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The rise in women's labour force participation in Mexico

Supply vs demand factors

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Abstract: We estimate the relative importance of alternative labour supply and demand mechanisms in explaining the rise of female labour force participation over the last 55 years in Mexico. The growth of female labour force participation in Mexico between 1960 and 2015 followed an S-shape, with a considerable acceleration during the 1990s. Using decomposition methods and a shift-share design, we show that, put together, supply and demand factors can account for the rise of female labour force participation over the period, led by increases in women's education and shifts in the occupational structure of the workforce. However, there is unexplained variation in the 1990s, when female labour force participation spiked.

Key words: female labour force participation, Mexico, education, labour demand, labour supply

JEL classification: J16, J21, J22, J23

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1 Introduction

At a global level, gender gaps in labour force participation have narrowed, with over half a billion women having joined the workforce in the last 30 years (World Bank 2012). However, there is enormous variation in women's labour force participation across low- and middle-income countries (Ñopo 2012; Ortiz-Ospina and Tzvetkova 2017; World Bank 2012), and there is no clear consensus on why (Klasen et al. 2019). In this paper we estimate the relative importance of alternative mechanisms in explaining the rise of female labour force participation (FLFP) over the last 55 years in Mexico. In particular, we estimate the importance of demand-side versus supply-side forces.

The growth of FLFP in Mexico between 1960 and 2015 followed an S-shape similar to that documented for the United States (Fogli and Veldkamp 2011). There was a fairly gradual increase through the three decades from 1960 to 1990, averaging 3.7 pps (pp) per decade. For a decade from 1990 there was a considerable acceleration of 16 pp in FLFP. After 2000, the decadal growth rate slowed, reverting to 3.7 pp. FLFP growth in the 1990s was among the largest decadal increases in the world (Bhalotra and Fernandez 2018; Ñopo 2012; World Bank 2012). Veiled by these average rates of growth was considerable spatial variation. The analysis here will leverage variation across 2,331 municipalities in Mexico. The speed and timing of the rise in FLFP, as well as the availability of abundant high-quality sources of data on different relevant dimensions for the analysis, makes Mexico an ideal setting for the purposes of the research.

We consider three supply-side determinants, education, marital status, and fertility, and quantify their impacts on FLFP using the Oaxaca–Blinder decomposition approach. Together, we estimate that they account for 73 per cent of growth in FLFP in the entire period 1960–2015, with education alone accounting for 45.7 per cent of the increase. The three supply-side factors do a poorer job of explaining the acceleration in FLFP in the 1990s—they can account for only 38.1 per cent of that increase.

On the demand side, we consider the two determinants often discussed in the literature: structural change and non-neutral technological change. Structural change refers to changes in the sectoral composition of employment which characterize the growth process and are often further driven by trade. Technological change is more accurately captured by changes in the occupational composition of employment, which reflects task-based skill requirements. We use a shift-share approach (Borusyak et al. 2018; Goldsmith-Pinkham et al. 2019) to estimate the explanatory power of these demand-side forces. We find that changes in occupational composition can explain about 40 per cent of the total increase in FLFP over the period, albeit a much smaller share of the 1990s spurt. Sectoral composition has no explanatory power.

Our estimates suggest that supply and demand factors can, together, account for all of the rise in FLFP, led by increases in women's education and shifts in the occupational structure of the workforce. However, there is unexplained variation in the 1990s, when FLFP spiked. Among potential explanations for this is that social norms surrounding all or any of marriage, fertility, and FLFP changed in this period and/or the share of women working in many local areas reached a critical mass, triggering further participation of women (Fogli and Veldkamp 2011).

Our results contribute to a large and recently active literature on FLFP. In addition to presenting new results for Mexico, we contribute by providing estimates of the role of key supply- and demand-side factors for a given sample. The available literature documents evidence of increasing demand for jobs in which women have a comparative advantage, and some studies show that this has incentivized women's participation. Changes in sectoral composition—for example, declines in the share of agriculture relative to services—have traditionally been associated with increases in the relative demand for women's labour, premised on the comparative disadvantage of women in brawn-intensive tasks (Galor and Weil

1996). Among studies emphasizing structural change, and in particular a shift in workforce composition from goods to service industries, are Lup Tick and Oaxaca (2010), Akbulut (2011), Olivetti and Petrongolo (2014), and Ngai and Petrongolo (2017). Among studies that instead highlight the way in which changing skill requirements in the economy have favoured women are Galor and Weil (1996), Blau and Kahn (1997), Weinberg (2000), Rendall (2010), Black and Spitz-Oener (2010), Aguayo-Tellez et al. (2013), Rendall (2013), Juhn et al. (2014), Deming (2017), Jaimovich et al. (2017), and Kis-Katos et al. (2018). More recent work emphasizes changes in occupational task content (Acemoglu and Autor 2011; Altonji et al. 2014; Autor and Dorn 2013; Autor et al. 2003), and some studies highlight increasing demand for social skills in which women have a comparative advantage (Cortes et al. 2018; Deming 2017).

The supply-side explanations explored in the literature include easier access to or lower cost of contraceptives (Costa 2000; Cruces and Galiani 2007; Katz and Goldin 2000), improvements in home production technologies (e.g. appliances) (Coen-Pirani et al. 2010; Costa 2000; de V. Cavalcanti and Tavares 2008; Greenwood et al. 2005), and changes in social norms and attitudes towards women's work (Costa 2000; Deshpande and Kabeer 2019; Fernández 2013; Fernández et al. 2004; Goldin 2006; Rindfuss et al. 1996).

A common feature of the cited studies is that each focuses upon isolating one mechanism, rather than the relative play of alternative mechanisms. Moreover, these studies use different identification strategies for different locations and time periods. This makes it hard to assess the weight of the different potential mechanisms. Similar to us in using a common sample to assess different explanations are Klasen et al. (2019) and Gasparini and Marchionni (2015), who investigate FLFP determinants in 8 and 18 countries respectively. Klasen et al. (2019) focus exclusively on supply-side factors. Gasparini and Marchionni (2015) analyse supply and demand factors, but they study variation across countries in Latin America at different stages of the transition. We focus on one country to develop a clearer understanding of the forces at work.

This paper is divided into six section, including this introduction. Section 2 describes the data used in the analysis; Section 3 describes the main patterns of the FLFP rate between 1960 and 2015; Section 4 considers the supply-side determinants of FLFP and quantifies their relative importance; Section 5 considers the demand-side determinants of FLFP and quantifies their relative importance; finally, Section 6 concludes.

