CHANGES IN FEMALE EMPLOYMENT IN MEXICO: DEMOGRAPHICS, MARKETS AND POLICIES

CAMBIOS EN LA PARTICIPACIÓN FEMENIL EN MÉXICO: DEMOGRAFÍA, MERCADOS Y POLÍTICA PÚBLICA

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Resumen: Después de la crisis económica de 2008, las brechas de género en desempleo y participación laboral se redujeron en México. Para identificar los determinantes que permitieron dicha reducción, estimamos un modelo probit con datos de 2007 y 2017 de la Encuesta Nacional de Ocupación y Empleo (ENOE), año en que la tasa de desempleo regresó a niveles precrisis. Los resultados sugieren que: el ingreso de mujeres entre 36 y 65 años al mercado laboral permitió el crecimiento general de la participación laboral femenil, la educación de las mujeres contrarresta cualquier característica individual o del hogar afectando negativamente su empleabilidad, y el acceso a estancias infantiles significativamente aumenta la probabilidad de que estén empleadas.

Abstract: Unemployment and labor force participation gender gaps narrowed in Mexico after the 2008 global economic crisis, when female labor force participation (FLFP) increased. This paper aims to understand the FLFP growth and identify the main determinants driving this growth. For that purpose, we estimate a probit model with data from the 2007 and 2017 National Employment Surveys, the year before the crisis, and the year when the unemployment rate returned to pre-crisis levels, respectively. Broadly, our results show that the increasing labor participation of women aged 36 to 65 sustained the growth of overall FLFP, that women's educational attainment can offset any individual or household obstacle to women's employability, and that childcare availability significantly increases mothers' employability.

Clasificación JEL/JEL Classification: J21, J22, O54

Palabras clave/keywords: female labor force participation; Mexico; gender gap; female education; childcare services

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1. Introduction

The 2008 global financial crisis caused a severe 6.6 percent decrease in Mexico's Gross Domestic Product GDP in 2009, the sharpest decline of any Latin American country (Villareal, 2010). Unemployment also increased significantly: after ranging around 3.6 percent since 2005, the unemployment rate rapidly increased to 5.7 percent in the second quarter of 2008. Despite an immediate but slight decrease in the following quarters, the unemployment rate took almost ten years to return to pre-crisis levels. Surprisingly, however, the gender gap -measured as the difference between the male and female unemployment rates- closed to a 0.25 percentage point difference after the crisis, from a 0.61 percentage point difference in 2007.

The labor participation gender gap also narrowed as female labor force participation (FLFP) rates increased. Despite Mexico having a historically lower FLFP rate than Latin America as a whole (World Bank, 2020), the gender gap shortened from 39.3 to 34.7 percentage points from 2005 to 2017. Considering that FLFP in Mexico has traditionally grown at a slower pace than the region's average and that labor market conditions deteriorated after the crisis (Villareal, 2010), this narrowing of the work gender gap after the economic downturn is puzzling, despite the economic recovery that followed.

Gender labor gaps convey great economic and social opportunity losses for women, their families, households, and countries in general (World Bank, 2019). In Mexico, studies show that if working-age women were to participate in the labor market in the same proportion as their male counterparts, the economic gain would be about 21-22 percent of GDP (Cuberes and Teignier, 2016; Cuberes and Teigner, 2018). This tremendous proportion, however, would had been even bigger decades ago.

Understanding the determinants of female employability in Mexico is important to advance gender equality and women's contribution to economic growth. Understanding what factors enable women's labor market inclusion and how these change through time, can point to policies that help women benefit from economic growth (Klasen and Pieters, 2015) and that help prevent economic crises from erasing gains.

This paper aims to explain the increase in female employment in Mexico and to identify the main determinants of the reduction in the gender gap in unemployment and labor participation. We take two approaches: to understand the demographic component, we decompose unemployment, gross employment, and labor force participation rates in 2005 and 2017 by age group and gender and compare them.

Subsequently, we investigate the economic crisis and governmental policy implications on the probability of a woman being employed by estimating a probit model that considers individual and household characteristics, using labor indicators as controls and the availability of childcare facilities as an explanatory variable.

We use data from the National Employment and Occupation Survey (*Encuesta Nacional de Ocupación y Empleo*, ENOE), Census, and the National Childcare Facilities Directory for Working Mothers of the Social Development Ministry (*Secretaría de Desarrollo Social*, SEDESOL) to estimate explanatory coefficients for both years. The Childcare Facilities for Working Mothers program (CFWM) granted a bimonthly cash transfer to mothers or guardians whose labor benefits did not include access to childcare facilities. Eligible mothers were expected to work or study. We chose 2007 as the year to begin our study because it coincides with the first year of the program, and we selected 2017 as the year to end our study because unemployment rates finally returned to pre-crisis levels that year.[1]

Our findings show that the increased participation of women aged 36 to 65 in the labor market explains the growth in female employment and labor force participation between 2007 and 2017. We also identify the main factors associated with women's employability in both 2007 and 2017: (i) having secondary and tertiary education, (ii) increased availability of childcare facilities, and (iii) higher wages in the services sector.

Most of these determinants had an even stronger effect on female employability after the crisis. Our results show that wage increases in the service sector increased women's propensity to be employed by more than 18 percentage points in 2017 compared to 2007. Access to childcare facilities helped increase the employment of women living in households with children aged 0 to 4 by 13.8 percentage points in 2007, and this impact doubled ten years later. In 2017, a generalized positive effect was observed for the whole female population. In other words, childcare facilities more than compensated for the negative effect of child dependency rates. Further, a woman with a college or university degree can offset any negative individual or household characteristic effect on her employability.

This paper's main contribution is to study the determinants of female employment in Mexico from 2007-2017, a period marked by crisis and recovery. This paper also contributes to the literature by

[1] Changes in the female labor force participation and unemployment rates were marginal (lower than 0.2 percentage points) for both 2018 and 2019.

testing the extent of several substitution and income effects after a period of economic downturn, and finds evidence of a long-term and increasing effect of childcare services ten years later after the CFWM program implementation. Further, we highlight how changes in the population's demographic profiles, as the Mexican population ages, pose a new important area of study as growing elderly dependency rates may limit Mexican women's future employability.

The paper is organized as follows. Section 2 highlights salient features of the literature on determinants of female employment worldwide and in Mexico, and how our efforts contribute to this literature. Section 3 describes our gender and age group data decomposition for unemployment, labor force participation, and gross employment rates to explain the demographic changes accompanying the contraction in the gender gaps. Section 4 details our data sources and specifies our empirical strategy for estimating the probability of a woman being employed during our study period. Section 5 reports summary statistics for individual, household, and labor market variables, and presents our estimation results. Section 6 concludes.

2. Academic literature and previous studies

Most of the world's adult women work many hours a day, although most of their work is unpaid care and household labor (ILO, 2017). Unlike in Mexico, where FLFP has risen in recent decades, FLFP rates worldwide have been decreasing since the end of the 1990s[2] (Verick, 2014), contrary to the Millennium Development Goals. This section highlights salient features of the literature on the main FLFP determinants. Moreover, we point out gaps in the literature and how this paper contributes to fill it.

