entry laws for elementary school changed and mothers of 5-year old children were able to enroll their children in elementary school. Both laws positively affected enrollment. Preschool enrollment also had a positive effect on a mother's probability of employment. Universal preschool increased a mother's probability of employment by 24-55 pp, when mothers of 3- and 4- year olds are compared to similar women with younger children. The effect of universal preschool enrollment on a mother's probability of work is also positive and significant when mothers of 3- and 4-year olds are compared to mothers of older children and non-mothers. Those effects ranged from 18- to 51 pp increases in employment, depending on the comparison group. When the specification of the treatment depended on a child's preschool enrollment (and not on the age of the child) the effect of universal preschool becomes stronger in for women of children enrolled in the first grade of preschool and remains statistically and substantially significant for women with children enrolled in second grade of preschool. When predicted enrollment by state and year is used instead of the observed enrollment rate, estimates are consistent. Overall, results show that women who enrolled their children in preschool did have better employment outcomes than the potential beneficiaries.

Effects of actual enrollment increased notoriously for mothers of first grade preschoolers, across all the comparison groups. One possible explanation could be that once mothers enroll

their children in the first year of preschool, they are more likely to maintain their child in school, while having a more steady employment path and less job interruptions. Since the preschool provision requires that to be enrolled in primary school a child has to have at the minimum one year of preschool, 3-, 4- and 5-year olds can be enrolled only in one year of preschool. However, the older the child grows without being enrolled in preschool, the lower the probability that the mother can return to the labor market. Longer absences from the labor market also imply larger losses of job experience. Another plausible explanation is that 4-year olds might already be in other form of child care (i.e. private childcare or some type of family care). If that is the case, mothers of those children should be less responsive to changes in compulsory education laws.

Even though the labor participation of Mexican women has increased over the last few years, working mothers still face several barriers to return to the labor market after childbirth. Time and monetary constraints hamper a mother's potential to invest in human capital, to fully develop professional long-lasting careers or to simply reincorporate into the labor market. Thus, improvements in mother's motivation for employment could further increase the female labor force participation in Mexico. In addition, the effects of universal preschool could be more lasting for potential beneficiaries. Thus, it is worth analyzing the effects on wages, income mobility and other indicators of wellbeing.

Paper 3: Gender Earnings' Differentials: Disaggregating Human Capital Characteristics

I. Introduction

In his seminal paper, Jacob Mincer (1958) argued that education and experience play a fundamental role in the determination of a worker's earnings. A wage differential between men and women could mirror a difference in workers' endowments of important aspects of human capital, in particular education and work experience, but it could also be a sign of differential returns to men's and women's characteristics. Hence, it is important to include accurate measures of these variables to estimate wage gaps. Literature analyzing earnings' differentials in Mexico has found mixed evidence on the overall composition of the gender wage gap.[6] Previous studies have failed to incorporate key aspects of human capital that impact workers' earnings. I establish that human capital endowments account for a larger share of the gender earnings' gap once a more precise measure of work experience and measures of cognitive ability and non-cognitive skills are added to the earnings' model.

In this study, I use detailed data on jobs, schooling, IQ (proxy for cognitive ability), self-reported measures of non-cognitive traits, and earnings of full time employees from the Mexican Family Life Survey (MxFLS) for 2002. The empirical strategy relies on the Oaxaca-Ransom decomposition to analyze the gender gap in two outcomes: weekly wages and weekly wages plus employer-provided benefits. Under this decomposition methodology, the component attributable to endowments measures the expected change in female's mean earnings, if females had males' human capital, and other relevant work-related characteristics. The component attributable to returns measures the expected change in females' mean earnings, if females were treated as

[6] Brown et al. (1999), Pagan and Ullibarri (2000) and Sánchez et al. (2001) have found that most of the wage gap is due to differences in human capital endowments. Yet, Popli (2008) found the most of the gender wage gap is explained by discrimination.

males. Wages and labor income are only observed for people who are working, and this is not necessarily a random sample of the population. Thus, it is common, and relevant, to include a correction for sample selection bias in the wage equations, based on the procedure developed by Heckman (1976). Based on this, I apply a selection adjustment to account for selection into employment prior to the decomposition calculations.

Once more precise human capital characteristics are incorporated into the earnings' equation; five main conclusions are derived from the analysis. First, the gender gap in weekly wages is 15%, while the gender gap in weekly wages plus benefits is 45%. Second, a quarter of the gender gap in weekly wages is explained by differences in women's and men's endowments. Another quarter is explained by differential returns to employees' characteristics, and half of the gap remains unexplained. Third, the share of the gender gap in weekly wages attributable to endowments increases by eight percentage points, and the share attributable to returns decreases by ten percentage points when more complete measures of human capital (i.e. projected work experience, cognitive skills, and non-cognitive skills) are added to the model. Fourth, the explanatory power of human capital characteristics on gender differences in the returns is 15%, while human capital explains 50% of gender differences in endowments. Fifth, work experience accounts for half of the human capital's share in endowments (7 out of 15 percentage points) and half of the share in returns (26 out of 49 percentage points). Disaggregated results for the different components of the gender gap in weekly wages that also adds employer-provided benefits yield similar conclusions.

The rest of the paper is organized as follows. Section II briefly describes the prior research on gender differences in earnings in Mexico. Section III presents the data and methods

for this study. Section IV presents the analysis of the results. The discussion can be found in section V and section VI concludes.

II. Prior Literature

Several authors have attempted to explain the sources of gender wage differentials in Latin America, exploring issues such as differences in individual characteristics and human capital endowments, labor market regulations, and occupational segregation (Tenjo, 1992, 2004; Brown, et al., 1999; Lim, 2002; Rendón, 2003, 2004; Cruces & Galiani, 2007; Deutsch et al., 2004; Atal et al., 2009), among others. The literature has also attempted to relate gender wage gaps to differences in income generating opportunities available in urban and rural areas, but no clear link can be found (Hertz et al., 2008).

In Mexico, Brown et al. (1999) and Sánchez et al. (2001) found that most of the gender wage gap could be explained by gender differences in human capital endowments. Both studies relied on the National Urban Employment Survey (ENEU) and both used a decomposition analysis. Pagan and Ullibari (2000) analyzed the gender gap in weekly earnings across heterogeneous socio-demographic groups using data from ENEU for the year 1995, potential work experience as a proxy for actual work experience, and an additively decomposable index (Jenkins inequality measure[7]). Pagan and Ullibari (2000) found an unexplained gender gap in weekly earnings of 10.4%, being the largest among individuals with either high or low levels of educational attainment. Meza (2001) estimated gender differentials in hourly wages in Mexico from 1988 to 1998. Meza (2001) used data from ENEU for full time workers, and Juhn, et al. (1991) decomposition methodology to measure changes in wage structures, and gender wage

[7] The Jenkins (1994) index summarizes the distribution of the unexplained gender wage gap based on the difference between two generalized Lorenz curves. These two curves represent the predicted distributions of female earnings and the counterfactual distribution of female earnings, under the assumption that they are treated as males.

differences throughout the wage distribution of male and female workers. This author estimated a gender wage gap for 1998[8] of 6% between the 50th percentile of the female wage distribution compared to the 50th percentile of the male wage distribution, and a gender gap of 11% for the 25th-25th percentiles of the wage distribution. The author also found that the gender wage gap also dropped in Mexico between 1988 and 1998.

Most relevant to this study, Popli (2008) estimated the most recent gender gap in hourly wages in the Mexican labor market for 2002. This study used data from the National Income and Expenditure Household Survey (ENIGH), age dummies to proxy work experience, and three different methodologies: a decomposition analysis, the Jenkins measure, and a non-parametric distribution approach. The estimate of the gender wage gap in this study is 21% in 1984 and 16% in 2002. Using a non-parametric approach that created wage counterfactuals, Popli (2008) estimated that half of the gender gap in wages was due to differences in characteristics and half due to difference in returns, with this later component being the only significant share of the two, thus attributing most of the gap to labor market discrimination. Previous literature on the Mexican gender wage gap has failed to include a precise measure of work experience. Instead, these studies rely on age dummies or potential work experience as proxies for work experience and seniority. Prior literature in this topic has not included cognitive or non-cognitive traits in the estimation of earnings' differentials.

III. Data and methods

Data

Data for this study come from MxFLS. This is a longitudinal survey that collects a wide range of information on demographics, employment decisions, family dynamics, mental health

[8] Meza (2001) provides estimates of the gender gap in hourly wages for all the years from 1988 to 1998, but I only mention results for the latest year available.

and emotional wellbeing among others. In addition, this is the only database in Mexico that contains information on cognitive ability. The survey was conducted during 2002 and has information on monthly income, hours worked and work experience for years 2000 and 2002. The sample size consists of approximately 4,534 individual observations with information in all the relevant variables including earnings. The analytic sample is restricted in two ways. First, it includes workers ages of 25 to 54 years of age to abstract from school enrollment and retirement decisions. Second, as women tend to be overrepresented in part-time, flexible jobs, the analytic sample is restricted to full-time workers, to have more comparable men and women. From the sample of workers previously mentioned, 2,870 are full time workers with complete information on the relevant variables, 24% of them are women and 76% are men. The MxFLS has information on self-reported monthly income and also on the disaggregated sources of income, including wages and employer-provided benefits. While there are 2,870 full time workers with information on total monthly income, there are only 850 full time workers with information on wages.