2 Data and sample selection

Our main source of data consist of samples of the Mexican Census of 1960 (1.5 per cent fraction), 1970 (1 per cent fraction), 1990 (10 per cent fraction), 2000 (10.6 per cent fraction), 2010 (10 per cent fraction), and 2015 (9.5 per cent fraction), made available by the Minnesota Population Center through IPUMS-International.[1] There are two advantages of using these data sets: first, it allows us to go much further back in time than household surveys, so we can study long-term trends of FLFP and their determinants. More traditional alternatives, like the main labour force survey of Mexico, goes back only to the mid-1980s, it became nationally representative in 2000, and had significant methodological changes introduced in 2005, so there are problems of comparability over time (Campos-Vazquez and Lustig 2017). The Household Income Expenditure National Survey (ENIGH), which is also used to study the Mexican labour market, is also available only since the mid-1980s and has a relatively small

[1] The data available for the 1995 Mexican Census is only a 0.4 per cent sample of the population. The 2005 Mexican Census has no information on work status. We do not use these censuses in our estimates.

sample size.[2] Second, given the samples sizes available in the censuses, we can study spatial variation in changes of FLFP, a feature that is important for our empirical strategy. The Minnesota Population Center provides spatio-temporally harmonized municipal identifiers for 2,331 (out of a total of 2,448) municipalities between 1960 and 2015. Municipalities are subnational geographical divisions of Mexico below the state level, which we take as a proxy for local labour markets.

For each year available, the Mexican Census asks questions about individual and work characteristics, including education attainment, marital status, participation in the workforce, occupation, sector, fertility, and household composition. We restrict the analysis to a sample of workers aged 25–55 (henceforth referred to as prime-age workers). This is done to ameliorate selection problems arising from changes in educational and retirement choices of younger and older cohorts. FLFP is defined as the number of prime-age women who report working or seeking work during the previous week divided by the total number of women in the same age bracket. Work includes all sectors, occupations, and the informal economy. Mexico uses its own classification of occupations, which has changed over time. IPUMS-International provides a modified variable with a consistent classification based on the major groups (ten groups) of the International Standard Classification of Occupations (ISCO). To ease comparison across time and space, we use this variable. Similarly, we use the recodified groupings (15 groups) of sectors that conform to the International Standard Industrial Classification (ISIC). Finally, when doing individual-level analysis or aggregating the information at municipal or national levels, we use the individual weights provided in the data. These are only available after the year 2000. For the pre-2000 censuses we use 'flat' weights (equal for all individuals) that are proportional to each census sample. All the results have been replicated using 'flat' weights for the entire sample. There are no significant changes.

3 Evolution of FLFP in Mexico: 1960s

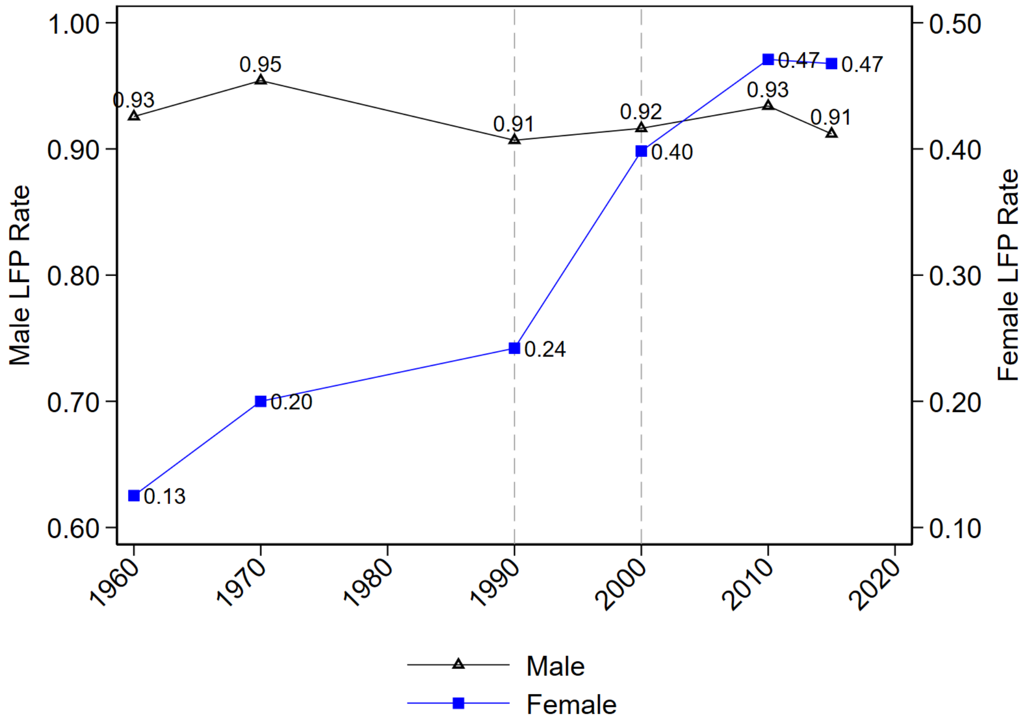
FLFP increased substantially over the last half-century in Mexico. In 1960, only 13 per cent of all prime-age female workers participated in the workforce. By 2015, that number reached 47 per cent (Figure 1).[3] Although FLFP remains at a low level compared to other countries with similar gross domestic product (GDP) per capita, and to other countries in Latin America (see Figure 2), this was a dramatic increase that fundamentally changed the landscape of the Mexican labour market.

The rate at which women joined the labour force varied over time, following an S-shape similar to what has been documented for the United States (Fogli and Veldkamp 2011). First there was a period of relatively slow but sustained growth between 1960 and 1990. In the span of those 30 years, FLFP grew by 11 pp, a decadal average growth of about 3.7 pp. Still, by the end of the period only one in four prime-age females were working in a market occupation.

[2] The census data are consistent with labour and household surveys. Our paper builds on Bhalotra and Fernandez (2018), where we study changes in FLFP during the period 1989–2014 in Mexico using the ENIGH. There, we show that patterns in the census and in the ENIGH are similar, both in terms of participation and earnings, within the periods in which they overlap. The census is not designed to collect labour market outcomes information, so results should be interpreted with this caveat in mind.

[3] For comparability, we replicate the labour force participation trends using ENIGH data over the period in which it overlaps with the census, between 1989 and 2014 (Figure A1).

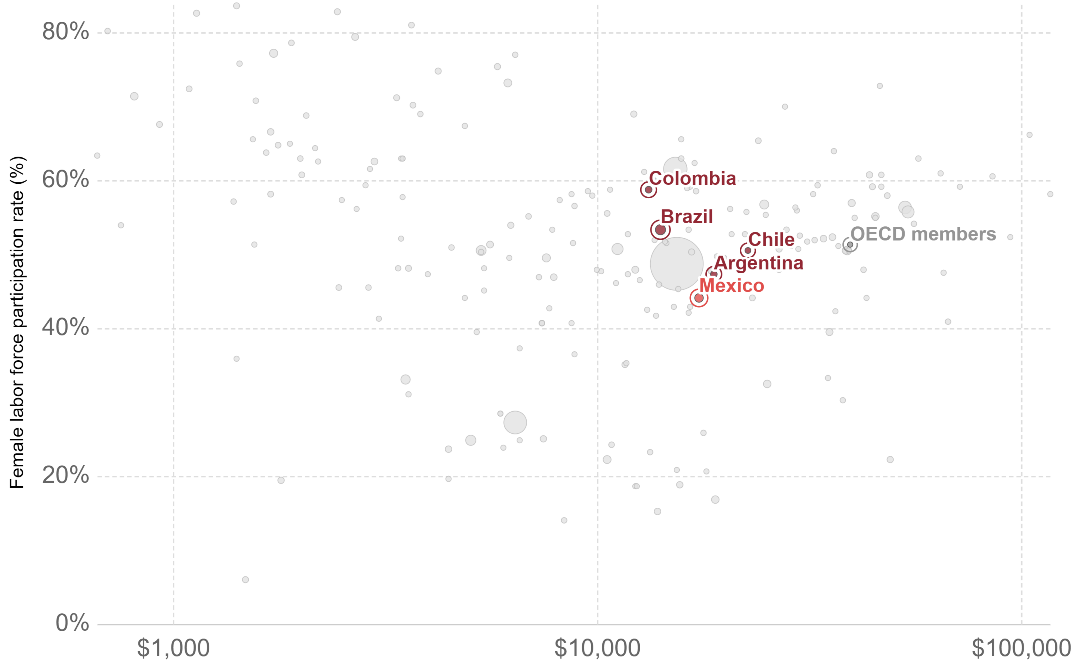
Figure 1: Labour force participation rate by year and sex