Economic development and education attainment

There is a strong relationship between economic growth, education, and labor market outcomes. Economic growth and education can significantly affect women's labor inclusion (Sinha, 1981). International

[2] Women's share of the global labor force has declined by more than 3 percentage points since 2000, from 50.8 to 47.8 percent in 2018 (World Bank, 2020). Although FLFP rates have increased in Europe, Africa, and Latin America and the Caribbean, the opposite has occurred in regions such as North America, East Asia, and South Asia.

comparisons show that FLFP is high in both low-income and highly-developed countries, while relatively low in middle-income countries, creating a "U-shaped" relationship between national income and female participation (Lincove, 2008).

Most authors explain this phenomenon by showing that during the early stages of industrialization, subsistence activities declined in many countries, a prime sector for women who perform agricultural work (Psacharpoulos and Tzannatos, 1989). Later in the process of economic development, the upward slope of FLFP is associated with women's entry to modern and white-collar jobs. As industrial and service sectors expand, female workers enter higher wage markets and substitute work at home for work outside the home.

The inclusion of women in the labor market during industrialization depends largely on the initial endowments of their human capital (Lincove, 2008). The extent of this relationship depends on the interaction between two competing dynamics: human capital raises earnings potential and increases the cost of not working, but higher pay for educated workers allows them to achieve target incomes faster and allocate more time to leisure.

These are well-known substitution and income effects. For a person not working, increasing wages reduces leisure demand, substituting it with increased labor supply. An increase in non-labor income or other household members' wages, on the other hand, increases leisure and thus reduces labor supply. According to Psacharpoulos and Tzannatos (1989), and Blau *et al.* (2010), empirical evidence suggests that female labor supply is usually more responsive to wages than to changes in non-labor income. However, these dynamics depend on each country's context.

For example, Klasen and Pieters (2015) estimate a probit model of FLFP to decompose the effect of supply and demand factors explaining the low and stagnated FLFP rate in urban India. Using cross-sectional surveys for five years, they found a strong negative income effect -due to increasing male income and education- that contributed to a withdrawal of women from the labor force. On the other hand, they argue that the substitution effect found has become weaker in the last years: women's education effect on FLFP, although positive, has been diluted by the erosion of positive selection into higher education and rising marriage market returns.

In any case, more educated women usually obtain higher wages, which explains why educated females have higher involvement in the labor market than less or uneducated women. This reinforces the importance of education on FLFP (Lam and Duryea, 1999; Matas *et* *al.*, 2010; Contreras *et al.*, 2011). Nevertheless, Mexico has experienced precarious wage growth over the last decades, yet FLFP has still grown. One explanation is that an incremental share of highly educated women is entering the labor market. In this paper, we contribute to the literature by testing the extent of the substitution effect after a period of economic downturn.

Parker and Skoufias (2004), and Parrado and Zenteno (2001) argue that recurrent recessions and adjustment policies in the 1980s, where traditional male occupations suffered most, changed households' survival strategies dramatically as more family members sought work to protect against labor instability. This led to a common income effect found after periods of economic downturn: the "added-worker effect".

The added-worker effect happens when more married women, regardless of their education, start working after husbands become unemployed in a crisis. This phenomenon was observed in Mexico after the national economic crisis in 1994, resulting in immediate large increases in FLFP rates (Parker and Skoufias, 2004; Parrado and Zenteno, 2001). To our knowledge, there is no evidence of the duration of this added-worker effect in Mexico; the literature has focused on the immediate consequences of the 1994 economic crisis. Our study sheds some light on the long-term consequences of the added-worker effect after the 2008 financial crisis.

Traditional gender roles and childcare

Gender roles are important when analyzing FLFP. For some women, having the primary role for household duties, including family or childcare responsibilities, prevents them from working outside of their homes (ILO, 2017). In many communities, traditional gender roles prevent women from working at all and are often the main factor for low FLFP.

The negative correlation between fertility and FLFP reflects, under traditional gender structures, the strain between mothering and work. In developed countries, a strong negative relationship between the two roles prevailed until the mid-1970s, but correlation became low afterwards (Engelhardt *et al.*, 2004). Studies argue that this was due to greater availability of childcare, family policies (such as maternity leave), changing attitudes to working mothers, and the growth of part-time jobs (Rindfuss and Brewster, 2000; Bernhard, 1993). Although the correlation between mothering and employment is still negative in some developing countries, even as they experience strong economic growth (Contreras *et al.*, 2011), the same factors that led to increased FLFP in developed countries can help explain the rise in FLFP rates in some developing countries.

In Mexico, cultural structures seem to have a strong effect on FLFP. Marriage seems to discourage Mexican women from working out of the home (Anderson and Dimon, 1998; King, 2011). The composition of Mexican households is also relevant. In the many families with gender-asymmetric child-rearing responsibility, the presence of other adult females, close networks, or community support can substitute for childcare services and encourage females with young children to work (Gong and Van Soest, 2002). Household and community assistance increase the primary caregiver's, usually the mother, time availability to work; and if that assistance is removed, women are usually the first to stop working (Talamás, 2019).

Similarly, childcare services provide women with time, money, or both, to work. Although the literature analyzing the effects of childcare services mainly focuses on developed countries (Gelbach, 2002; Baker *et al.*, 2008; Givord and Marbot, 2015; Bettendorf *et al.*, 2015; Vuri, 2016; Kawabata, 2015; Lee and Lee, 2014), a few studies provide evidence for the positive effects of such policies on female labor supply in developing countries (Mateo and Rodríguez-Chamussy, 2013; Martinez and Perticara, 2017). However, childcare expansion in developing countries can even increase household income and reduce poverty and inequality, depending on the population groups these programs target (Contreras *et al.*, 2012).

In Mexico, the only two impact evaluations of childcare interventions, to our knowledge, find similar results. Seira *et al.* (2011) use surveys and data for seven Mexican states to show that mothers, especially those who were unemployed before signing up for government-provided childcare services, increased their labor participation and number of hours worked. Calderón (2014) found that the National Childcare Facilities for Working Mothers (NCFWM) program increases FLFP but argues that it only explains 23 percent of the total increase of FLFP in the period studied. We intend to fill that gap by presenting other determinants of FLFP.

Further, both papers evaluate the short-term impacts of governmental childcare services in 2007-2010, immediately after the NCFWM program's implementation and the 2008-2009 economic crisis. This study explores the relevance and long-term effects of childcare services ten years later.

3. Decomposition of labor market indicators

Mexico still has one of the lowest FLFP rates in Latin America at 43.6 percent in 2017 (figure 1). Although FLFP in Mexico has increased significantly -by about 10 percentage points since 1990- this number is still low compared to the average FLFP rate for Latin America, which is close to 53 percent.[3] Nevertheless, after the 2008 crisis, Mexican women swiftly entered the labor force, significantly narrowing the labor participation gender gap. Figure 2 shows how the gap steadily narrowed from 39.3 to 34.7 percentage points between the second quarters of 2005 and 2017.[4]

The 2008 global financial crisis also sharply increased Mexico's unemployment rate (figure 3), yet the gender unemployment gap still closed almost completely. Before the crisis, some periods showed female unemployment rates close to one percentage point higher than male unemployment rates, but this gap closed after the crisis. Specifically, the gender unemployment rate gap between the second quarter of 2005 and the second quarter of 2008 averaged 0.53 percentage points, compared to 0.25 percentage points during and after the crisis (2008Q3 to 2016Q4).

Substantial changes across populations accompanied the evolution of unemployment and labor participation gaps between 2005 and 2017. A disaggregated demographic approach is therefore required to understand the context in which these gender gaps narrowed. In this section, we carry out an age and gender group decomposition for three labor market indicators: unemployment, gross employment, and labor force participation rates.