Outcome Measures: wages and wages plus employer-provided benefits

In this study, two measures of earnings are analyzed: weekly wages and total weekly wages that also include employer-provided benefits. Wages are reported on a monthly basis, and then adjusted using self-reported weeks worked to generate weekly wages. Weekly and not hourly wages are preferred to decrease the measurement error introduced by using working hours that might be under or over reported. As opposed to using weeks worked, the measurement error for hours worked can be greater. The second measure of earnings is added to have a broader understanding of differences in the types of jobs that men and women have. This measure of weekly wages plus employer-provided benefits adds up information from wages, piecework, tips,

extra hours, meals, housing and transportation allowances, and medical benefits. Among these benefits, only transportation allowances benefit the worker exclusively, the rest of the benefits potentially benefit the whole family. Income from the main and secondary jobs from the aforementioned sources is added up. One relevant aspect of compensation that is not accounted for is job flexibility. Women might be working in more amenable workplaces that allow for remote work options or other flexible work arrangements, where they can achieve a better work-family balance. This type of flexibility is not measured in the compensation package, thus differentials in wages plus benefits might overestimate the actual gender differences.

Selection correction

Wages and labor income are only observed for people who are participating in the labor force and this might be a selective group. Thus, it is common to include a correction for sample selection bias in the wage equations based on the procedure by Heckman (1976, 1979). The most straightforward approach to account for selection bias in a decomposition analysis is to deduct the selection effects from the overall differential and then apply the standard decomposition formulas to this adjusted differential (Reimers 1983; Dolton and Makepeace 1986; Neuman and Oaxaca 2004).

The following models use Heckman selection correction to adjust for selection into employment. As a first step I use a probabilistic model of labor force participation for women, controlling for age, age squared, marital status (married or cohabitating, single and divorced, separated or widowed), education (incomplete primary education, primary or some secondary education, secondary or some high school, and some college and beyond), a four-level dummy that captures the effect of number of children (one-child, two children and three or more children, the base category is no children)and urban residence. As a second step predicted values

of employment are calculated based on the coefficients of the predictors, holding predictors at their mean. The third step is to calculate the inverse mills ratio (IMR) which is equal to the conditional expectation of a standard normal random variable. The IMR answers the question "what is the probability of an event given that the event has not already occurred" (Autor, 2003). The fourth step is to estimate earnings' differences using the OR decomposition, including the IMR as one of the predictors.

Empirical strategy

The most common regression-based method used in the literature to measure earnings' gaps is the counterfactual decomposition technique (and its variations) developed by Blinder (1973) and Oaxaca (1973). In this method, mean differences in workers' earnings can be disaggregated into two components: endowments and returns. The "endowments effect" measures the expected change in female's mean earnings, if females had males' predictor levels. This is the part of the differential explained by group differences in the predictors. The second component known as the "coefficients effect" measures the expected change in female's mean earnings, if females had males' coefficients. This component measures the portion of the earnings' differential due to returns in a worker's characteristics.

The main criticism to the Blinder-Oaxaca decomposition is that using a single gender earnings' structure as a norm for measuring discrimination and productivity differentials is too extreme. Extensive research on earning's decomposition has resulted in improved models for measuring the wage gap (Cotton, 1988; Oaxaca and Ransom, 1994; Dinardo et al., 1996; Juhn et al., 1991, 1993; Machado and Mata, 2005; Chernozhukov, 2010). Particularly, Oaxaca and Ransom (1994) developed a pooled method where the wage structure obtained from the pooled regression is interpreted as an estimate of a competitive norm. This decomposition methodology

consists in estimating three separate constrained linear wage regressions: one for males, one for females and one for the pooled sample of all workers. This last equation would include a gender intercept that would shift along with the identification restriction. Namely, the pooled regression is an estimate of what the wage structure would be if there was no wage discrimination (Fortin, 2008).

Under the Oaxaca-Ransom (OR) decomposition[9], worker's earnings for males (m), females (f) and for the pooled sample of males and females (p) are represented in the following linear model:

$$Y_{ig} = \alpha_{0g} + \alpha_{ig}\underline{X_{ig}} + e_{ig}, \quad g=f,m,p \tag{1}$$

In this model, Y_i represents a logged measure of weekly wages or weekly total wages plus employer-provided benefits The $\underline{X_i}$ is a vector that includes all the control variables for the *i*-th individual's characteristics. Controls include dummies for: age, age squared, education (incomplete primary education, primary or some secondary education, secondary or some high school, and some college and beyond), region (urban and rural), formal job contract, family status (i.e. whether the worker is head of the household). State fixed effects are included.

There is an ongoing debate in labor economics regarding inclusion of variables that might be endogenous to wages, such as occupations (Blau and Ferber, 1987). The main models do not include controls for occupations, but additional analyses including fifteen dummies for different occupations, based on the North American Classification System (SCIAN), are included in the appendix. The independent and identically distributed error is represented as e_i. Errors are clustered at the state level.

[9] The detailed disaggregation of the decomposition methodology can be found in the Appendix.

The average earnings' differentials, based on the OR decomposition can be decomposed as:

$$Y_{im} - Y_{if} = \Delta X\beta_p + X_m(\beta_m - \beta_p) + (\beta_{0m} - \beta_{0p}) - X_f(\beta_f - \beta_p) + (\beta_{0f} - \beta_{0p}) \quad (1a)$$

Where the first term represents changes in endowments, the second term represents the "advantage of men", in the form of higher returns to their characteristics, and the last term represents the "disadvantage of women", in the form of lower returns to their characteristics (Fortin, 2008). A residual portion of the wage gap that is not explained by returns or endowments of workers' characteristics is deemed as unexplained.

Augmented models

One problem that arises when measuring the gender wage gap is that if important characteristics are omitted when calculating this gap, the unexplained component will capture the effect of unobserved group differences in productivity and tastes. Thus, the unexplained portion of the gap might be overestimated to the extent that unexplained pay differentials between men and women are due to gender differences in unmeasured qualifications. Measurement error in wage gaps can also cause an overestimation of the portion due to returns. If women's work experience is measured with error, as it tends to be the case when potential work experience is used, the return to experience might be lower for women, suggesting that gender wage gaps are mainly explained by differences in returns. Once a more precise measure of work experience is used, the portion due to returns might decrease while, at parallel, the portion due to endowments increases.

In order to provide more precise estimates of the shares attributable to endowments and returns, I include human capital variables, that previous studies on wage differentials in Mexico had fail to incorporate: years of work experience, a measure of IQ (as a proxy for cognitive ability) and non-cognitive traits (that reflect emotional wellbeing).

Work experience

Women are more likely than men to interrupt their careers to bear and raise children. For this reason, on average, women have less work experience than men. But within women there is also heterogeneity in their labor choices. Mothers have lower work experience than non-mothers (Light and Ureta, 1995; Waldfogel, 1997; Budig and England, 2001). Thus, it would be imprecise to assume continuous work profiles for all women. In order to have a correct model of women's earnings it is crucial to have information on work experience and job interruptions. Wage models ideally should have measures of job continuity and tenure with each employer.

In the case of Mexico, researchers have relied on age dummies or age and age squared to measure the effects of seniority (Sanchez et al., 2000; Meza, 2000; Popli, 2008). Others have used potential work experience as a proxy for actual work experience by subtracting years of education and to years of age –adjusting for the number of years before entering school (Brown et al., 1999; Pagán and Ulibarrri, 2000).

On average, men have strong labor force attachment and potential work experience is a reasonable proxy for men's actual experience (Oaxaca, 1973). Women have more job interruptions and the use of potential experience is an inadequate proxy to measure women's job-related skills (Oaxaca, 1973; Light and Ureta, 1995; Waldfogel, 1997; Altonji and Blank, 1999). Potential experience generally overstates women's work experience since it does not account for the time that women spent out of the labor market for child rearing. Theory predicts that women's potential experience-wage profile is flatter than the actual experience-wage profile (Oaxaca, 1973). Waldfogel (1997) calculates that, on average, the ratio of actual–to–potential work experience for women in the U.S. is a little over two thirds.[10]

[10] Waldfogel (1997) also shows that the ratio is 66% for married mothers v. 77% for women without children. The difference between potential and actual experience is even greater (59%) for never married women with children.