Note: each series shows the evolution of the labour force participation rate for men (black) and women (blue) between 1960 and 2015. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

Figure 2: Female labour force participation and GDP per capita (PPP) in 2016



Note: the labour force participation rate corresponds to the proportion of the population aged 15 and older that is economically active. National income levels correspond to GDP per capita in constant 2011 international dollars.

Source: International Labour Organization, ILOSTAT database, and World Bank – World Development Indicators. Available at: https://ourworldindata.org/female-labor-force-participation-key-facts. Reproduced under the Creative Commons license CC BY 4.0.

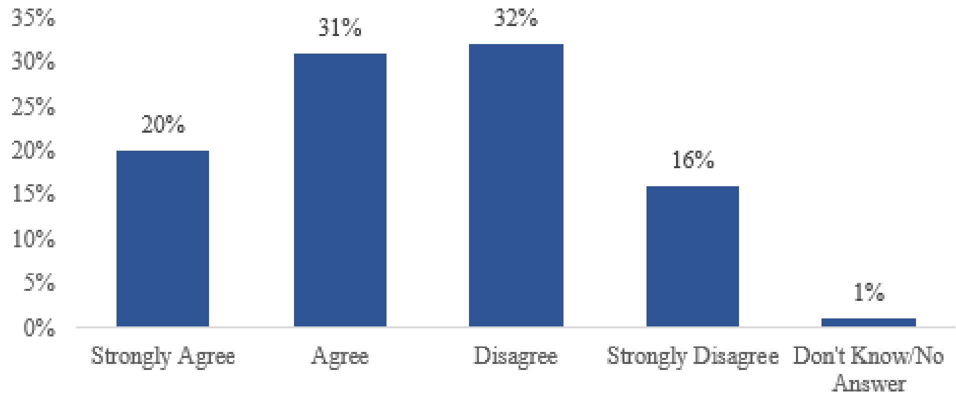
It was during the 1990s that FLFP took off, increasing by 16 pp (67 per cent) in ten years. The growth rate of FLFP in the 1990s was 4.3 times faster than the decadal average growth of the previous 30 years (Figure 1). There is no consensus on the cause of the sharp rise in FLFP during the 1990s. The fact that the period coincides with major market-oriented reforms and trade liberalization programmes has led some authors to argue that there is a causal connection between the two phenomena. The hypothesis is that demand-side trends favourable to women were central to the story: the set of reforms positively impacted production in sectors and occupations in which women typically have greater participation, effectively increasing the demand for female labour (Cordourier and Gómez Galvarriato 2004; Juhn et al. 2014; Meza González 2001). Technological change could also have played a role. New technologies, by lowering the need for physically intensive tasks in the jobs while increasing the relative importance of analytical and social skills, potentially generated better opportunities for women in the labour market (Jayachandran 2020; Rendall 2013).

The 1990s were also a period when women made substantial gains in education attainment, and fertility and marriage rates declined. These are all factors strongly associated with higher FLFP (Blau and Kahn 2017; Katz and Goldin 2000; Killingsworth and Heckman 1987; Klasen et al. 2019), and there is some evidence specific to Mexico suggesting that they played a role (Campos-Vazquez and Velez-Grajales 2014; Cruces and Galiani 2007). Given the magnitude and the speed of the change of FLFP in this decade, it is likely that both supply and demand factors contributed to the explanation, but there is yet no clear idea as to their relative quantitative importance.

After the growth spurt of the 1990s, FLFP growth decelerated, increasing at a decadal rate of 7 pp during the 2000s, and finally stagnating between 2010 and 2015. A similar deceleration of FLFP growth over the last decade has been documented for other Latin American countries, but its main drivers are also an open question. Gasparini and Marchionni (2017) argue that the fast economic growth during the 2000s, fuelled by the commodity price boom (Erten and Ocampo 2013), reduced the incentive for women, especially married women with lower levels of education, to join the workforce. This is consistent with previous work showing that FLFP follows a countercyclical pattern (Serrano et al. 2019), and it's negatively related to the husband's earnings (van der Klaauw 1996). It can also reflect ingrained cultural values. For example, in a nationally representative public opinion survey carried out by Latinobarómetro in 2015, 51 per cent of respondents, including men and women, said that they either agreed or strongly agreed with the statement that 'Women should work only if the couple doesn't earn enough' (Figure 3). Increased social assistance through welfare programmes like *Progresa/Oportunidades*, introduced in 1997 and expanded in the early 2000s, could have also disincentivized female labour supply, although recent evidence using experimental variation suggests this factor played a minor role in the aggregate (Alzúa et al. 2013).

The evolution of FLFP in Mexico over the previous 60 years can then be characterized by three distinct periods: sluggish growth (1960–90), fast expansion (1990–2000), and deceleration (2000–15). In the next sections we explore in detail how different supply and demand factors contributed to shaping these trends.

Figure 3: Degree of agreement with the statement: 'Women should work only if the couple doesn't earn enough'



Source: authors' construction based on data from the Latinobarómetro Survey, Mexico, 2015.

4 Supply-side determinants: education, marital status, and fertility trends

We first describe the main stylized facts about the evolution of education attainment, marital status, and fertility. We then use decomposition methods to quantify their relative importance across the three sub-periods.

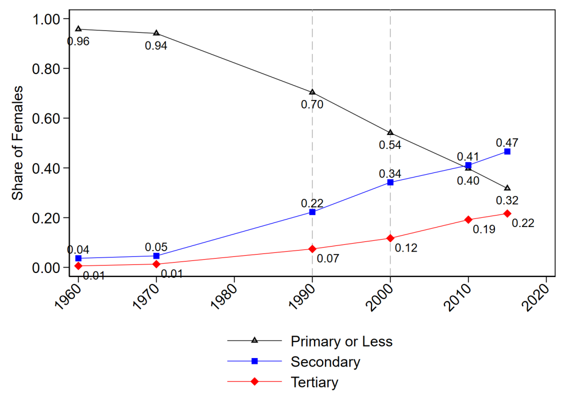
Education. The level of completed education is one of the main predictors of female participation in the workforce, so we start here. There were sharp gains in educational attainment over the last 55 years in Mexico, both for men and women (Figure 4(a,c)). During the 1960s, the majority of prime-age women (94 per cent) had at most completed primary education, approximately 6–8 years of formal schooling. Policies to expand secondary education started in the 1950s (Binelli and Rubio-Codina 2013; Gómez 1999), but the results began to show among the prime-age group from 1970 onward. The share of women with secondary schooling completed increased steadily from 5 to 47 per cent between 1970 and 2015, an average growth of 9.3 pp per decade. On average, women with secondary education are 1.4–3.5 times more likely to be in the workforce relative to those with at most primary education (Figure 4(b)). This suggests that the expansion of secondary schooling could have played a major role in the rise of FLFP, although the fact that the growth rate was fairly constant indicates that it was probably not the main driver behind the acceleration of FLFP in the 1990s. Interestingly, the share of women with primary education who are working in market occupations doubled between 1990 and 2000. Atkin (2016) shows that the growth of export manufacturing during the period of trade reforms increased school drop-out in Mexico. The author argues that higher demand for less-skilled jobs raised the opportunity cost of schooling, which could explain why the FLFP rate among the least educated increased profusely.