Three different effects can explain changes in each of these indicators: (i) changes in the incidence of employment within each group, (ii) changes in the demographic composition among distinct groups, or (iii) the interaction between these two effects.

[3] In Peru and Chile, for example, the FLFP rates increased by 26.3 and 17.4 percentage points, respectively, from 1990 to 2017. Hence, their labor force participation gender gaps also narrowed: Peru reduced the gender FLFP gap from 30.43 to 14.8 percentage points, while the FLFP gap in Chile decreased from 40.5 to 23.3 percentage points (World Bank, 2020).

[4] We start our analysis in 2005 because it is the first year of ENOE data release. For FLFP estimations before that date, we used ILO's modeled estimations using the national population above 15 years old.

The equation describing the decomposition is:

$$x_{t+h} - x_t = \sum_k (x_{k,t+h} - x_{k,t})\, n_{k,t} + \sum_k (n_{k,t+h} - n_{k,t})\, x_{k,t} + \sum_k (n_{k,t+h} - n_{k,t})\, (x_{k,t+h} - x_{k,t}) \tag{1}$$

We define x_t as the national unemployment rate, the gross employment rate, or the labor force participation rate in period t; $n_{k,t}$ represents the share of group k relative to the entire labor force (in the case of unemployment rates) or the entire working-age population (in the case of gross employment and participation rates). The first term on the right side represents the intra-group effect, which is the contribution to changes in x due to variations in employment within group k. The second term represents the inter-group effect; that is, contribution to changes in x caused by changes in the demographic composition across age and gender groups. The last term in the equation describes the interaction effect between the intra-group and inter-group effects.

Figure 4 displays the decomposition of the selected labor market indicators and illustrates the demographic changes after the crisis. We use the second quarter of each year to control for seasonality when estimating changes or for comparisons. Panel A in figure 4 decomposes changes in Mexico's national unemployment rate between 2005 and 2017. Unemployment rates increased for the youngest segment of the population, including both men and women aged 18 to 45 years (light-gray bars). However, since the population's demographic composition changed due to a decline in the proportion of young people, these population groups contributed less to the overall change in the national unemployment rate (dark-gray bars).

Labor force participation differs notably by gender, as shown in panel C in figure 4. No changes in labor force participation (intra-group effects) stand out for any male age group, except the youngest; this indicates that changes in demographic composition drive the changes in the national labor participation of men. Conversely, women in most age groups -except the 18-to-25 group- sharply increased their labor participation rates between 2005 and 2017. However, the 26-to-36 age group shows a strong population effect that counters its increased labor participation.

Indeed, the group of women aged 36 to 65 contributed the most to the increase of the FLFP rate. The demographic component explains

29 percent of the total growth in the female labor participation rate. The intra-group effect of this group (changes in incidence of labor participation) accounts for 44 percent of the national female participation rate growth. These two components can help explain the labor participation gender gap contraction since together they account for 73 percent of the total FLFP increase.

The decomposition of changes in gross employment shows similar patterns as those we observe in labor force participation rates. Most of the variations in male employment are due to a demographic component, while changes in the female employment rate are due to both demographic (increased shared of adult women) and economic (increased labor force participation) factors.

Real wages persistently declined for all male groups and most females, with a starker fall for males (figure 5). For both males and females, the 36-to-54 age group experienced greater declines; and for the oldest group of females (56-to-65), real wages stagnated but did not decline. Therefore, the economic forces driving the increase in FLFP cannot be wage considerations or a substitution effect. The increase in FLFP in Mexico after the protracted 2008 crisis is due to an important demographic component, but it also may be associated with the added-worker effect (income effect) or some other factors (addressed later in this paper).

We tested the validity of the economic and demographic effects found in the decomposition that explain the increase in FLFP over the last decade. We predicted the propensity of women being employed by studying the marginal effects using a simple probit model (detailed information about the specification can be found in appendix 1).

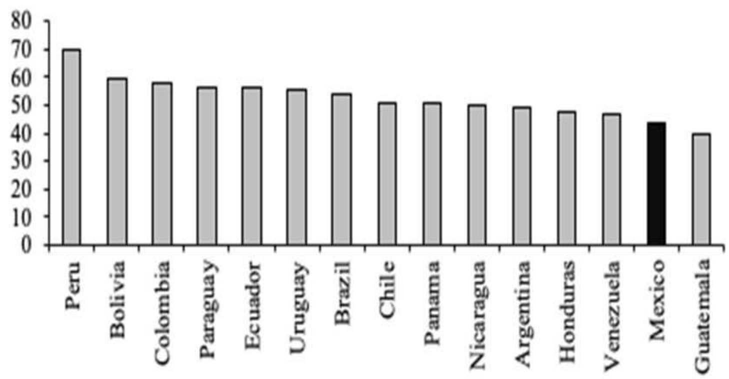
Figure 6 shows the estimated probability of females being employed according to their age and educational attainment, compared to a male with middle-school education in the 26-to-35 age group. We estimated coefficients and their respective confidence intervals for 2005 (light-gray bars) and 2017 (black bars). Only where confidence intervals do not overlap can we conclude statistical significance regarding a change in the probability of women being employed between 2005 and 2017.

For men, no characteristic had a statistically significant effect on the change of employability over the period, similar to the previously explained disaggregated labor indicators. For women, on the other hand, the probability of being employed does change throughout the years for the 36-to-65 age brackets with basic education. For the three oldest age groups of females, the propensity to be employed increased by approximately 5 percentage points.

These results reinforce our previous findings that older women (36-to-65) account for the demographical component explaining the increase in female labor market participation and employment in the last decade. They also suggest that specific characteristics, such as education, explain these changes, despite stagnant or declining wages.

Figure 1

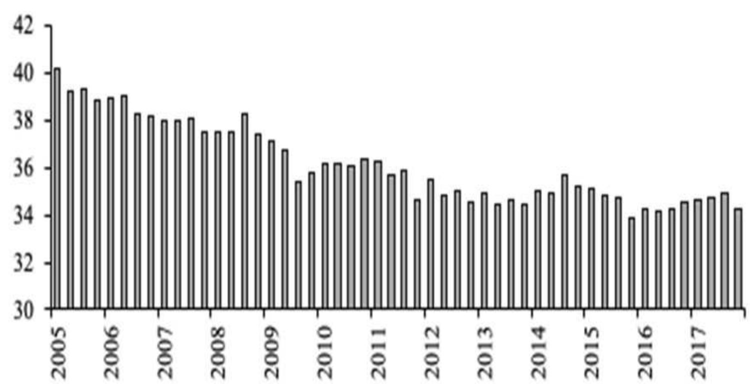
Female labor participation rates, Latin America, 2017



Source: World Development Indicators, World Bank.

Figure 2

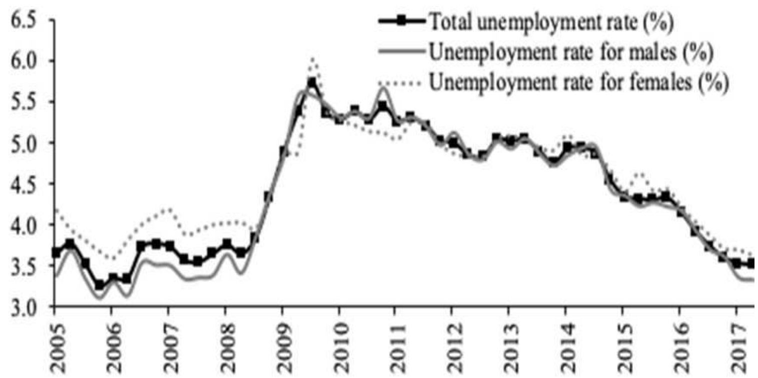
Mexican labor force participation gender gap, 2005-2017



Notes: Difference between male and female labor force participation rates.