The MxFLS collected information on an individual's first job (day, month and year). Based on this information, *projected work experience* is computed subtracting the self-reported year of an individual's first job to the year of the survey. In addition, I adjusted women's level of work experience to account for the time off for childbearing. Since there is no self-reported measure of this time off, the adjustment is based on the number of self-reported pregnancies and the minimum maternity leave period (3 months) for workers at a formal job. The analytic sample consists of full time workers and the majority (59%) has a formal job contract. After the adjustment, a woman's average work experience decreases by 0.59 years in comparison to the average work experience pre-adjustment, this translates into approximately 7 months. Although this differs from a perfect measure, is to date the most accurate measure of work experience available in the literature of gender wage gaps in Mexico. Given the nature of this variable, the estimates of the gap in projected work experience among male and female workers should be below the gap in actual work experience, but above the 2-year gap in potential work experience found in the literature (Pagan and Ullibarri, 2000). As described, this type of work experience constitutes a general measure of human capital. A measure of specific human capital is available in the data (i.e., job tenure at last job); however the number of observations with information on job tenure is not large enough to allow the use of this variable. This distinction is important as it matters who is willing to pay for training (Becker, 1964).

Cognitive ability and non-cognitive traits

Market equilibrium wages and promotion policies depend on efficient job assignments (Lazear & Rosen, 1990). Worker's ability plays an important role in job assignment because it is efficient to assign high-skilled workers to the most productive jobs. When cognitive ability is not observed, employers find proxies to determine workers' tasks and promotion paths and

discrimination arises. However, when a wage model does not include a measure of ability it is tempting to claim that a worker has been discriminated when in fact she might have not.

In this study a measure of IQ is used as a proxy for cognitive ability and should be highly correlated with wages. Cognitive scores are measured through Raven's Progressive Matrices Test (RPM). Raven's test was set out with the specific intent of developing tests which would be easy to administer and also easy to interpret in a clear, theoretically relevant way (Raven, 1936; Watt, 1998). This test is a well-validated measure of basic cognitive function; it is designed to measure the person's cognitive ability and does not require the person to be literate. The theoretical framework which guided the development of the tests has since been confirmed in numerous studies (Horn, 1994; Matarazzo, 1990; Ree, Earles, & Teachout, 1994; and Snow, Kyllonen & Marshalek, 1984).

The version of the RPM test applied to Mexican women in the MxFLS is made up of a series of diagrams or designs with a part missing. Those taking the tests were asked to select the correct part to complete the designs from a number of options printed beneath (Raven, 2000). In this study, the RPM score is included in the earnings' model as a continuous variable from 0 to 100.

Non-cognitive skills strongly influence schooling decisions and also affect wages (Heckman et al., 2006; Cawley et al., 2001). Heckman et al. (2006) showed that a change in non-cognitive skills from the lowest to the highest level has an effect on behavior comparable to or greater than a corresponding change in cognitive skills. According to Fortin (2008) some of the features that influence the level of job effort –and that are linked to job responsibility– are a person's self-esteem and the external locus of control. Some of the mechanisms through which non-cognitive skills raise wages are through productivity and, indirectly, also through schooling

and work experience Heckman et al. (2006). The literature on personality and earnings usually incorporates non-cognitive factors from the Rosenberg self-esteem[11] and the Rotter locus of control[12] scales (Heckman et al. 2006; Fortin, 2005, 2008; Manning and Swaffield, 2008).

In the MxFLS, there are a set of questions asked to individuals about their own perceptions on emotional aspects of their lives, i.e., feelings of depression, feelings of accomplishment, difficulty concentrating and poor performance assessment, among others. These variables are coded as 1 if the person expressed having negative feelings all or most of the times in three categories: *poor performance*, *feelings of insecurity* and *pessimistic feelings*.

The augmented models that progressively incorporate years of work experience, cognitive ability and non-cognitive traits are the following:

$$Y_{ig} = \alpha_{0g} + \alpha_{ig}\underline{X}_{ig} + \beta_{1g}Projected\ work\ experience\ + \beta_{4g}IMR_{ig} + e_{ig} \quad (2)$$

$$Y_{ig} = \alpha_{0g} + \alpha_{ig}\underline{X}_{ig} + \beta_{1g}Projected\ work\ experience\ + \beta_{2g}Cognitive\ ability_{ig} + \beta_{4g}IMR_{ig} + e_{ig} \quad (3)$$

$$Y_{ig} = \alpha_{0g} + \alpha_{ig}\underline{X}_{ig} + \beta_{1g}Projected\ work\ experience + \beta_{2g}Cognitive\ ability_{ig} + \beta_{3g}Noncognitive\ traits_{ig} + \beta_{4g}IMR_{ig} + e_{ig} \quad (4)$$

Earnings' differentials using equations (2) – (4) are calculated through the same OR decomposition method described in equation (1a).

IV. Results

Descriptive statistics indicate that, on average, working men have higher earnings than working women, with weekly wages 15% above those of women's and a gap in weekly wages

[11] Rosenberg (1979) posited four principles of self-concept formation: reflected appraisals, social comparisons, self-attribution, and psychological centrality.

[12] Rotter (1954) suggested that people generally identify either an internal or external locus of control in their lives. Those with an internal locus of control tend to believe in their own ability to control events, whereas people with an external locus of control believe other people or events determine their own circumstances.

plus benefits of 45% among men and women (See appendix table 1). Gaps in wages and income are often attributed to differences in experience and education. Descriptive data from Table 1 show mixed evidence on this hypothesis. On average, men have seven more years of projected work experience than women, and men work two more hours per week, compared to women.[13] However, on average women are more educated than men. A greater percentage of women have completed college and beyond, in comparison to similar men (17% v. 12%, respectively). As for participation in the informal economy, 59% of women and 55% of men have a written or verbal job contract. On average, the majority of the workers live in urban regions (82%), around 83% of the workers have at least one child and the average number of children is between two and three. There are significant differences in family composition by gender. While most of the working men are married (95%), less than half of the full-time female employees are married. On the other hand, only 3% of full-time male workers are single, while 36% of full-time female workers are single. It is worth notice that, regarding non-cognitive traits, there are a larger proportion of women who have negative feelings of self-perception. Among this sample of full time workers, women tend to feel more often a *poor performance at work*, *feelings of insecurity* and *pessimistic attitudes* in comparison to men. Differences in these self-reported measures are around 8-14 percentage points (pp). Even though women have a higher average score in the cognitive ability test, the difference among men and women is only 1 point out of 100. Finally, while 99% of the male full-time workers are head of their households, only 22% of comparable female workers are the main breadwinners. A table with the descriptive statistics for the sample that has information on wages plus employer-provided benefits is found in the appendix. This sample does not differ significantly from the one described.

[13] In comparison, Pagan and Ullibarri (2000) report a difference of two years of potential work experience among male and females working in Mexico in 1995.

Table 1 Descriptive statistics of full time workers of 25-54 years of age with information on wages

	All		Women		Men	
Employment variables		SE		SE		SE
Log weekly wage	4.73	(0.001)	4.23	(0.128)	4.34	(0.031)
Weekly hours worked	50.64	(0.376)	49.18	(0.601)	51.38	(0.474)
Yearly weeks worked	49.10	(0.005)	48.27	(0.011)	49.49	(0.005)
Projected work experience	18.20	(0.347)	13.62	(0.542)	20.53	(0.407)
Formal contract	0.560		0.588		0.546	
Cognitive / non-cognitive traits						
Cognitive ability (IQ score)	51.353	(0.909)	52.007	(1.600)	51.020	(1.104)
Feelings of poor performance	0.139		0.192		0.112	
Feelings of insecurity	0.194		0.286		0.147	
Pessimistic attitude	0.201		0.286		0.158	
Marital Status						
Married	0.795		0.482		0.954	
Single	0.138		0.355		0.027	
Divorced/separated	0.067		0.163		0.019	
Education						
Incomplete primary	0.036		0.024		0.041	
Elementary or some secondary	0.333		0.294		0.353	
Secondary or some high school	0.329		0.355		0.315	
Complete high school	0.164		0.159		0.166	
Some college and beyond	0.139		0.167		0.124	
Fertility						
No children	0.173		0.208		0.156	
One child	0.135		0.196		0.104	
Two children	0.205		0.204		0.205	
Three or more	0.487		0.392		0.535	
Other characteristics						
Head of household	0.729		0.216		0.990	
Urban residence	0.824		0.861		0.805	
Actual observations	733		247		486	
Weighted observations	2,748		872		1,875	

Note: 1. Earnings were converted to US dollars using the average exchange rate for year 2002 of 9.46 pesos per dollar. 2. Weighted observations are in thousands.

I next estimate a series of multivariate regression models. As mentioned before, all models adjust for selection correction using the method described above. Results from the OR decomposition show that there is a statistically insignificant gender gap in weekly wages of 14-15% in the Mexican labor market. This gap varies due to the interaction of the Inverse Mills Ratio with the new variables added in each model, causing slightly different predictive wages for female workers.