The share of women with tertiary education increased from 1 to 22 per cent over the 55-year period. This was again the result of policies that can be traced back to the 1950s (Gómez 1999). The labour force participation gap between college- and secondary-educated women increased over time, going from a 14 pp gap in 1960 to a 27 pp gap in 2015. This was driven by an increase in the participation rate of the college-educated, which went from 44 per cent in 1970 to 72 per cent in 2015. In fact, the FLFP rate of women with secondary education changed very little: it remained in a range between 39 and 45 per cent since the 1960s.

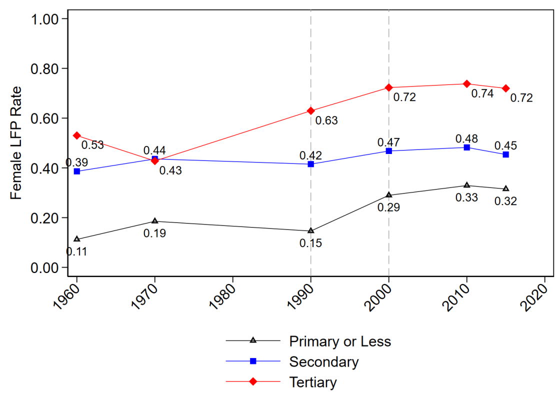
To summarize, starting in 1970 there was a strong trend in the educational attainment of prime-aged workers, and both the initial levels and the rates of growth of secondary and tertiary education were very similar for men and women. A striking pattern in the data, though, is that the strong trend in FLFP is driven by women with primary and tertiary education, there being no increase in FLFP among women with secondary education. The increased participation of women at the two ends of the education distribution is sharp in the 1990s, with a notable difference being that participation among women with tertiary education has risen since 1970, while participation among women with primary education only began to rise in 1990. Male participation rates were high and stable for men with secondary and tertiary education. However, participation rates for men with primary education declined over the period, from 97 per cent in 1970 to 86 per cent in 2015.

Figure 4: Education attainment and labour force participation by year and sex

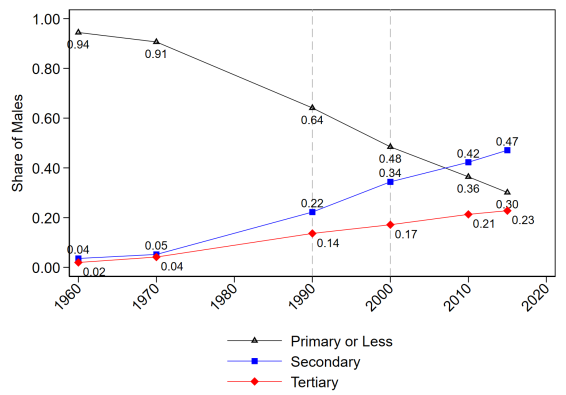
(a) Share of females by education group



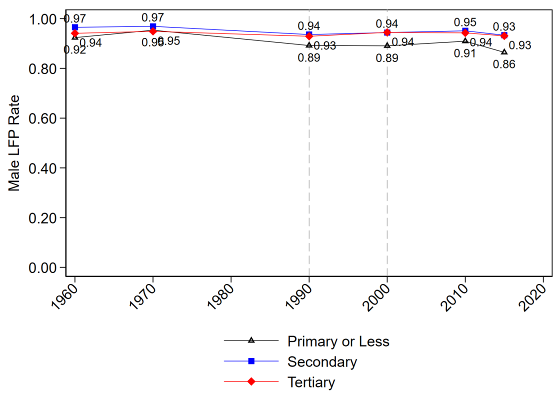
(b) Female LFP rate by education group



(c) Share of males by education group



(d) Male LFP rate by education group



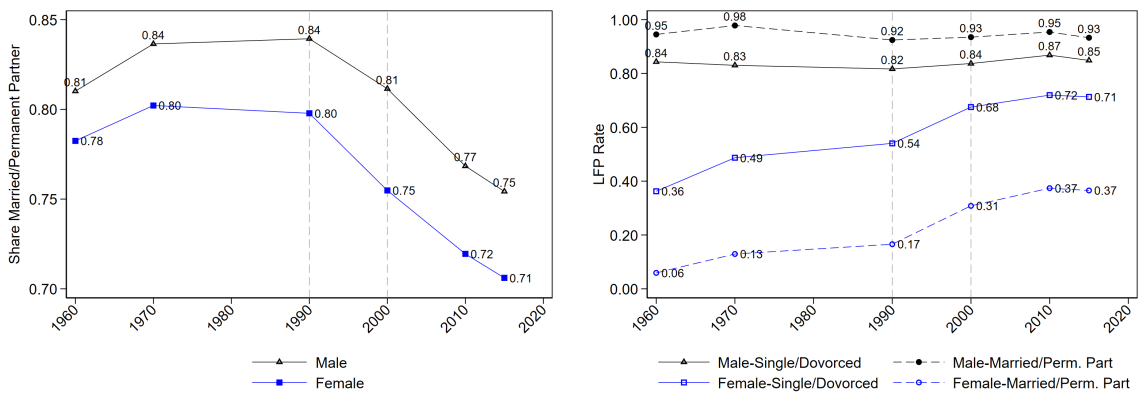
Note: panel (a) reports the share of females aged 25–55 according to maximum education attainment between 1960 and 2015. We consider three educational groups: primary or less, secondary, and tertiary. Panel (b) reports labour force participation rate of females aged 25–55 conditional on education attainment. Panels (c) and (d) replicate the exercise for males.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

Marital status. Most research finds that the largest gains in FLFP over the past century are due to the incorporation of married women into the workforce (Blau and Kahn 2017; Fogli and Veldkamp 2011; Gasparini and Marchionni 2017; Goldin 2006; Goldin and Olivetti 2013), but this was not the case in Mexico (Figure 5(b)).[4] The participation rates of both married and single women increased by similar magnitudes between 1960 and 2015: 31 pp and 35 pp respectively. This implies an average growth rate of about 6 pp per decade. Given this symmetry, participation rates by marital status mimic closely the S-shape of the overall FLFP rate.