Source: Secretariat of Labor and Social Welfare (*Secretaría del Trabajo y Previsión Social*, STPS).

Figure 3
Mexico unemployment rate, 2005-2017



Notes: Seasonally adjusted.
Source: STPS.

Figure 4
Decomposition of changes in Mexican labor market indicators (2Q2005-2Q2017)

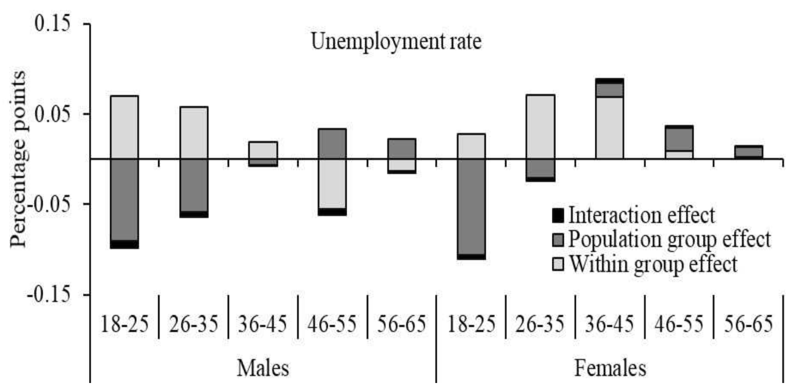
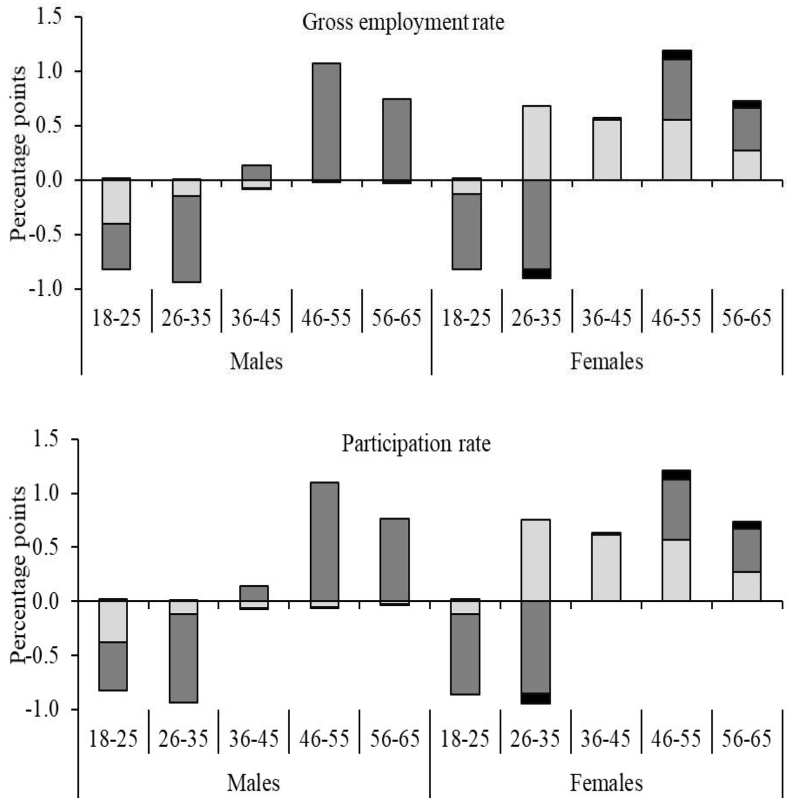


Figure 4
(continued)



Notes: Within group effect: changes in incidence of employment within each group. Population group effect: changes in demographic composition among distinct groups. Interaction effect: interaction between the other two effects.

Source: Own calculations using data from ENOE data.

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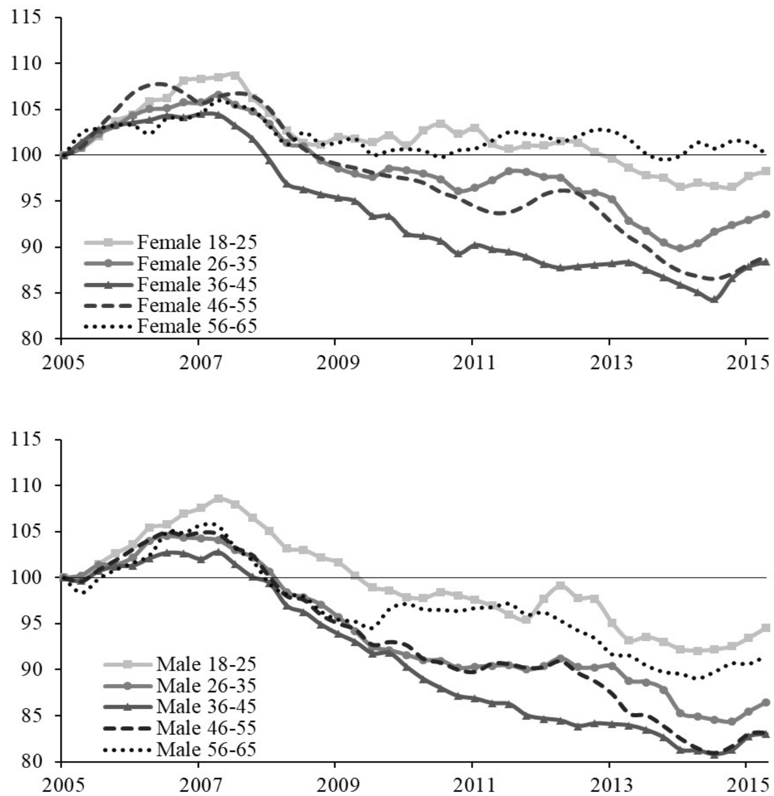
Figure 5
Real hourly wages index (2005Q1=100)

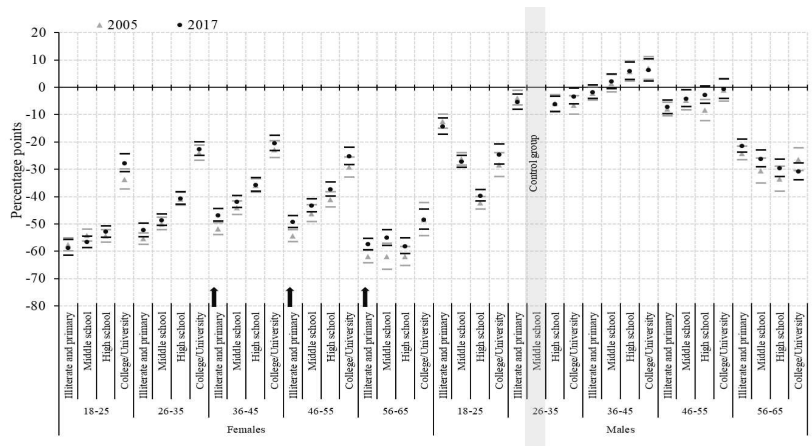


Notes: The average hourly wage by gender and age group was computed using quarterly ENOE data. These data were deflated using the national consumer price.