As observed in table 2, using Popli's (2008) benchmark model that uses age as a proxy for work experience (model 1), the largest share of the gender gap in weekly wages remains unexplained (48%); although this share is statistically insignificant. Under this model specification, 18% of the gender gap in weekly wages is explained by endowments in human capital and other worker characteristics and 34% of the gap is explained by returns to a worker's characteristics. Under model (2) that adds projected work experience, the share explained by returns decreases 11 pp, the unexplained share increases 8 pp and the share explained by endowments increases 3 pp. Under model (3), once cognitive ability as well as projected work experience is added to the model, the shares of the gender gap in weekly wages explained by returns and endowments practically do not change. Under model (4) that adds projected work experience, and cognitive and non-cognitive traits, the share of the gender gap in weekly wages attributable to endowments is 25%, and the share attributable to returns is 26%. The share attributable to returns is statistically significant. Overall, the unexplained share of the gender gap in weekly wages remains close to half.

Table 2 Weekly wage for full-time workers

	(1)	(2)	(3)	(4)
	Age	Projected work experience	Cognitive ability	Non-cognitive traits
Men	4.38	4.38	4.38	4.38
	(0.031)	(0.031)	(0.031)	(0.031)
Women	4.24	4.28	4.27	4.23
	(0.115)	(0.128)	(0.129)	(0.128)
Difference	**0.136**	**0.106**	**0.112**	**0.148**
	(0.119)	**(0.132)**	**(0.132)**	**(0.132)**
Decomposition of estimated differentials (in %)				
Endowments	18.1%	21.4%	20.7%	25.4%
Returns	34.1%	22.7%	22.3%	25.9%*
Unexplained	47.8%	55.9%	57.0%	48.7%
N	850	850	850	850

Note: 1. Wages are calculated in logarithmic terms and converted into USD. 2. Robust standard errors are clustered at the state level. 3. Significance levels: +p <0.10, *p<0.05, **p<0.01, ***p<0.001. 4. Decomposition of estimated differentials reflects the share of the gender gap in weekly wages under each specification and adds up to 100%.

The share of the gender gap in weekly wages attributable to human capital endowments is 15% (Table 3). Projected work experience accounts for 47% of that share, cognitive ability accounts for 0.6%, non-cognitive traits accounts for 32%, and education accounts for 19% (see appendix table 3). The share of the gender gap in weekly wages attributable to returns to human capital characteristics is 49%. Among the characteristics that impact a worker's returns on weekly wages, projected work experience accounts for 53%, cognitive ability accounts for 8%, non-cognitive traits accounts for 26%, and education accounts for 13%. Adding variables of projected work experience, cognitive ability and non-cognitive traits increases the share explained by human capital endowments from 3% to 15%, and the share explained by human capital returns from 8% to 49%. Among these human capital characteristics, work experience is the largest contributor to the portion explained by differences in endowments and in returns. Thus, adding an adequate measure of work experience is relevant in the estimation of the gender gap in weekly wages.

Table 3 Contribution of human capital characteristics to gender differences in in weekly wages

	Endowments				**Returns**			
	Model (1)	Model (2)	Model (3)	Model (4)	Model (1)	Model (2)	Model (3)	Model (4)
Education	0.033	0.033	0.031	0.030	0.081	0.074	0.070	0.064
Work experience		0.091	0.091	0.073		0.287	0.289	0.260
Cognitive Ability			0.001	0.001			0.036	0.044
Non-cognitive traits				0.050				0.127
Share of endowments explained by human capital characteristics	**0.033**	**0.124**	**0.122**	**0.154**	**0.081**	**0.361**	**0.395**	**0.495**
Share of endowments explained by personal characteristics	0.97	0.876	0.878	0.846	0.919	0.639	0.605	0.505

Note: 1. Differences were calculated in relative terms and adding up the coefficients of the different variables that were used to portray each characteristic included in the OR models that corrected for selection into employment. 2. The total share of endowments explains 25% of the gender differential in weekly wages. 3. The total share of returns explains 25% of the gender differential in weekly wages. 4. Non-cognitive traits include poor performance at work, feelings of insecurity and pessimistic attitudes.

When using the other measure of earnings, that also includes employer-provided benefits; the gender gap in weekly income triples (15% v. 45%) (Table 4). Under model (1), 5% of the gender differences in weekly wages plus employer-provided benefits are explained by endowments, 43% are explained by returns and 52% remains unexplained. The share of the gender differences explained by endowments once projected work experience is taken into account decreases 3 pp, the unexplained portion raises 1 pp, and the share explained by returns increases 2 pp. Adding cognitive and non-cognitive ability in addition to work experience shows the opposite trend: a decreasing explanatory share of returns, an increasing explanatory share of endowments, and subtle changes in the share of the unexplained residual. In all models, the share explained by the endowments of workers characteristics is not statistically significant. However, the share explained by differences in returns to characteristics is always statistically significant. This suggests that men and women might be receiving different returns to their mean job-relevant characteristics.

Table 4 Weekly wages + employer provided benefits for full-time workers

	(1) Age	(2) Projected work experience	(3) Cognitive ability	(4) Non-cognitive traits
Men	4.34	4.34	4.34	4.34
	(0.018)	(0.018)	(0.018)	(0.018)
Women	3.98	3.91	3.90	3.89
	(0.074)	(0.083)	(0.083)	(0.083)
Difference	**0.360*** **	**0.436*** **	**0.445*** **	**0.455*** **
	(0.076)	**(0.085)**	**(0.085)**	**(0.085)**
Decomposition of estimated differentials (in %)				
Endowments	4.7%	1.9%	3.1	5.0%
Returns	42.7%***	44.7%***	43.6%***	42.8%***
Unexplained	52.6%	53.3%***	53.3%***	52.2%***
N	3,326	3,326	3,326	3,326

Note: 1. Income is calculated in logarithmic terms and converted into USD. 2. Robust standard errors are clustered at the state level. 3. Significance levels: +p <0.10, *p<0.05, **p<0.01, ***p<0.001. 4. Decomposition of estimated differentials reflects the share of the gender gap in weekly wages plus employer-provided benefits under each specification and adds up to 100%.

Gender differences in returns are explained by human capital characteristics in the following way: work experience accounts for 45%, cognitive ability explains 41%, non-cognitive traits explain 5% and education explains 9% (Table 5). Together, these variables explain 44% of the gender income differences. Gender differences in workers' human capital endowments are mainly explained by work experience (69%), followed by education (19%). Endowments in cognitive and non-cognitive traits do not explain a significant portion of the endowments' share (2% and 11%, respectively). The relative weight of these four variables on the total share of the gender gap in weekly wages plus employer-provided benefits attributable to endowments is 15%.

Table 5 Contribution of human capital characteristics to gender differences in returns and endowments in weekly wages + employer provided benefits

	Endowments				**Returns**			
	Model (1)	Model (2)	Model (3)	Model (4)	Model (1)	Model (2)	Model (3)	Model (4)
Education	0.034	0.034	0.030	0.029	0.053	0.054	0.040	0.042
Work experience		0.075	0.092	0.107		0.251	0.223	0.197
Cognitive Ability			0.002	0.002			0.173	0.178
Non-cognitive traits				0.017				0.022
Share of endowments explained by human capital characteristics	**0.034**	**0.109**	**0.124**	**0.155**	**0.053**	**0.305**	**0.436**	**0.438**
Share of endowments explained by personal characteristics	0.96	0.891	0.876	0.845	0.947	0.695	0.564	0.562

Note: 1. Differences were calculated in relative terms and adding up the coefficients of the different variables that were used to portray each characteristic included in the OR models that corrected for selection into employment. 2. The total share of endowments explains 25% of the gender differential in weekly wages plus employer-provided benefits. 3. The total share of returns explains 25% of the gender differential in weekly wages plus employer-provided benefits. 4. Non-cognitive traits include poor performance at work, feelings of insecurity and pessimistic attitudes.

V. Discussion

In Mexico studies that have analyzed gender gaps in earnings have failed to incorporate measures of important aspects of human capital –projected work experience, cognitive ability, and non-cognitive traits. With models that relied on age dummies or measures of potential work experience, the previous literature has found mixed evidence on whether endowments or returns

explain different or equal shares of the gender wage gap in Mexico. I establish that returns and endowments explain equal shares of the gender gap in weekly wages.

This study differs from previous literature in that it incorporates a more precise measure of work experience, and measures of cognitive ability, and non-cognitive traits to estimate the gender gap in weekly wages for full-time workers in Mexico. A gender gap in weekly wages that includes employer-provided benefits is also estimated to explore gender differences in compensations provided by employers. This study also contributes to the literature in that it disaggregates the contribution of four human capital characteristics to the gender gap in earnings.

I establish that for 2002, the gender gap in weekly wages is 15%, and the gender gap in weekly wages plus employer-provided benefits is 45%. Once the human capital variables are added to the earnings model, a quarter of gender gap in weekly wages is accounted for by endowments and another quarter by returns. However, only the share attributable to returns remains statistically significant. Most of the differences in returns and endowments, among male and female workers, attributable to human capital characteristics are explained by work experience. The main difference is that human capital characteristics explain 50% of the share attributable to returns, while human capital explains 15% of the share attributable to endowments. This result suggests differences in human capital endowments between men and women do not account for much of the wage gap, however male and female workers are compensated differently over those gaps in work experience.