What did change was the share of the prime-age population that reports being married, which began to decline around 1990 (Figure 5(a)). To our knowledge, this fact has not been pointed out before in the literature on FLFP in Mexico. It is not clear what drives the change in the trend. Divorce has legally existed in Mexico for more than a century, and the only major reform in this respect came in 2008 when unilateral divorce was approved, first in Mexico City and then in other 17 of the 31 states in the country (Aguirre 2019). It seems plausible that improved labour market opportunities for women led them to delay marriage or incur divorce. Of course, marriage and labour supply are decisions that are jointly determined (Eckstein and Wolpin 1989; Fernández and Wong 2014; Greenwood et al. 2016; Grossbard-Shechtman and Neuman 1988; Killingsworth and Heckman 1987; van der Klaauw 1996), so it is not easy to establish the direction of causality. Given that single or divorced women were, on average, 32 pp more likely to participate in the labour market, the declining trend in marriage could have contributed to the rise of FLFP. It is notable that the decline in the share of married women (and men) started in 1990, which is also when FLFP accelerated.

Figure 5: Marital status and labour force participation by year and sex
(a) Share of females/males married/permanent partners (b) LFP rate of females/males by marital status



Note: panel (a) reports the share of females (blue) and males (black) aged 25–55 who are either married or live with a permanent partner between 1960 and 2015. Panel (b) reports labour force participation rate conditional on marital status. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

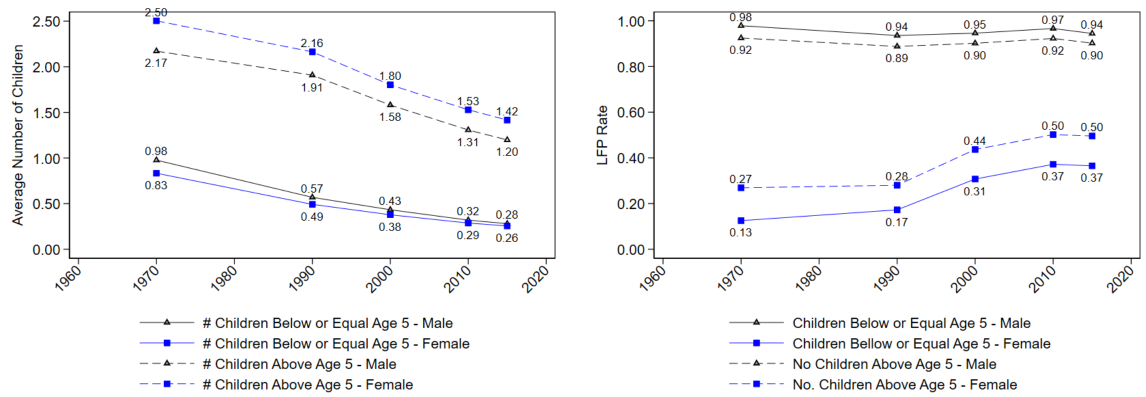
Fertility. The third main supply-side predictor of FLFP is fertility. There is extensive evidence showing a negative correlation between fertility and female labour supply, both in the intensive and extensive margins. Having children, especially of young ages, increases the probability of having out-of-work spells (Goldin 2006; Kleven et al. 2019), and induces withdrawals from the workforce (Angrist and Evans 1998; Costa 2000; Cruces and Galiani 2007; Korenman and Neumark 1992). Cultural norms regarding women's roles have been shown to be important in the connection between fertility and female labour supply (Fernández 2013; Fernández and Fogli 2009; Fogli and Veldkamp 2011), a factor that could be particularly relevant in Mexico.

[4] We make no distinction between women who are married and those who have a permanent partner.

We proxy fertility by the number of a woman's own children that are living in the household. The information to construct this variable is only available from 1970 onward, so we lose the 1960s for the analysis. Following Goldin (2006), we divide the fertility measure into two according to the ages of the children: five years old and younger, and above five years of age. The former is what Goldin calls the child burden. Consistent with international trends, fertility declined steadily in Mexico since the 1970s (Figure 6(a)). The average number of own children five years old or younger in the household declined from 0.83 in 1970 to 0.28 in 2015 (–66 per cent). The same numbers looking at children older than five are 2.5 and 1.42 (–43 per cent). In principle, the reduction in fertility, especially the child burden, could be a driver of FLFP trends. However, fertility fell at a fairly constant rate, so it might not be able to explain the S-shape pattern—that is, the acceleration in the 1990s, followed by a dampening of the FLFP trend. Also, it is clear from Figure 6(b)) that the child career penalty for women (i.e. the difference in FLFP between women with and without a child of five years or younger) was stable at 11–13 per cent between 1970 and 2015.

Figure 6: Own children by year and sex

(a) Average number of own children in household (b) LFP rate conditional on having children below five years



Note: panel (a) reports the average number of (own) children five years or younger and above age five years who are living in the household. The series is computed separately for each male and female adult in the household. Panel (b) reports the LFP rate conditional on having children aged five and under or over five. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

4.1 Relative importance of supply-side trends

To quantify the relative importance of education, marital status, and fertility in explaining the evolution of FLFP, we estimate an Oaxaca–Blinder decomposition that accounts for unobserved heterogeneity across municipalities and time. We start by discussing the econometric model that underlies the decomposition. Let $i \in \{1,...,N\}$ index individuals, $m \in \{1,...,M\}$ index municipalities, and $t \in \{1970, 1990, 2000, 2015\}$ index census years. We define $Part_{i,m,t}$ as a variable that takes the value of 1 if individual i in municipality m and year t participates in the workforce. We assume the probability of participating can be characterized by the linear probability model:

$$Part_{i,m,t} = X'_{i,m,t}\beta_t + \mu_{m,t} + e_{i,m,t} \tag{1}$$

where $X_{i,m,t}$ is a vector of explanatory variables specific to individual i that includes the maximum level of education attainment (primary, secondary, or tertiary), marital status (married/permanent partner or single/divorced), the number of own children aged five and younger and over the age of five living in the household, age, and age squared.

$\mu_{m,t}$ are municipal $\times$ year fixed effects, which capture omitted trends at the municipality level in a flexible manner. These will include the municipality unemployment rate (Gasparini and Marchionni 2017; Serrano et al. 2019), geographically differentiated cultural norms regarding women's roles (Fernández

2013; Fernández and Fogli 2009; Fogli and Veldkamp 2011), and the sectoral and occupational structure of the local labour market (Akbulut 2011; Lup Tick and Oaxaca 2010; Ngai and Petrongolo 2017; Olivetti and Petrongolo 2014). Aggregate shocks to the economy, particularly demand-side shocks, tend to be differentiated across local labour markets and are rarely geographically uniform (Moretti 2011). These fixed effects will absorb most of this variation. This serves the purpose of allowing us to isolate supply-side variation.

Table 1 shows the results of estimating Equation 1 for males and females separately. Recognizing that decisions over education, labour supply, marital status, and fertility are typically jointly determined, we refrain from making causal claims. The associations are nevertheless informative of the drivers behind the changes in FLFP. The estimated effects are all in line with previous results in the literature. Higher educational attainment is always associated with a higher probability of participating in the workforce. Relative to a woman with at most primary education, the probability of participation increases by 11.7 pp for a woman with secondary education, and 30.9 pp for a woman with tertiary education. Being married reduces the same probability by almost 30 pp, while having one more child aged five or younger does so by 4.4 pp. Although statistically significant, the same effects for men are of a much smaller magnitude. This reflects the fact that the prime-age male LFP rate is always higher than 90 per cent, so the variation is limited. It is noticeable, though, that both being married and having more children increases the probability that men work in market occupations, consistent with the allocation of roles between the household being highly gendered, as also with marriage and fatherhood acting to encourage men away from risky behaviours and unemployment and into productive activity.