Source: Own calculations using data from ENOE.

Figure 6

Propensity to be employed in Mexico by sex, age, and educational attainment



Note: The horizontal lines correspond to confidence intervals. The arrows show those cases where the 95% confidence intervals for 2017 and 2005 regression coefficients do not overlap.

Source: Own estimates using data from ENOE.

4. Methodology and Data

The previous sections explained the demographic component of women's increased labor market participation. Now we explore individual and household characteristics and labor market indicators to estimate a model to identify the main determinants of the increase in women's employment. We follow Klasen and Pieters (2015) approach mentioned in section 2 estimating a probit model to decompose marginal contributions of different covariates to women's probability of being employed. Nevertheless, we pool the selected years, 2007 and 2017, in the same regression rather than estimating a model for each year separately. We also include a new variable for Mexico's context-namely "childcare facilities", in consideration that in 2007 the Mexican government initiated its CFWM that operated throughout the decade. We also included lagged labor market indicators to control for possible endogeneity.

Data

We use Mexico's ENOE, a quarterly household-level rotating panel for which each individual is interviewed for five consecutive periods.[5] ENOE, Mexico's official labor force survey since 2005, provides representative information on labor market characteristics at the national, state, urban, and rural levels. It includes information for individuals aged 15 and above; however, we restrict our sample to women aged 18 to 65. Our analysis includes observations from 2007 -when CFWM started operating and one year before the financial crisis- and 2017, when unemployment rates returned to pre-crisis levels. Again, we use the second quarter data to avoid seasonal effects.

ENOE questionnaires include broad thematic information, such as labor and socio-demographic characteristics of respondents, their current economic condition, type of work, industry, and earnings. The ENOE also includes information on the respondent's educational attainment. Based on questions regarding the number of years of schooling and whether the respondent had concluded each grade, we constructed four categories of formal education: illiterate and primary, middle school, high school, and college/university.

Urban households are those in localities with more than 2,500 inhabitants. We computed household real income as the sum of all members' labor earnings, and then deflated these earnings using the official Mexican Consumer Price Index (INPC). ENOE also provides the number of hours worked by each individual. We defined people working fewer than 35 hours per week as part-time workers. Also, we calculated average wages for different industries using the North American Industry Classification System (NAICS).

We built a "childcare facilities availability" variable using data from the population census and the national childcare facilities directories. This variable is defined as the number of childcare facilities per 1,000 people in each municipality. First, we used the National Childcare Facilities Directory for Working Mothers of SEDESOL -the largest childcare provider in Mexico- to calculate the number of public childcare facilities in each municipality.

We used the December 2008 and December 2016 directories as they provide the closest data available to 2007 and 2017, respectively.

[5] For this paper, we do not use ENOE panel data design since comparing the same population after ten years is not feasible. As mentioned, each individual is surveyed for 15 months at the most, making it difficult to identify the before and after dynamics of the 2008 economic crisis.

Second, we use the Population and Housing Censuses to calculate each municipality's population size. We use the Census data instead of ENOE since the latter is not representative at the municipal level. Census data are available from 1990 to 2010, but only every five years, so we matched the 2005 and 2010 Census data with the 2007 and 2017 ENOE surveys, respectively.

Model

We are interested in explaining the growth in female employment during the last decade in Mexico. Hence, we model the probability of a woman being employed as:

$$\begin{aligned} &E[P_i|\, X_i^I, X_i^H, X_i^M, Year17] \\ &= F[\beta_0 + \ \beta_1 Year17 + \sum_I \left(\beta^I X_i^I + \gamma^I X_i^I {*} Year17\right) \\ &+ \sum_H \left(\beta^H X_i^H + \gamma^H X_i^H {*} Year17\right) \\ &+ \sum_M \left(\beta^M X_i^M + \gamma^M X_i^M {*} Year17\right)] \end{aligned} \qquad (2)$$

Where F is the standard normal cumulative distribution function; and X_i^I, X_i^H, X_i^M are sets of explanatory variables at the individual, household, and labor market levels, respectively. Unlike Klasen and Pieters (2015), we do not estimate the model separately for each year but pool both years in the same regression, and we include a dummy variable for the year 2017. We also include an interaction term for each variable with the 2017 dummy to observe whether the explanatory variables have a different effect on women's employability in 2017 compared to 2007.

The set of individual characteristics starts with the age and age-squared variables. We then include the set of educational attainment dummies in which "primary education" and "being illiterate" represents the reference category. Concerning household variables, Klasen and Pieters (2015) argue that information on household head's highest educational degree can proxy for household wealth or "permanent income beyond earnings". Therefore, we include a dummy variable for female-headed households, and then we include the education level of the male household head as a substitute for a housing asset index.[6] Since less than 1 in 5 households are headed by a female in Mexico, this alternative income measure covers most of the sample.[7]

We also include a dummy variable that takes the value of "1" if there is at least one male household member with salaried employment, which proxies for "security of household income". We add the natural logarithm of the household's total monthly real income in Mexican pesos, which excludes the individual's own earnings; this estimates an individual's leisure cost, as we assume that the higher the earnings of other household members, the lower the need for women in the household to seek employment.

In addition, we include variables for households with children and dependent elderly because these affect female employment in two ways: higher dependency discourages women from working outside the home because of the need to take care of children or older people; on the other hand, in low-income households, having a larger number of non-working dependents requires additional earnings, which could encourage women to participate in the labor market. We also include a measure of the supply of nearby childcare facilities -that is, the number of childcare facilities per 1,000 people in the municipality- and an interaction term with a "children between 0-4 years old" dependency variable. These indicators estimate whether having access to childcare services encourages women to work.

Finally, labor market conditions comprise: (i) the state's female and male unemployment rates (as an indicator of labor demand); (ii) state's average real hourly earnings of women and men in non-white-collar service sector and in industrial production sectors, respectively[8]; and (iii) state's share of part-time employees to total employment (to measure access to jobs with flexible conditions). We estimated labor market condition variables using data from the corre-

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[6] Hence, we define six categories for this variable: i) being the household head; ii) not being the household head and living in a female-headed household (reference group); iii-vi) living in a male-headed household (four categories depending on the male household head educational attainment).

[7] Further, including female household head education would generate a collinearity problem with the household head dummy previously mentioned and would not allow us to differentiate effects from male or female household heads on their cohabitant females.

[8] The non-white-collar services sectors are traditionally associated with female employment, while the industrial production sector is associated with male employment.

sponding previous year, that is 2006 or 2016, to control for potential endogeneity. Standard errors are clustered by sampling design substratum[9], acknowledging a possible correlation between residuals and households' characteristics within the same substratum.

5. Results

Table 1 summarizes statistics for the variables we used in the analysis and sets the stage to understand how the Mexican context changed after one decade. Looking at individual characteristics, we observe that female employment increased between 2007 and 2017. Similarly, overall education for women improved substantially throughout this period: the share of illiterate women decreased 13 percentage points, while higher educational attainment levels increased. Also, the percentage of female household heads grew slightly from 17 to 19 percent.

The educational attainment of male household heads increased as well. Household real income decreased, while the share of households with at least one male salaried employee slightly increased during these ten years. Household dependency rates for children 0-to-4 and 5-to-14 decreased almost 4 and 5 percentage points, respectively; while elderly dependency rates increased slightly, suggesting an ageing population. However, Mexico's population and the number of childcare facilities grew at similar rates: the average number of government childcare facilities per 1,000 people in each municipality remained almost stable (decreasing by less than 1 percent).