Fourth, the explanatory power of human capital characteristics on gender differences in the returns is 15%, while human capital explains 50% of gender differences in endowments. Fifth, work experience accounts for half of the human capital's share in endowments (7 out of 15 percentage points) and half of the share in returns (26 out of 49 percentage points).

Disaggregated results showed that adding work experience, cognitive ability, and non-cognitive traits increases the share of human capital traits in explaining differences in endowments from 3% to 15%. The inclusion of these variables also increases the share of human capital variables in explaining differences in returns from 8% to 49%. This supports the hypothesis that incorporating more precise measures of work experience, cognitive ability and non-cognitive traits is key to calculate an accurate gender wage gap.

Wider differences in the gender gap in weekly wages plus employer-provided benefits portray the disparities in work benefits among male and female full-time workers. This suggests that women (in particular mothers) may be in jobs that offer different rewards (e.g. more flexible schedules) rather than jobs that provide higher additional benefits (medical benefits and different types of allowances), resulting in a wider income gap when these additional measures of work benefits are added up. However, as previously discussed, job amenities are not accounted in the benefits' package, thus results might overestimate the actual differential. In future work, an estimation of the family gap could show whether this hypothesis is holds.

VI. Conclusion

In this study it is established that there is a wider gap in weekly wages + employer provided benefits than in just weekly wages. Thus, on average, male workers have jobs with higher benefits in comparison to females. Results from the models analyzed showed that differences in levels and returns to work experience account for a significant share of the differences in earnings among male and female workers. As previously mentioned, women have weaker job attachments, and in consequence less work experience. Government programs that help working mothers to stay in the labor market have been implemented over the last few years and it would

be interesting to compare the differences in earnings among a new cohort of women who have received higher maternal benefits.

Discussion and implications for social work policy

Women provide a crucial source of income and family support. An increase in working women's standard of living could result in less stress for children, families and governments. Research illustrates a strong negative correlation between female employment and poverty rates; thereby further supporting participation of women in the labor market would have an equalizing effect on income disparity (Hoynes et al., 2006). The United Nations Economic Commission for Latin America and the Caribbean (2010) reported that in 2008 poverty in the Latin American region would have been 10 percentage points higher in urban areas and 6 percentage points higher in rural areas, had women not increased their labor participation. Thus, it is important to understand the conditions that improve women's bargaining position in the labor market and to foster policies that encourage women's participation on equal grounds with respect to men.

Evidence from this study shows that policy changes have encouraged mothers to join or remain in the labor market. Over the analyzed period, universal preschool encouraged the labor force participation of mothers of 3– and 4– year olds, when those mothers are compared to mothers of younger and older children, and to non-mothers. In addition, over the last two decades, the 'motherhood penalty' in the Mexican labor market decreased. The larger problem is that men and women are not compensated equally in the labor market. Public social policies must address the causal factors of earnings' disparities among men and women. Policies should also continue to support working mothers, who constitute a large portion of the work force in Mexico. In an effort to increase women's probability of working or maintaining jobs, the Mexican government offered subsidized childcare to low-income women through the *Estancias*

Infantiles program (EI).[14] Calderon (2012) showed that EI increased a woman's probability to obtain a more stable job, and to increase beneficiaries' labor income.

Results also show that gender gaps in weekly wages are highly influenced by differences in human capital among male and female workers. On average, male workers in Mexico have over 7 years of additional work experience in comparison to their female counterparts. Disaggregated analyses show that gender differences in earnings are largely explained by work experience. Under this scenario, creating stronger job attachments seems crucial to decrease gender wage gaps in Mexico. Thus, governments and employers should encourage employment retention to increase women's levels of work experience and job tenure. One possible policy solution would be to promote training programs for working mothers, as part of the employer-provided benefits, to favor their value as employees. These types of programs would lead to stronger labor force attachments. On a worker's perspective, job certainty provides those positive incentives to invest in firm-specific human capital, and sending a positive signal to employers on job commitment. In the long term, this would also have a positive effect on their wages and allowing them to maintain good job matches. Job continuity has a positive impact on the employment status of women, especially mothers, and reduces the cost of moral hazard to employers. Family policies that facilitate women's labor force re-entry can potentially impact not only women but their families and the economy. Without the capacity to generate their own income, women face considerable barriers to reaching higher levels of autonomy needed to get access to high paying jobs and climb corporate or political ladders.

[14] See Calderon (2012)

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Appendices for Paper 1

Table 1 Average characteristics of all women 25 to 54 years old (mean or proportion)

	1989	1992	1994	1996	1998	2000	2002	2004	2005	2006	2008	2010	2012
LFPR	**33.9%**	**36.3%**	**42.3%**	**46.5%**	**47.3%**	**48.1%**	**51.4%**	**49.4%**	**51.3%**	**55.9%**	**51.3%**	**50.4%**	**59.8%**
Hours worked	12.792	13.597	15.265	16.942	17.253	18.000	19.100	40.806	21.471	22.781	39.529	40.510	38.989
Age	36.893	36.692	36.901	36.680	37.072	37.353	37.651	37.590	37.765	37.631	38.238	38.325	38.450
Marital status													
Never married				0.135	0.130	0.144	0.146	0.151	0.157	0.169	0.162	0.162	0.163
Married				0.753	0.761	0.749	0.733	0.727	0.722	0.700	0.711	0.706	0.702
Divorced/widowed				0.113	0.110	0.107	0.122	0.122	0.122	0.130	0.127	0.132	0.135
Education													
Less than primary school	0.452	0.407	0.383	0.344	0.318	0.292	0.278	0.241	0.234	0.213	0.202	0.183	0.167
Primary + some secondary	0.280	0.288	0.263	0.272	0.279	0.253	0.252	0.240	0.238	0.241	0.233	0.218	0.206
Secondary and beyond	0.267	0.304	0.354	0.385	0.402	0.455	0.470	0.519	0.528	0.546	0.565	0.599	0.627
Number of children													
No children				0.133	0.130	0.147	0.151	0.156	0.166	0.171	0.155	0.166	0.172
One child				0.158	0.166	0.185	0.194	0.205	0.194	0.201	0.208	0.215	0.231
Two children				0.250	0.266	0.293	0.282	0.286	0.288	0.293	0.297	0.291	0.307
Three or more children				0.459	0.438	0.375	0.373	0.352	0.352	0.335	0.339	0.328	0.290
Household composition													
Head of household	0.093	0.096	0.100	0.105	0.118	0.117	0.133	0.159	0.159	0.172	0.168	0.149	0.154
Number of women	1.520	1.526	1.504	1.539	1.301	1.657	1.734	1.807	1.864	1.889	2.176	2.134	2.184
Number of men	2.980	2.874	2.790	2.818	2.655	2.631	2.550	2.581	2.562	2.554	2.583	2.498	2.441
Additional workers	2.698	2.585	2.536	2.479	2.359	2.202	2.254	2.186	2.202	2.168	2.210	2.170	2.089
Urban residence	0.665	0.782	0.778	0.794	0.790	0.787	0.792	0.794	0.792	0.794	0.805	0.802	0.793
Weighted observations*	13.01	14.85	15.71	16.98	17.75	19.19	20.17	20.90	20.98	21.44	21.69	23.09	23.66

Note: 1. Data from ENIGH for waves 1989-2012. 2. Weighted observations are in millions

Table 2 Average characteristics of *working women* 25 to 54 years old (mean or proportion)

	1989	1992	1994	1996	1998	2000	2002	2004	2005	2006	2008	2010	2012
Hours worked	37.20	37.13	36.13	36.41	36.49	37.45	37.14	41.57	40.44	39.55	40.41	41.38	39.01
	(0.009)	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Age	36.22	36.36	36.58	36.51	37.01	37.28	37.58	37.40	37.64	37.69	38.21	38.31	38.30
Marital status													
Never married				0.205	0.195	0.213	0.202	0.221	0.225	0.229	0.230	0.230	0.209
Married				0.622	0.641	0.627	0.620	0.602	0.597	0.590	0.590	0.583	0.615
Divorced/widowed				0.173	0.165	0.160	0.178	0.177	0.177	0.181	0.179	0.187	0.175
Education													
Less than primary school	0.345	0.353	0.329	0.302	0.277	0.237	0.234	0.181	0.184	0.179	0.150	0.134	0.156
Primary + some secondary	0.276	0.237	0.224	0.237	0.258	0.225	0.224	0.214	0.209	0.207	0.202	0.186	0.178
Secondary and beyond	0.379	0.410	0.447	0.460	0.465	0.538	0.542	0.604	0.607	0.614	0.648	0.680	0.665
Number of children													
No children				0.182	0.162	0.185	0.184	0.200	0.212	0.209	0.192	0.205	0.204
One child				0.167	0.192	0.200	0.205	0.218	0.206	0.212	0.224	0.231	0.237
Two children				0.249	0.251	0.277	0.281	0.282	0.282	0.291	0.283	0.285	0.288
Three or more children				0.403	0.395	0.338	0.329	0.299	0.301	0.288	0.300	0.279	0.270
Household composition													
Head of household	0.197	0.186	0.182	0.177	0.189	0.179	0.202	0.222	0.221	0.229	0.228	0.206	0.199
Number of women	1.388	1.375	1.473	1.516	1.159	1.409	1.521	1.544	1.642	1.667	1.889	1.827	1.983
Number of men	2.947	2.904	2.813	2.846	2.689	2.654	2.547	2.571	2.557	2.537	2.583	2.492	2.455
Additional workers	2.323	2.248	2.271	2.288	2.165	2.041	2.120	1.962	2.013	2.009	2.038	1.990	1.964
Urban residence	0.747	0.846	0.801	0.817	0.810	0.822	0.827	0.847	0.832	0.833	0.867	0.865	0.812
Weighted observations*	4.39	5.37	6.64	7.90	8.39	9.22	10.37	10.27	10.71	11.92	11.10	11.63	14.14