Table 1: Probability of participation in the labour force

	Dep. var.: = 1 if in labour force		
	All	Female	Male
Educ. ref. group: primary or less			
= 1 if secondary	0.102**	0.117**	0.036***
	(0.012)	(0.017)	(0.004)
= 1 if tertiary	0.218***	0.309***	0.037**
	(0.018)	(0.017)	(0.005)
Marital status/children			
= 1 if married	–0.087***	–0.297***	0.092***
	(0.003)	(0.006)	(0.007)
No. children $\leq$ 5 yrs	0.011	–0.044**	0.008**
	(0.007)	(0.008)	(0.002)
No. children $>$ 5 yrs	–0.021***	–0.012**	0.004**
	(0.001)	(0.002)	(0.001)
Age	0.038***	0.038***	0.015**
	(0.001)	(0.003)	(0.002)
Age squared	–0.000***	–0.000***	–0.000***
	(0.000)	(0.000)	(0.000)
Constant	–0.060**	–0.125*	0.568***
	(0.015)	(0.057)	(0.035)
Observations	14,645,233	7,670,064	6,974,934
Mean LFP rate	0.607	0.341	0.899
Municipality $\times$ year FE	Yes	Yes	Yes

Note: *$p < 0.10$, **$p < 0.05$, $p < 0.01$. Robust standard errors, clustered by municipality. The table reports the ordinary least squares (OLS) estimates of a linear probability model relating labour force participation to a set of observable characteristics. The sample used in column 1 includes all workers aged 25–55. The sample in columns 2 and 3 correspond to females and males respectively.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

Decomposition

Let t and t' correspond to two census years such that $t' > t$. For each sex, the specification of the Oaxaca–Blinder decomposition based on Equation 1 takes the form:

$$\Delta_t LFP = \left(\overline{X'}_{t'} - \overline{X'}_t\right)\hat{\beta}_{t,t'} + \underbrace{\overline{X'}_{t,t'}\left(\hat{\beta}_{t'} - \hat{\beta}_t\right) + \text{FE residual}}_{\text{Unexplained}} \tag{2}$$

where ΔLFP is the change in the participation rate between t and t'. Overbars denote averages, and $\hat{\beta}_{t,t'}$ and $\overline{X'}_{t,t'}$ correspond to the estimated vectors of parameters and explanatory variables when we pool the observations across the two years, as in Oaxaca and Ranson (1994).[5] The term FE residual captures the variation in the participation rate that is not accounted for by the composition (first term of the RHS of the equation) or price (second term of the RHS of the equation) effects associated with the variables in X. We report the estimates separately for women and men, and for the different sub-periods, choosing t and t' accordingly.

We focus on the overall composition effects, which capture the change in the FLFP rate that can be accounted for by changes in the three supply-side determinants considered (plus age), but we further report the composition effects associated with each of education, marital status, and fertility separately. The variation that cannot be accounted for by compositional effects linked to these three variables—both price effects and the FE residual—we take as variation that is unexplained. We have abstained from interpreting changes in the coefficients in the Oaxaca–Blinder decomposition. As Fortin et al. (2011) show, the detailed decomposition associated with changes in the coefficients is not identified. The problem arises because one has to choose a base category, which in turn affects the detailed decomposition results.[6] The fixed effects are intended to capture changes in the demand side that are specific to the local labour markets. Since we observe clear spatial clustering of high vs low FLFP (see Section 5), part of the heterogeneity will be absorbed by the FE. Given that they are capturing a variety of factors (not only demand-side trends), we do not interpret them directly, but they end up subsumed in the unexplained part.

There are three main takeaways from this exercise. First, taken together, changes in the composition of the workforce in terms of educational attainment, marital status, and fertility can account for a large share of the increase in the FLFP rate between 1970 and 2015 (see column 1 Table 2). The participation rate of prime-aged females increased by 26.7 pp in that time span, and composition effects can account for 73 per cent of the change (19.5 pp). The most important factor was education, which accounted for 62.5 per cent of the overall composition effect, and for 45.7 per cent of the increase in the FLFP rate. Declining marriage accounts for 16.1 per cent of the increase of the FLFP rate, and declining fertility for 10.9 per cent. In sum, supply-side determinants of FLFP were fundamental over the long run. In sharp contrast to this, education, marriage, and fertility do not begin to explain the decline in male LFP over the period—they predict an increase when in fact we see a decrease.

The second takeaway is that the importance of these changes in characteristics of workers varied significantly across sub-periods. During the periods of sluggish growth (1960–90) and deceleration (2000–15) of FLFP, they more than account for the rise of the FLFP rate, which implies that the unexplained variation negatively affected female labour supply (columns 2 and 4 of Table 2). In contrast, in the 1990s, when FLFP accelerated, changes in worker characteristics can account for at most 38 per cent of the

[5] This specific counterfactual allows us to analyse composition effects relative to a baseline defined by the (population-weighted) mean returns and (population-weighted) mean characteristics over the two periods, eliminating the interaction term present in other decompositions (Oaxaca and Ranson 1994).

[6] Yun (2005) has proposed a solution to this identification problem based on a normalization, but the solution makes it difficult to interpret the results. Our experience with these types of detailed decompositions is that results tend to be sensitive to changes in the specification. Hence, we prefer to only interpret the effect of changes in composition.

rise (6.1 pp out the 16.0 pp increase). In fact, if we predict the FLFP rate associated with these three supply-side forces, FLFP growth would have been stable through the entire period: decadal increase of 3.8 pp for 1970–90, 6.1 pp for 1990–2000 (well below the actual 16 pp), and 5.1 pp for 2000–15.

Finally, the quantitative importance of education, marital status, and fertility was similar over the three sub-periods. This can be explained by the fact that, with the exception of marital status, these variables have changed at a relatively constant rate since 1970. For example, the decadal growth in the FLFP rate associated only with women having higher schooling was 3.1 pp for 1970–90, 3.7 pp for 1990–2000, and 3.4 pp for 2000–15.

Clearly, supply-side determinants of female labour supply played a major role in the rise of FLFP in Mexico, but they cannot by themselves explain the acceleration observed during the 1990s. In the next section we study whether demand-side forces drive the S-shaped pattern.