With respect to labor market characteristics, average unemployment rates for both men and women increased.[10] Surprisingly, the share of part-time employees did not increase from 2007 to 2017, despite structural labor reforms implemented in 2012 to promote labor

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9 Substratum is the most detailed ENOE grouping of households in its sample design. Access to public services, the presence of certain goods, and population characteristics, such as education and income, are some of the variables considered for substratum grouping.

10 The averages of the labor market characteristics in table 1 might not coincide with those observed for the national aggregates, since they are calculated using state-level data. We first computed the states' industry employment shares, part-time employment shares, unemployment rates, and average real hourly wages using the full sample of the ENOE and frequency weights. We then restricted the sample to women aged 18 to 65 and generated the indicators for the labor market characteristics. Small differences between the sample and population averages are explained by differences in the population distribution across states.

market flexibility. The share of agriculture sector employment declined by more than a percentage point, while the share of industrial, white-collar, and service sector employment all expanded, with the latter -where 49 percent of all women work- experiencing the biggest increase.

The estimation results from our model to explain women's employability are presented in table 2. These represent the average marginal effects of the probit model (2) and show the change in the probability of a woman being employed with every unit change in the explanatory variables.

The dummy variable "2017" has a negative and significant coefficient, but its magnitude and sign should not be interpreted as a decrease in women's employment at the end of the decade; the effect varies for each population group due to the interaction terms. Therefore, no simple interpretation of this coefficient is possible. In any case, this variable captures unaccounted factors beyond the explanatory variables in our fixed-effects model.

With respect to individual characteristics, as previously suggested, our results indicate that older women have a higher probability of being employed. Our results also show that improved educational attainment encouraged women's labor inclusion throughout the decade. College or university education has a substantial positive effect, increasing the employability of women by 35.4 and 28.3 percentage points in 2007 and 2017, respectively. Middle and high school education -compared to being illiterate or having only primary education- also raised employability by 8.3 and 15.4 percentage points in 2007, but this increase had narrowed by 3.1 and 5.8 percentage points ten years later. Despite the reduction in the effects of education after a decade, this is still indicative of a broad demand for more educated and skilled workers.

Regarding household characteristics, results in table 2 show the differences in the propensity of being employed depending on the role of the individual within the household and the household head's educational attainment. As discussed before, the reference group includes those women living in a household headed by another female.[11] Be-

[11] With a different model specification that considers female households' education, household education coefficients increase and remain statistically significant. However, these coefficients also capture the effect of not being a household head, and do not allow us to make a distinction between female or male household's education. Therefore, we select the current specification to have a more approachable interpretation. All results are robust across model specifications.

ing the household head increases the probability of being employed by 9.2 percentage points in any year. On the other hand, living in a household headed by a male reduces women's employability. In those households, every additional educational level on the part of the household head has a stronger negative effect on the probability of a woman being employed, ranging from -8.5 to -16.3 percentage points.

We used educational attainment as a proxy for household wealth or permanent income for household heads, following Klasen and Pieters (2015). Since 83 percent of households in Mexico were headed by a male in 2007 and 81 percent in 2017, higher permanent household income may cause Mexican women to delay or forego labor market entry. Male household head's education has a persistent negative coefficient throughout the decade; however, it is smaller than the woman's educational attainment at all educational levels. That is, the education effect for women overcomes the permanent income effect of having a highly educated male heading the household. Women's education appears to be a major enabler for female labor participation.

Households having at least one salaried male employee show a similar pattern: the woman's probability of working decreased by 5.3 percentage points in 2007, although without an additional effect in 2017. At the beginning of the decade, the traditional division of work and the income effect associated with salaried males discouraged women from entering the labor market. Nonetheless, since male wages and household income dramatically decreased after the 2008 economic crisis, it is notable that the coefficients related to household income and having a salaried male in the household variables did not change ten years later.

In other words, the general decrease in wages and the accompanying fall in household income did not impact women's employability any further after the crisis. An increase in the monthly household income has the same negative effect on the employability of women in both 2007 and 2017, even as the cost of leisure increased after the economic downturn. In contrast, studies show that after the 1994 economic crisis in Mexico, women entered the labor market as the male unemployment rate increased, and household income was at stake (Parker and Skoufias, 2004; Parrado and Zenteno, 2001). In this paper, however, we do not find any statistically significant effect of male unemployment on women's likelihood to be employed any year. Therefore, we do not find evidence of a long-term added-worker effect.

The results of the study on the 1994 crisis, discussed above, implies that households are a decision-making unit in which, under traditional gender roles, women are less attached to the workforce than their male counterparts. A favorable economic environment, or higher parental educational attainment, raises family earnings and allows women in the household to wait longer for a better job (Marchionni and Gasparini, 2017; Klasen and Pieters, 2015). The implications could be adverse for women: staying out of the labor market can decrease their productivity, cost them valuable work experience, and reinforce traditional household gender roles that could later inhibit female work prospects. However, one possible scenario is that wealthier households or households with higher educated heads, support women while pursuing higher education instead of working, as previous studies in Mexico have found (Bentaouet and Széquely, 2014; De Hoyos *et al.*, 2016).

Estimates show that living in an urban household is associated with an 11.1 percentage point higher propensity of being employed in both 2007 and 2017. The effect's magnitude did not change despite Mexico's sharp GDP contraction (the region's largest), with severe unemployment -especially in urban areas- and stark decreases in formal blue-collar jobs (Villareal, 2010).

Consistent with the literature, younger children have a large, negative effect on mothers' probability to work; children require more care, which is traditionally delegated to women. In 2007, younger infant dependency -having children between ages 0 and 4- decreased a woman's probability of working by 8.9 percentage points, and having children between ages 5 to 14 decreased a woman's probability of working by 1.9 percentage points. Ten years later, the magnitude of the negative effect grew 1 percentage point only for women in the second group, while remaining equally negative for mothers of youngest children.

Notably, having elderly dependents shows a positive effect of 3.6 percentage points on female employability in 2007 and 2017. Some studies imply that the presence of senior adults in households could encourage labor participation for women with young children as older adults substitute for childcare services, especially in households with a female head (Tienda and Glass, 1985; King, 2011; Talamás, 2019). However, as stated before, childcare dependency rates dropped, and elderly dependency rates rose since 2007 (table 1). Although not statistically significant, the coefficient of elderly dependency is negative in 2017.

The literature has shown that Mexican women traditionally bear informal eldercare provisions (Van Gameren and Velandia, 2015). As the population pyramid shifts and the share of older people increases, it is possible that traditional gender roles will cause more women to stop working and take care of older family members (Johnson and Lo Sasso, 2006; Ettner, 1995). The negative effect of having younger children on women's employability is counteracted by the expansion of childcare facilities, and probably by having older adults who can substitute for childcare, but this might not compensate for rising elderly dependency in the long run.

Government policies -specifically the provision of childcare facilities- can offset the effect of having children. Although not significant in 2007, a one-unit increase in the number of childcare facilities per 1,000 people in the municipality is associated with a 13.8 percentage point rise in a woman's propensity to be employed ten years later. The positive effect is not exclusively for mothers; having more childcare facilities increases all women's likelihood to be employed. It is possible that other women within the household, or in mothers' close network, are also entering the labor market as they are less constrained to provide childcare.