Note: 1. Data from ENIGH for waves 1989-2012. 2. Standard errors are shown in parentheses. 3. Weighted observations are in millions

Table 3 Average characteristics of *working mothers* 25 to 54 years old (mean or proportion)

	1989	1992	1994	1996	1998	2000	2002	2004	2005	2006	2008	2010	2012
Hours worked	36.71	35.61	35.84	35.60	35.60	36.57	36.50	40.84	40.06	38.77	39.79	40.80	37.79
	(0.010)	(0.010)	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Age	36.58	37.21	37.17	36.99	37.45	37.78	38.01	37.85	38.30	38.15	38.56	38.83	38.72
Marital status													
Never married				0.114	0.109	0.113	0.119	0.129	0.121	0.130	0.137	0.135	0.120
Married				0.693	0.714	0.708	0.689	0.675	0.679	0.671	0.661	0.655	0.682
Divorced/widowed				0.193	0.177	0.179	0.192	0.197	0.199	0.199	0.201	0.210	0.199
Education													
Less than primary school	0.361	0.408	0.346	0.329	0.300	0.254	0.253	0.194	0.199	0.188	0.158	0.145	0.169
Primary + some secondary	0.298	0.242	0.252	0.250	0.267	0.237	0.231	0.233	0.226	0.220	0.215	0.200	0.192
Secondary and beyond	0.341	0.350	0.402	0.421	0.433	0.509	0.515	0.574	0.574	0.593	0.628	0.654	0.639
Number of children													
One child				0.204	0.229	0.245	0.252	0.273	0.261	0.268	0.278	0.290	0.298
Two children				0.304	0.299	0.340	0.345	0.353	0.357	0.368	0.350	0.358	0.362
Three or more children				0.492	0.471	0.415	0.404	0.374	0.382	0.364	0.372	0.351	0.340
Household composition													
Head of household	0.197	0.209	0.175	0.180	0.185	0.184	0.208	0.229	0.225	0.237	0.235	0.239	0.224
Number of women	1.415	1.273	1.473	1.547	1.176	1.437	1.560	1.575	1.692	1.723	1.988	1.926	2.125
Number of men	3.076	2.820	2.887	2.967	2.792	2.747	2.651	2.677	2.667	2.638	2.714	2.621	2.613
Additional workers	2.533	2.392	2.478	2.514	2.362	2.253	2.332	2.179	2.242	2.246	2.263	2.223	2.194
Urban residence	0.729	0.827	0.782	0.805	0.802	0.813	0.818	0.844	0.830	0.833	0.864	0.857	0.800
Weighted observations*	3.04	3.7	4.8	5.6	6.2	6.5	7.3	7.01	7.2	8.1	7.5	7.7	9.6
Hours worked	36.71	35.61	35.84	35.60	35.60	36.57	36.50	40.84	40.06	38.77	39.79	40.80	37.79

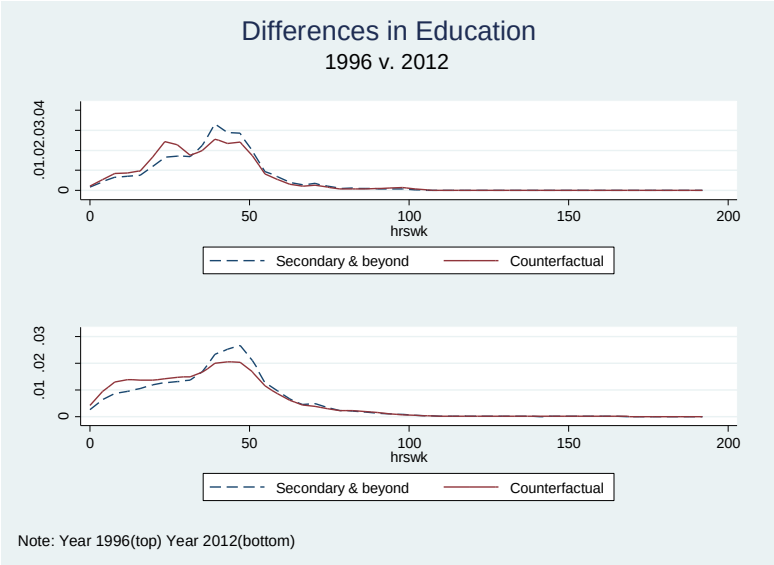
Note: 1. Data from ENIGH for waves 1989-2012. 2. Standard errors are shown in parentheses. 3. Weighted observations are in millions

Table 4 Oaxaca-Ransom decomposition of women's *hours worked*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	96-98	**98-00**	**00-02**	**02-04**	**04-06**	**06-08**	**08-10**	**10-12**
Hrs. worked in t_1	36.483	36.286	36.243	40.267	38.719	38.791	39.664	38.181
Hrs. worked in t_0	36.421	36.483	36.286	36.243	40.267	38.719	38.791	39.664
Difference	0.063	-0.197	-0.043	4.024	-1.548	0.072	0.873	-1.483
Change in *endowments*	-0.110	-0.990	-0.098	0.098	-0.001	-0.139	0.074	-0.582
Contribution to total differential	38.9%	55.5%	64.1%	2.4%	0.06%	39.7%	8.5%	39.2%
Change in *returns*	0.173	0.793	0.055	3.926	-1.547	0.211	0.799	-0.901
Contribution to total differential	61.1%	44.5%	35.9%	97.6%	99.9%	60.3%	91.5%	60.8%

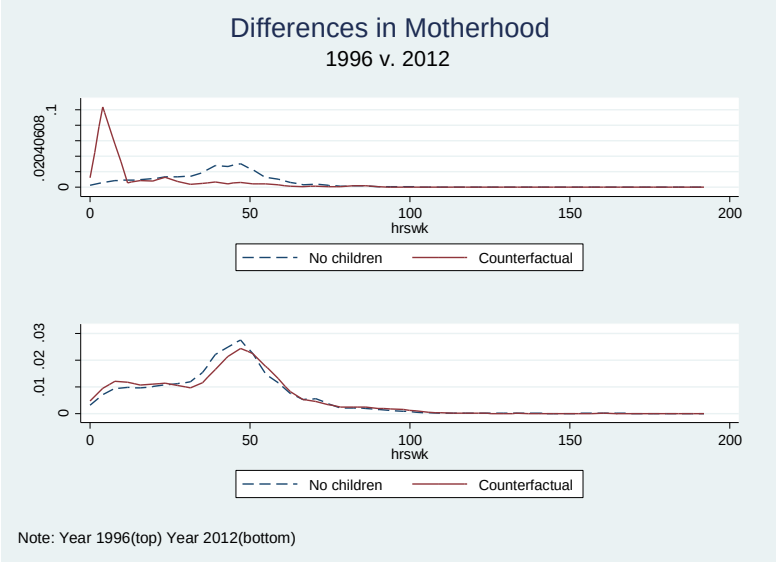
Note: Only individuals with working hours above zero are included in this analysis.