Table 2: Oaxaca–Blinder decomposition of the change in labour force participation based on supply-side determinants

	Female Δ LFP rate				Male Δ LFP rate			
	1970–2015	1970–90	1990–2000	2000–15	1970–2015	1970–90	1990–2000	2000–15
Δ LFP rate	0.267***	0.041***	0.160***	0.066***	–0.042***	–0.047***	0.011***	–0.006***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
Composition	0.195***	0.076***	0.061***	0.079***	0.025***	0.010***	0.004***	0.003***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.000)	(0.001)
Unexplained	0.072***	–0.035***	0.099***	–0.013***	–0.067***	–0.057***	0.007***	–0.010***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.000)	(0.001)
Composition detailed								
Education	0.122***	0.061***	0.037***	0.052***	0.039***	0.011***	0.007***	0.011***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Marital status	0.029***	0.001	0.013***	0.015***	–0.008***	0.000	–0.003***	–0.005***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Children	0.043***	0.014***	0.010***	0.013***	–0.006***	–0.001***	–0.001***	–0.001***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.001**	–0.000*	0.001***	–0.000**	–0.001***	0.000	–0.000	–0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
100 × share of Δ LFP accounted for by detailed composition								
Overall composition	73.03	185.36	38.12	119.70	–59.52	–21.28	36.36	–50.00
Education	45.69	148.78	23.12	78.79	–92.85	–23.40	63.63	–183.33
Marital status	10.86	2.44	8.12	22.73	19.04	0.00	–27.27	83.33
Children	16.10	34.15	6.25	19.70	14.28	2.13	–9.09	16.67
Age	0.37	0.00	0.62	0.000	–2.38	0.00	–0.00	33.33
Observations	2,333,670	1,391,831	3,074,510	4,016,349	2,100,914	1,294,289	2,845,048	3,651,673

Note: **p* < 0.10, ***p* < 0.05, *p* < 0.01. Robust standard errors, clustered by municipality. The table reports the estimates of the Oaxaca–Blinder decomposition described by Equation 2. The upper panel reports the results from the overall decomposition, while the middle panel shows the detailed composition effects. The lower panel reports the share of the change of FLFP that can be accounted for by composition effects.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

5 Demand-side determinants: occupation and sectoral composition of employment

The two most common drivers of changes in labour demand are structural change, which usually manifests itself as changes in the sectoral composition of production and employment, and non-neutral technological change, which a recent literature,[7] especially since the influential work of Autor et al. (2003), argues manifests itself by changing the occupational composition of employment. Structural change

[7] See, among others, Acemoglu and Autor (2011), Altonji et al. (2014), Autor and Dorn (2013), Autor et al. (2003, 2006), Dorn (2009), Goos et al. (2014), Michaels et al. (2015).

can be fuelled by many factors. Examples include the transition of countries from agriculture to manufacturing and services production as economies modernize, trade-induced economic specialization, and demographic changes that shift spending patterns of the population, for example as it ages. Non-neutral technological change is a shift in the production technology that favours some labour groups, such as skilled or female labour, over others. It affects the occupational structure by changing the task content of jobs, either replacing or complementing specific tasks performed by workers.

There is some evidence that both structural change and non-neutral technological change create employment opportunities for women and, thereby, encourage FLFP. For example, a shift in sectoral composition towards services will favour women if they have either a comparative advantage in or a preference for service sector jobs (Akbulut 2011; Goldin 2006; Lup Tick and Oaxaca 2010; Ngai and Petrongolo 2017; Olivetti and Petrongolo 2014). There is also a large literature suggesting that new technologies decrease the relative importance of 'brawn' while increasing the relative importance of cognitive ('brain') and social skills (Aguayo-Tellez et al. 2013; Black and Spitz-Oener 2010; Blau and Kahn 1997; Deming 2017; Galor and Weil 1996; Jaimovich et al. 2017; Juhn et al. 2014; Rendall 2010, 2013; Weinberg 2000). To the extent that women have either no disadvantage or a comparative advantage in these skills, the relative demand for female labour will increase.

In the specific case of Mexico, Juhn et al. (2014) argued that tariff reductions associated with the North American Free Trade Agreement (NAFTA), implemented in 1994, induced more productive firms to modernize their technology and enter the export market. This in turn improved the employment prospects of women, especially in blue-collar roles. Cordourier and Gómez Galvarriato (2004) also show evidence that female participation in industry jobs increased after the trade liberalization reforms of the late 1980s and early 1990s. Bhalotra and Fernandez (2018) estimate a structural equilibrium model of the Mexican labour market, finding evidence that demand-side trends during the 1990s and 2000s were favourable to women, independently of their level of schooling.

If women have benefited from labour demand trends, we should observe that the sectors and occupations in which they tend to work have grown disproportionately, or occupational and sectoral segregation of employment by sex must be declining. To assess this, we first chart the descriptive patterns in the data. We then use a shift-share design to quantify the relative importance of demand-side changes for the evolution of FLFP.

Occupational composition. There is clear gender-based occupational segregation in Mexico, albeit it has lessened over time. In 1960, occupations like crafts and related trades (e.g., carpenters, plumbers, structural metal workers, welders), plant and machine operators, and higher-skilled occupations like managers were almost exclusively occupied by men, with female shares of employment below 10 per cent (see Figure 7(a)). The few women in the labour market were concentrated in clerical occupations (e.g., secretaries and administrative assistants), services and sales, and, at the high end of the skill distribution, they worked as technicians and associated professionals (see Figure 7(b)). But even in these 'female occupations' the participation rate of women was at most 27 per cent.

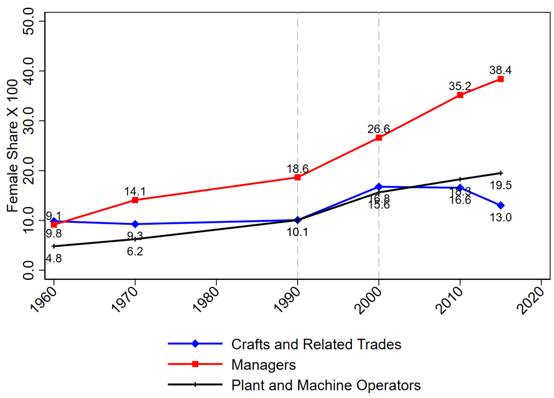
As women joined the workforce, they did so in the occupations that already had a relatively high share of employment. The share of women in clerical occupations reached 61.4 per cent by 2015 and the share of women among technicians and associated professionals rose to 59.6 per cent. In the case of services and sales, there is an even split in the share of employment between men and women in 2015, but there was an acceleration of the female share starting in 1990. Although the female share also increased in 'male occupations', only in the case of managers do we see significant gains, going from 9.8 to 38.4 per cent between 1960 and 2015. Segmentation is consistent with women selecting into specific occupations either on account of comparative advantage or on account of social norms dictating the kinds of jobs that were 'appropriate' for them.

Importantly, the overall share of employment in ‘female’ occupations tended to increase, which is indicative of labour demand in these occupations increasing (Figure 7(d)). This is particularly true for services and sales, which doubled its occupation share, going from 11.1 to 20.2 per cent, with most of the gains coming after 1990. Services and sales occupations rely mostly on non-routine tasks and personal interaction, which makes them harder to automate. The combination of higher overall occupation share of employment and higher within-occupation female share suggests that demand forces associated with non-neutral technological change could have incentivized women to join the labour force, or at least provided the opportunities for them to do so.