Three reasons could explain the lack of a significant effect in 2007: (i) we are using the 2008 childcare directory, with much more childcare facilities, instead of the 2007 directory, (ii) we are evaluating CFWM's impact soon after its implementation, leaving no opportunity for positive externalities to the general female population, and (iii) the program targeted mothers with children 0-4 years old.

Thus, accessibility to childcare facilities has a stronger benefit for women living in households with children aged under 4. Childcare facilities helped increase these women's employment by 13.8 percentage points in 2007, and this impact doubled in 2017. The size of this broader effect results from adding the marginal contributions of the childcare facilities indicator in 2017 and its interaction with the "children between 0-4 years old" dependency variable.

Regarding labor market characteristics: the small positive effect of part-time employment share in 2007 became null ten years later. Literature associates the growth of part-time jobs with more women in the labor market due to flexible work schedules that ease their entrance (Rindfuss and Brewste, 2000; Bernhard, 1993). In Mexico - despite national labor reform in 2012 and a new legal basis for flexible contracts designed to create more jobs (Banco de México, 2013)- part-time employment decreased by the end of the decade. This likely explains the small but negative coefficient in 2017.

Further, the coefficient for real hourly wages for men the industrial sector is only positively correlated with women's labor inclusion in 2007, while higher service sector wages for women have a strong positive effect on their employability in 2017. Thus, increases in the real hourly wages for women in the service sector raised their employability by 18.6 percentage points in 2017. Despite declining or stagnating wages for all women after the crisis (table 1), it appears that they are still strongly drawn to sectors where they have traditionally worked.

Table 1
Basic statistics

	2007				*2017*			
Variable	*Mean*	*Std. Dev.*	*Min.*	*Max.*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Dependent variable								
Employed	0.48	0.50	0.00	1.00	0.50	0.50	0.00	1.00
Individual characteristics								
Age	37.06	12.83	18.00	65.00	38.53	13.18	18.00	65.00
Age^2	1538	1021	324	4225	1658	1065	324	4225
Illiterate and primary	0.38	0.49	0.00	1.00	0.25	0.43	0.00	1.00
Middle school	0.25	0.43	0.00	1.00	0.31	0.46	0.00	1.00
High school	0.26	0.44	0.00	1.00	0.28	0.45	0.00	1.00
College/University	0.11	0.31	0.00	1.00	0.16	0.37	0.00	1.00
Household characteristics								
Household head (HH)	0.17	0.37	0.00	1.00	0.19	0.39	0.00	1.00
Household head education								
Illiterate and primary (male HH head)	0.34	0.47	0.00	1.00	0.24	0.43	0.00	1.00
Middle school (male HH head)	0.16	0.37	0.00	1.00	0.20	0.40	0.00	1.00
Highschool (male HH head)	0.12	0.32	0.00	1.00	0.13	0.34	0.00	1.00
College/University (male HH head)	0.11	0.31	0.00	1.00	0.12	0.32	0.00	1.00

Table 1
(continued)

	2007				*2017*			
Variable	*Mean*	*Std. Dev.*	*Min.*	*Max.*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Household characteristics (continued)								
Urban	0.85	0.36	0.00	1.00	0.86	0.35	0.00	1.00
Male salaried emp.	0.57	0.49	0.00	1.00	0.59	0.49	0.00	1.00
Log real income	9.06	0.87	3.23	13.76	8.89	0.79	3.55	13.02
Children 0-4	0.32	0.47	0.00	1.00	0.28	0.45	0.00	1.00
Children 5-14	0.52	0.50	0.00	1.00	0.47	0.50	0.00	1.00
Elderly	0.14	0.35	0.00	1.00	0.16	0.36	0.00	1.00
Childcare facilities per 1,000 population	0.119	0.08	0.00	0.59	0.118	0.08	0.00	0.79
Labor market characteristics								
State employment shares								
Agriculture	15.44	9.39	0.43	37.25	14.22	9.69	0.63	38.53
Industrial production	25.62	5.97	16.78	35.14	25.88	7.23	14.94	40.11
Services	48.83	5.14	38.01	61.69	49.34	5.96	38.22	64.83
White-collar services	10.11	2.91	5.86	20.93	10.56	2.92	6.40	21.59
Part-time employment share								
Part-time employment	26.79	5.68	13.47	36.83	26.31	5.12	17.32	36.55
Unemployment rates								
Female unemployment rate	3.32	1.34	1.19	6.01	3.58	1.25	1.54	7.41
Male unemployment rate	2.84	1.10	1.08	6.02	3.38	1.18	1.15	7.20
Average real hourly wages								
Female - agriculture	3.23	0.38	2.59	4.33	3.14	0.31	2.63	3.84

Table 1
(continued)

	2007				2017			
Variable	*Mean*	*Std. Dev.*	*Min.*	*Max.*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Average real hourly wages (continued)								
Female - industrial production	3.48	0.22	2.98	4.00	3.39	0.20	2.92	3.75
Female - services	3.75	0.12	3.55	3.99	3.58	0.12	3.35	3.88
Female - white-collar services	4.00	0.10	3.79	4.19	3.88	0.12	3.66	4.14
Male - agriculture	3.16	0.27	2.47	3.79	3.15	0.26	2.40	3.76
Male - industrial production	3.74	0.15	3.48	4.05	3.60	0.14	3.38	3.97
Male - services	3.82	0.11	3.62	4.08	3.62	0.12	3.37	3.88
Male - white-collar services	3.99	0.12	3.68	4.22	3.83	0.13	3.53	4.12
N	129,184				126,311			

Notes: The results are sample summary statistics. All labor indicators were estimated before restricting our sample and do not reflect national estimates. Source: Own estimates using data from ENOE and Census.

Table 2
Probit (average marginal effects) 2007-2017

Pr (Employment)		*Interaction with 'Year 2017'*
Year 2017	-0.531***	
	(0.000)	
Individual characteristics		
Age	0.042***	0.002
	(0.000)	(0.341)
Age^2	-0.001***	-0.000
	(0.000)	(0.877)
Own education (Ref. Illiterate or primary ed.)		
Middle school	0.083***	-0.031***
	(0.000)	(0.000)
High school	0.154***	-0.058***
	(0.000)	(0.000)
College/University	0.354***	-0.071***
	(0.000)	(0.000)
Household characteristics		
Household head (HH)	0.092***	-0.012
	(0.000)	(0.276)
Household head education (Ref. female-headed households.)		
Illiterate or primary school (male HH head)	-0.085***	0.008
	(0.000)	(0.434)
Middle school (male HH head)	-0.117***	0.018*
	(0.000)	(0.075)
High school (male HH head)	-0.119***	0.018
	(0.000)	(0.113)
College/University (male HH head)	-0.163***	0.014
	(0.000)	(0.280)

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Table 2
(continued)

Pr (Employment)		*Interaction with 'Year 2017'*
Household characteristics (continued)		
Urban	0.111***	-0.002
	(0.000)	(0.895)
Male salaried emp.	-0.053***	0.010
	(0.000)	(0.152)
Log real income	-0.007**	0.000
	(0.037)	(0.986)
Children 0-4	-0.089***	0.002
	(0.000)	(0.844)
Children 5-14	-0.019***	-0.010*
	(0.000)	(0.064)
Elderly	0.036***	-0.013
	(0.000)	(0.109)
Childcare facilities	0.045	0.138**
	(0.213)	(0.013)
Children 0-4 * Childcare facilities	0.138**	0.031
	(0.011)	(0.682)
Labor market characteristics		
Part-time employment share		
Part-time employment	0.002***	-0.002**
	(0.000)	(0.019)
Unemployment rates		
Female unemployment rate	-0.007**	-0.006
	(0.039)	(0.285)
Male unemployment rate	-0.006	0.002
	(0.147)	(0.702)

Table 2
(continued)

Pr (Employment)		*Interaction with 'Year 2017'*
Labor market characteristics (continued)		
Average real hourly wages		
Female - services	0.011	0.186***
	(0.769)	(0.003)
Male - industrial production	0.078**	-0.014
	(0.016)	(0.795)
N	179,362	

Notes: The sample is restricted to females between 18 and 65 years old. P-values in parentheses, *** p<.01, ** p<.05, * p<.10.