Graph 1. Differences in the density of hours worked by education



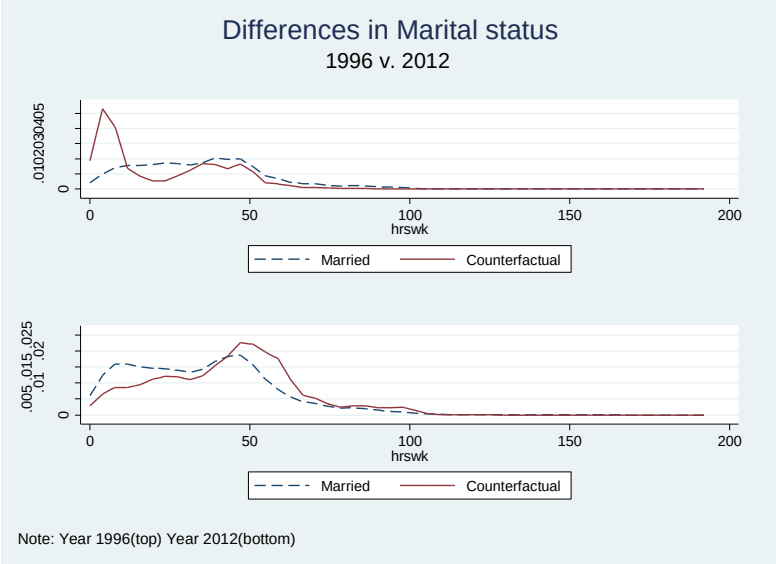
Note: Year 1996(top) Year 2012(bottom)

Graph 2. Differences in the density of hours worked by motherhood

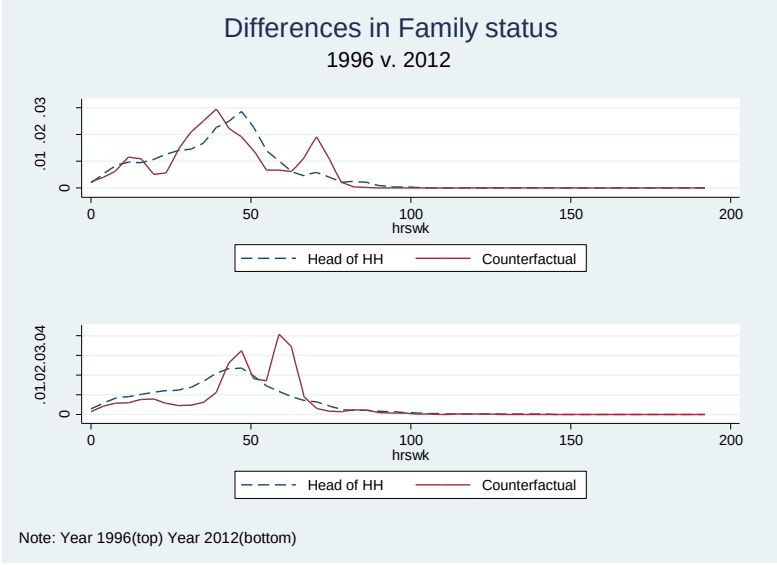


Note: Year 1996(top) Year 2012(bottom)

Graph 3. Differences in the density of hours worked by marital status



Graph 4. Differences in the density of hours worked by family status



Appendices for Paper 2

Analysis for mothers of 5-year old children

As previously outlined, in 2006 a second law change that affected mothers of 5-year old children occurred. The minimum entry age for first grade elementary school was lowered so that some 5-year olds could be enrolled four months earlier. In order to control for this change, model (3) is modified to include the number of 5 and 6 year olds enrolled in the first grade of elementary school. Once this control is included the DD estimate of universal preschool on mothers' employment is negative when mothers of 5-year olds are compared to mothers of younger and older children (see table A). The effect of universal preschool is only positive when mothers of 5-year olds are compared to non-mothers. These effects could reflect the choices of mothers that preferred to enroll their 5-year old children in elementary school rather than in preschool.

The TOT estimates show that universal preschool enrollment has no effect on a mother of a 5-year old enrolled in preschool, when compared to mothers of younger children. However, when mothers of enrolled 5-year olds are compared to mothers of older children and to non-mothers the effect of universal preschool is positive and significant. Preschool enrollment increases the employment of mothers of enrolled 5-year olds in 8- to 25 pp.

Table 1 Preschool enrollment and female labor force participation (T_i: mother of a 5-yr old)

	(1) Younger child	(2) Older child	(3) No children
ITT estimate (unadjusted)	-0.0816***	-0.4533***	-0.5157***
	(0.005)	(0.005)	(0.004)
ITT estimate (adjusted)[1]	-0.0877***	-0.1092***	0.1324***
	(0.006)	(0.006)	(0.007)
TOT estimate	-0.0007	0.0759***	0.2528***
	(0.005)	(0.007)	(0.006)
State and year fixed effects	yes	yes	yes
Mother's age fixed effects	yes	yes	yes
Observations	32.3	18.9	61.8

Notes: 1. Adjustment for 5-6 year olds enrolled in primary school. 2. Robust standard errors in parentheses. 3. Significance level: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 4. Household composition, education and political environment controls are included. 5. Weighted observations are in millions.

Figure 1.Mexican state variation in average preschool enrollment for the three grades in school year 2008-2009

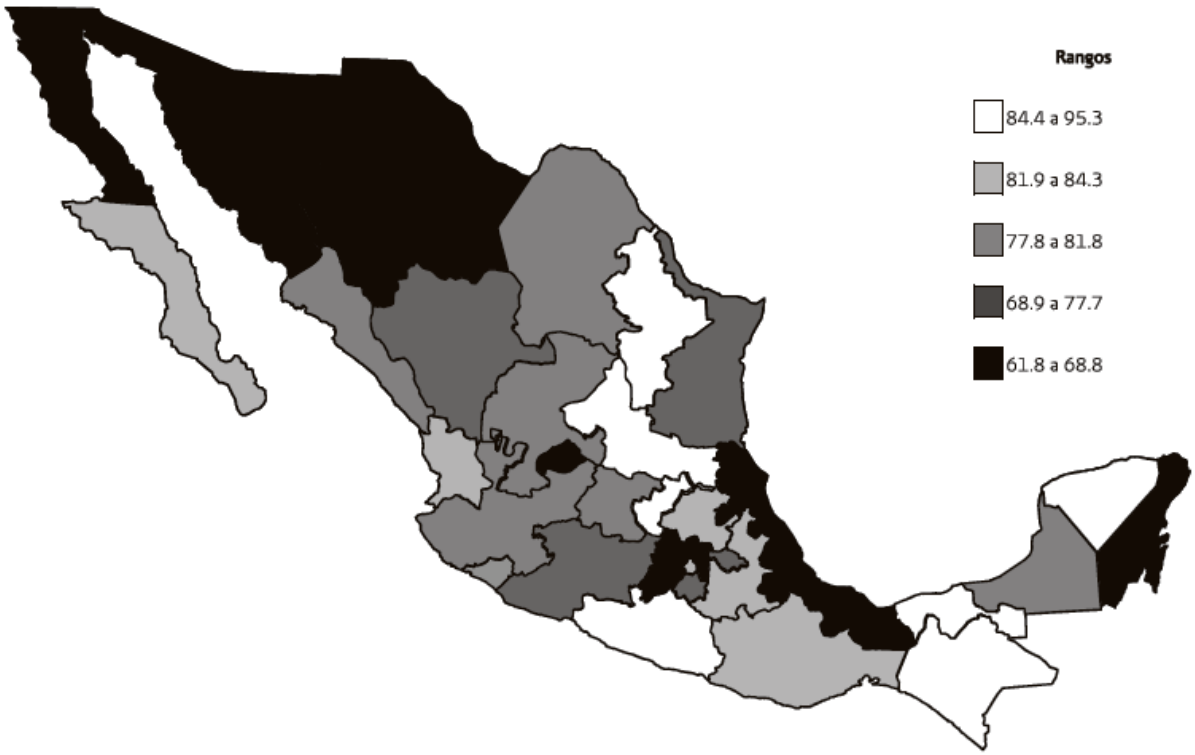
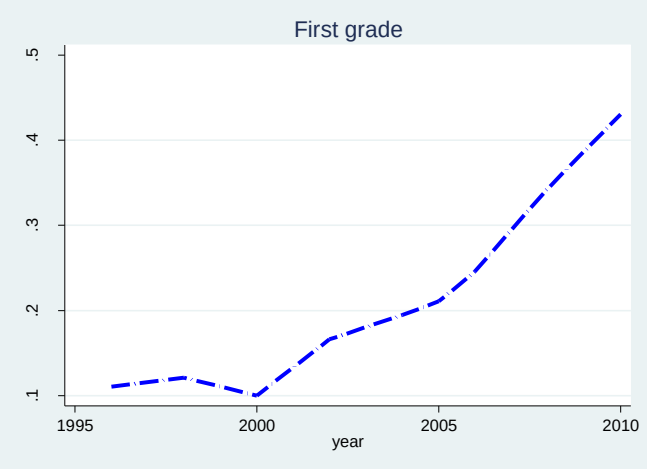


Table 2 Mean preschool enrollment rates by grade

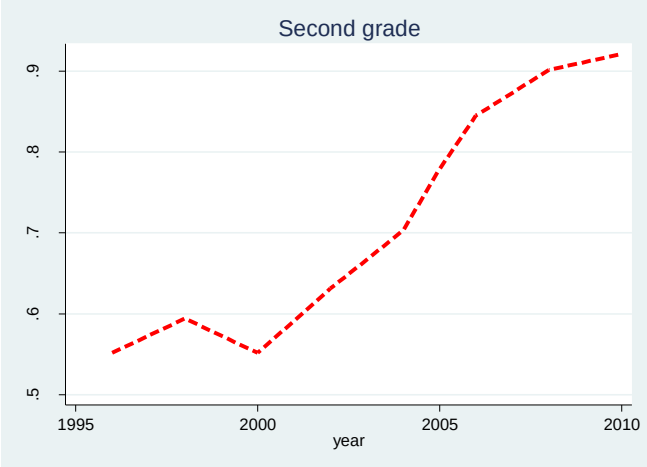
Grade	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2012**
First	15%	16%	19%	20%	23%	25%	31%	34%	38%	39%	43%	47%
Second	55%	55%	61%	62%	69%	80%	89%	93%	97%	99%	101%	104%
Third	81%	80%	81%	84%	88%	93%	97%	100%	96%	98%	98%	98%

Notes: Data come from the Mexican Ministry of Education's yearly reports. 2. Enrollment rates include over-age children (younger and older aged children than the typical age at that grade level). Typically children of 3-5 years of age would be enrolled in 1st -3rd grades.