Source: Own calculations using data from Census, ENOE and SEDESOL.

6. Conclusions

A decade after 2007, improvement in several conditions supported female inclusion in the Mexican labor market. Despite the 2008 economic crisis, the unemployment gender gap almost closed, and the labor force participation gender gap narrowed. Demographics, economic decisions, and governmental policies enabled this change.

Analyzing our decomposition of labor market indicators, both an increased share of women aged 36 to 65 and higher labor participation rates among this group were the main contributors to the overall FLFP growth since 2005. Further, we estimated a probit model to identify the primary determinants of women's employability, in which we define a set of individual and household characteristics and labor market indicators as covariates. Our results show that increased schooling and returns to secondary and tertiary education, an increase in service sector wages, and access to childcare facilities were the main determinants of women's employability, contributing to the decline in labor gender gaps during our study period.

Demographic dynamics accompanying inversion of the population pyramid have an important role in explaining women's inclusion in the labor market. Women aged 15 to 34 experienced weaker gross employment rates due to the decline in the share of young people and higher labor force participation. However, rising employment rates for older cohorts of women combined with their increasing share of the population more than compensated for this at the national level: women aged 36 to 65, who represented 73 percent of national female participation rate growth between 2005 and 2017, were responsible for the increase in FLFP during that period.

Economic household decisions also explain a large part of the contraction in the labor gender gap, with strong income effects manifesting. The existence of a male salaried employee in the household -an indicator of alternative household income sources- decreased the likelihood of a woman working in both 2007 and 2017. With no additional effect after the crisis, but stagnant or decreasing wages for all women, we conclude that a woman's probability of working is still conditioned by household-level decisions and traditional roles in which men are the main income providers, even when income instability is at stake.

Further, we found that a higher male household-head educational level -a proxy for household wealth or permanent income (Klasen and Pieters, 2015)- delays women's entry into the labor market. Although women may be delaying or foregoing labor market entry due to the traditional division of work, it could also reflect that wealthier households enable dependent women to focus on their education or other activities. In any case, household-level decisions once more condition women's probability of working.

However, female educational attainment seems to be the predominant factor enabling woman's employability and mitigating traditional gender roles. Although all levels of educational attainment lost momentum, highly educated women are less employment constrained regardless of household characteristics, including the household head's education level and sharing a household with a male salaried employee. According to our results, a female with a college or university degree can offset any negative household characteristic effect on her likelihood to be employed, even when combining all constraining factors. This finding holds at both the beginning and the end of the decade we studied.

Some government policies -in specific, providing childcare facilities- also appear to encourage female labor market inclusion in Mexico, consistent with international experience and previous empirical work. On the other hand, despite legislative reforms to expand flexible work schemes, we observe no changes in the share of women working part-time, and no sizeable change in its impact upon likelihood to work.

We find evidence of sustained and increasing effects of childcare schemes after their implementation. Their existence enhanced the employability of women and offset the adverse effects of child dependency. The positive effect is not exclusively for mothers: childcare services expansion increased *all* women's likelihood to be employed. Further, for women with children under age four, the positive effect of childcare availability is doubled at the end of the decade.

Data on the availability of private childcare facilities over the ten-year period is limited, hence we might be underestimating the benefits of childcare availability on women's employability in 2017. By mid-2017, the supply of private formal childcare institutions rose to 8,655 facilities from 3,012[12] in 2010 (INEGI, 2010; CONEVAL, 2008; CONEVAL, 2019), a number close to the 9,157 Government National Program of Childcare Services for Working Mothers institutions. Further investigation is needed related to the benefits of private childcare.

Elderly dependency rates had a positive effect on women's employability in 2007 and 2017, likely because older adults substitute for childcare (Talamás, 2019). However, elderly dependency rates rose in 2017. It is possible that, under traditional gender roles, more women will abandon work outside the home to care for older family members. As the population ages, elderly substitution for childcare might not compensate for rising elderly dependency rates in the long term. It is crucial to better understand this relationship going forward to inform policies to address elderly dependency, quality of retirement lifestyles, and support for women's employability.

In any case, our results suggest that Mexico follows the development theory that economic shift away from agriculture to the non-white collar sector -the service sector in this context- contributed to the increase in female employment. Increasing real service sector average hourly wages increased the employability of women by 18.6 percentage points in 2017. This indicates that women's occupations in Mexico still concentrate in traditional service sectors; but this also implies that higher wages encourage women to enter labor markets as they substitute leisure or work at home for wage work (substitution effect).

Our study coincides with a long-term crisis between 2007 and

[12] The first National Statistical Directory of Economic Units available in Mexico is from 2010. To our knowledge, no detailed public information about private provision of childcare services in Mexico is available before that.

2017, whereby more women needed to join the labor market to sustain household income (Parker and Skoufias, 2004; Parrado and Zenteno, 2001), even as wages declined or stagnated. However, gender stereotypes are being counteracted thanks to higher female educational attainment and governmental policies, such as providing childcare facilities, which combine to enable female employability. The increase in women's employability in Mexico represents progress in gender equality and women's empowerment.

To continue expanding female inclusion in labor markets, policymakers should be aware of the implications of demographics shifts occurring in Mexico and expand policies that have succeeded, such as investment in childcare facilities and support for women's education. Given the results from our analysis, and the world economic shift to a service-oriented economy (ILO, 2017), governments seeking to promote female labor participation should prioritize providing women with access to quality education. The increasing complexity of the industrial sectors, combined with our results, suggest that increasing women's accessibility to tertiary education will be critical for enabling them to attain formal, well paid, quality jobs.

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Appendix I

We define the probit model as follows:

$$\begin{aligned}
&E[P_i|\ Sex,\ Age,\ Educ] \\
&= F\Big[\beta_0 + \beta_1 Sex + \beta_2 Age + \beta_3 Educ + \sum_J \left(\beta^J Sex * Age\right) \\
&+ \sum_K \left(\beta^K Sex * Educ\right) + \sum_L \left(\beta^L Educ * Age\right) \\
&+ \sum_M \left(\beta^M Sex * Educ * Age\right)\Big]
\end{aligned} \tag{3}$$

Where F is the standard normal cumulative distribution function; and *Sex*, *Age*, and *Educ* are sets of dummy variables. Age dummies include five categories: 18-25, 26-35, 36-45, 46-55, and 56-65 years old. Education dummies include four categories: Illiterate and primary, middle school, high school, and college/university. After estimating the model and computing the marginal effects, we predict the expected conditional probability of being employed given the sociodemographic characteristics, and relative to a reference group's average (26-35 years old males with middle school education).