Graph 1 Pre-school enrollment for first graders



Graph 2 Pre-school enrollment for 4-year olds



Graph 3 Pre-school enrollment for 5-year olds

Descriptive characteristics for a shorter period

In this table are found the characteristics of women of interest for this analysis for a shorter period for which models are run. Characteristics are similar to the ones described in the main text that includes years 1996 to 2012.

Table 3 Descriptive characteristics of women 20-40 years of age (average from 2005 to 2012)

Mothers grouped by child's age	Child 3-5	Child 0-2	Child 7-9	No children
Labor force participation rate	0.450	0.349	0.506	0.638
Age groups 20-25	0.171	0.311	0.045	0.308
26-30	0.306	0.319	0.178	0.221
31-35	0.302	0.237	0.365	0.158
36-40	0.222	0.132	0.412	0.149
Marital status				
Single	0.036	0.029	0.041	0.380
Married	0.903	0.937	0.878	0.541
Divorced/separated/widowed	0.061	0.033	0.082	0.079
Education				
Less than primary	0.158	0.160	0.177	0.117
Primary and some secondary	0.239	0.243	0.247	0.161
Secondary and beyond	0.603	0.597	0.576	0.722
Number of children				
One	0.220	0.221	0.167	n/a
Two	0.351	0.337	0.382	n/a
Three or more	0.429	0.442	0.450	n/a
Household composition				
Head of household	0.138	0.098	0.160	0.211
Additional workers	1.631	1.555	1.882	1.453
Number of women	2.342	2.388	2.423	1.757
Number of men	2.244	2.312	2.251	1.041
Urban residence	0.773	0.743	0.762	0.852
Observations	16.16	19.19	9.34	10.54

Note: 1. Data come from ENIGH for the years 2005-2012 2. Observations are weighted and expressed in millions.

Appendices for Paper 3

Oaxaca-Ransom decomposition

The Oaxaca-Ransom decomposition methodology consists in estimating three separate constrained linear regressions. One regression for females, one for males and a pooled regression that includes gender intercept shifts along with an identification restriction and constraints for each categorical variable (Fortin, 2008). For simplicity, I will show a more general version of the model for the decomposition analysis, following a similar approach to that of Fortin (2008) and Oaxaca and Ransom (1994, 1999).

$$Y_{ig} = \beta_{0g} + \beta_i \underline{X}_{ig} + e_{ig}, \qquad g=f,m,p \tag{1}$$

Assuming that the expected value of the error term is zero:

$$Y_{im} - Y_{if} = X_m\beta_m - X_f\beta_f + (\beta_{0m} - \beta_{0f}) \tag{2}$$

Where $\Delta X = X_m - X_f$ and $\Delta\beta = \beta_m - \beta_f$

Then, $Y_{im} - Y_{if} = \Delta X\beta_m + X_f\Delta\beta + (\beta_{0m} - \beta_{0f})$ (3a)

Analogously:

$$Y_{im} - Y_{if} = \Delta X\beta_f + X_m\Delta\beta + (\beta_{0m} - \beta_{0f}) \tag{3b}$$

Using a non-discriminatory pooled wage structure, income differences can be expressed as follow (Oaxaca and Ransom, 1994; Fortin, 2008):

$$Y_{im} - Y_{if} = \Delta X\beta_p + X_m(\beta_m - \beta_p) + (\beta_{0m} - \beta_{0p}) - X_f(\beta_f - \beta_p) + (\beta_{0f} - \beta_{0p}) \tag{4}$$

Where $X_m(\beta_m - \beta_p) + (\beta_{0m} - \beta_{0p})$ represents the "advantage of men" and $X_f(\beta_f - \beta_p) + (\beta_{0f} - \beta_{0p})$ represents the "disadvantage of women."

Table 1 Descriptive statistics of full time workers of 25-54 years of age with information on *wages plus benefits*

	All		Women		Men	
Employment variables		SE		SE		SE
Log weekly income	4.35	(0.003)	4.34	(0.018)	3.89	(0.083)
Weekly hours worked	51.71	(0.003)	50.29	(0.006)	52.29	(0.004)
Yearly weeks worked	48.43	(0.003)	48.67	(0.005)	48.34	(0.003)
Work experience	19.29	(0.003)	14.56	(0.005)	21.23	(0.003)
Formal contract	0.365		0.437		0.335	
Cognitive / non-cognitive traits						
Cognitive ability (IQ score)	51.413	(0.008)	50.036	(0.015)	51.972	(0.009)
Feelings of poor performance	0.193		0.269		0.162	
Feelings of insecurity	0.182		0.276		0.143	
Pessimistic attitude	0.203		0.271		0.176	
Marital Status						
Married	0.825		0.498		0.958	
Single	0.104		0.297		0.026	
Divorced/separated	0.070		0.205		0.016	
Education						
Incomplete primary	0.041		0.024		0.048	
Elementary or some secondary	0.368		0.348		0.376	
Secondary or some high school	0.296		0.320		0.287	
Complete high school	0.137		0.141		0.135	
Some college and beyond	0.157		0.166		0.153	
Fertility						
No children	0.180		0.212		0.167	
One child	0.100		0.156		0.077	
Two children	0.205		0.183		0.214	
Three or more	0.515		0.448		0.542	
Other characteristics						
Head of household	0.769		0.232		0.988	
Urban residence	0.846		0.910		0.820	
Actual observations	2,870		804		2,066	
Weighted observations	10,148		2,931		7,217	

Note: 1. Income was converted to US dollars using the average exchange rate for year 2002 of 9.46 pesos per dollar. 2. Weighted observations are in thousands.

Gender gaps in wage and income (including occupation dummies)

In models that incorporate occupation dummies and correct for selection into employment, the share of the gender gap in weekly wages explained by endowments is 17%, the share explained by returns is 30% and 53% remains unexplained. The share of the gap in weekly income explained by endowments is 5%; the share explained by returns is 48% and 47% remains unexplained.

Table 2 Weekly *wages* -including occupations

	(1) Age + age squared	(2) Actual experience	(3) Cognitive ability	(4) Non-cognitive traits
Men	4.39	4.39	4.39	4.39
	(0.032)	(0.032)	(0.032)	(0.032)
Women	4.24	4.27	4.27	4.24
	(0.116)	(0.131)	(0.132)	(0.131)
Difference	0.149	0.111	0.115	0.150
	(0.120)	(0.135)	(0.135)	(0.135)
Decomposition of estimated differentials (in %)				
Endowments	12%	15%	14%	17%
Returns	43%	27%	27%	30%
Unexplained	45%	59%	59%	53%
N	841	841	841	841

Note: 1. Income is calculated in logarithmic terms and converted into USD. 2. Robust standard errors are clustered at the state level. 3. Significance levels: +p <0.10, *p<0.05, **p<0.01, ***p<0.001. 4. Decomposition of estimated differentials reflects the share of the gender gap in weekly income under each specification and adds up to 100%.

The main difference between the specification that includes or excludes controls for job occupations is that including occupations increases the share of the unexplained component in the gender gap in weekly wages. This result might be an indication that including occupation dummies in the earnings' model does not add precision to the estimates of earnings' differentials among men and women. Results also suggest that adding job occupations might be endogenous.

Table 3 Weekly wages + employer provided benefits -including occupations

	(1)	(2)	(3)	(4)
	Age + age squared	Actual experience	Cognitive ability	Non-cognitive traits
Men	4.34	4.34	4.34	4.34
	(0.018)	(0.018)	(0.018)	(0.018)
Women	3.99	3.93	3.92	3.91
	(0.073)	(0.082)	(0.082)	(0.083)
Difference	0.356***	0.413***	0.421***	0.428***
	(0.075)	(0.084)	(0.084)	(0.085)
Decomposition of estimated differentials (in %)				
Endowments	11%	7%	6%	5%
Returns	40%	48%	48%	48%
Unexplained	49%	45%***	46%***	47%***
N	3,300	3,300	3,300	3,300

Note: 1. Income is calculated in logarithmic terms and converted into USD. 2. Robust standard errors are clustered at the state level. 3. Significance levels: +p <0.10, *p<0.05, **p<0.01, ***p<0.001. 4. Decomposition of estimated differentials reflects the share of the gender gap in weekly income under each specification and adds up to 100%.