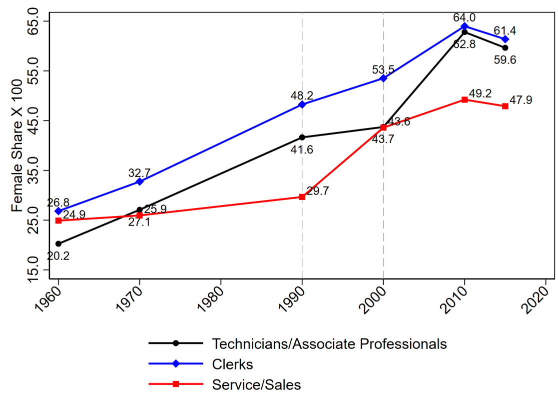
Figure 7: Occupation share and share of female workers in the occupation: evolution between 1960 and 2015

Female employment share

(a) ‘Male occupations’

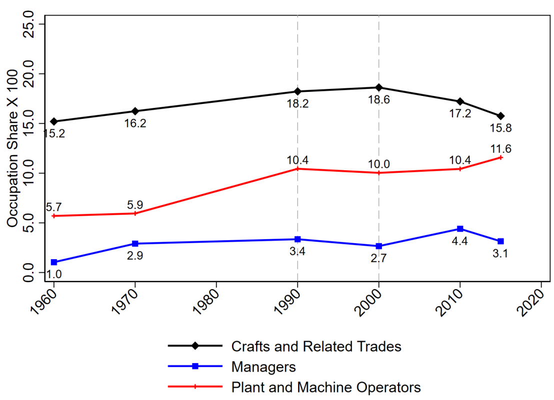


(b) ‘Female occupations’

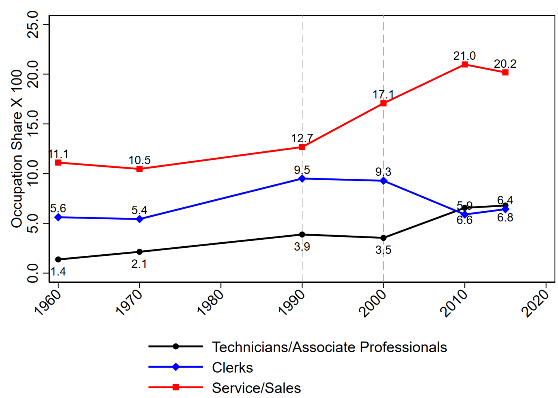


Occupation share of employment

(c) ‘Male occupations’



(d) ‘Female occupations’



Note: panels (a) and (b) show the female share of employment for occupations that are mostly done by men and those where women have a relatively higher share. Panels (c) and (d) show the share of the workforce in each occupation. Sample restricted to individuals aged 25–55.

Source: authors’ own calculations based on data from the ENIGH and Mexican Census.

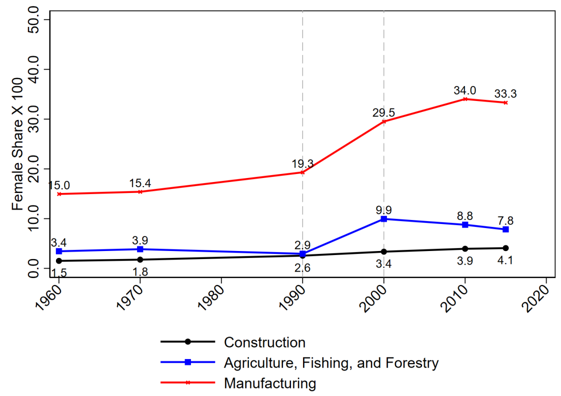
Sectoral composition. There is also clear gender segregation by sector, though less so than by occupation (see Figure 8(a,b)). In 1960, half of all workers in both the education and health sectors were women, which is impressive since women only accounted for 13 per cent of the workforce. These numbers increased to 66.6 and 62.3 per cent respectively by 2015, an important gain but not so dramatic as the increase observed across ‘female occupations’. Sectors like wholesale and retail trade, which also had a high female share in 1960 (21.3 per cent), did show important gains, with the female share more than doubling in the 55-year span. Moreover, in sectors like manufacturing, where the female share was relatively low to begin with (14.0 per cent), the participation of women increased substantially, especially after 1990. This is consistent with the findings of Juhn et al. (2014), who showed that after NAFTA, export-oriented firms modernized, improving employment prospects of women and in particular those with primary education.

A clear sign of structural change lies in the sharp decline of agriculture in the overall employment share, from 36.4 per cent in 1970 to only 8.8 per cent in 2015. On average, women only accounted for 1.5–4.1 per cent of all employment in agriculture, so its relative decline suggests that the transition of the Mexican economy from a primary-goods producer to a manufacturing and services producer could have been beneficial to women. Agricultural jobs are intensive in 'brawn', while expanding sectors like wholesale and retail sales are more intensive in interactive social skills.

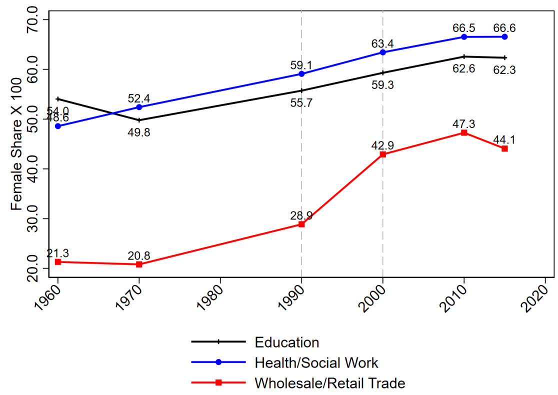
Figure 8: Sector share and share of female workers in the sector: evolution between 1960 and 2015

Female sectoral share

(a) 'Male sectors'

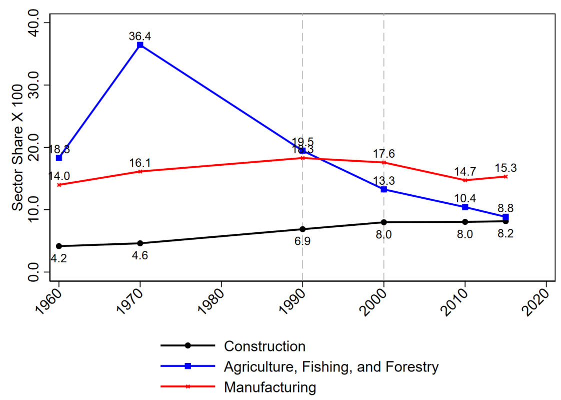


(b) 'Female sectors'

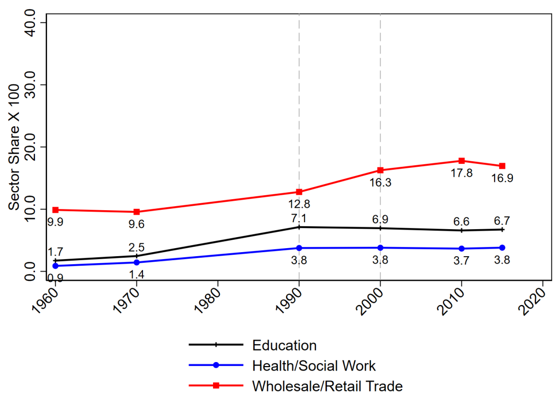


Sectoral share of employment

(c) 'Male sectors'



(d) 'Female sectors'



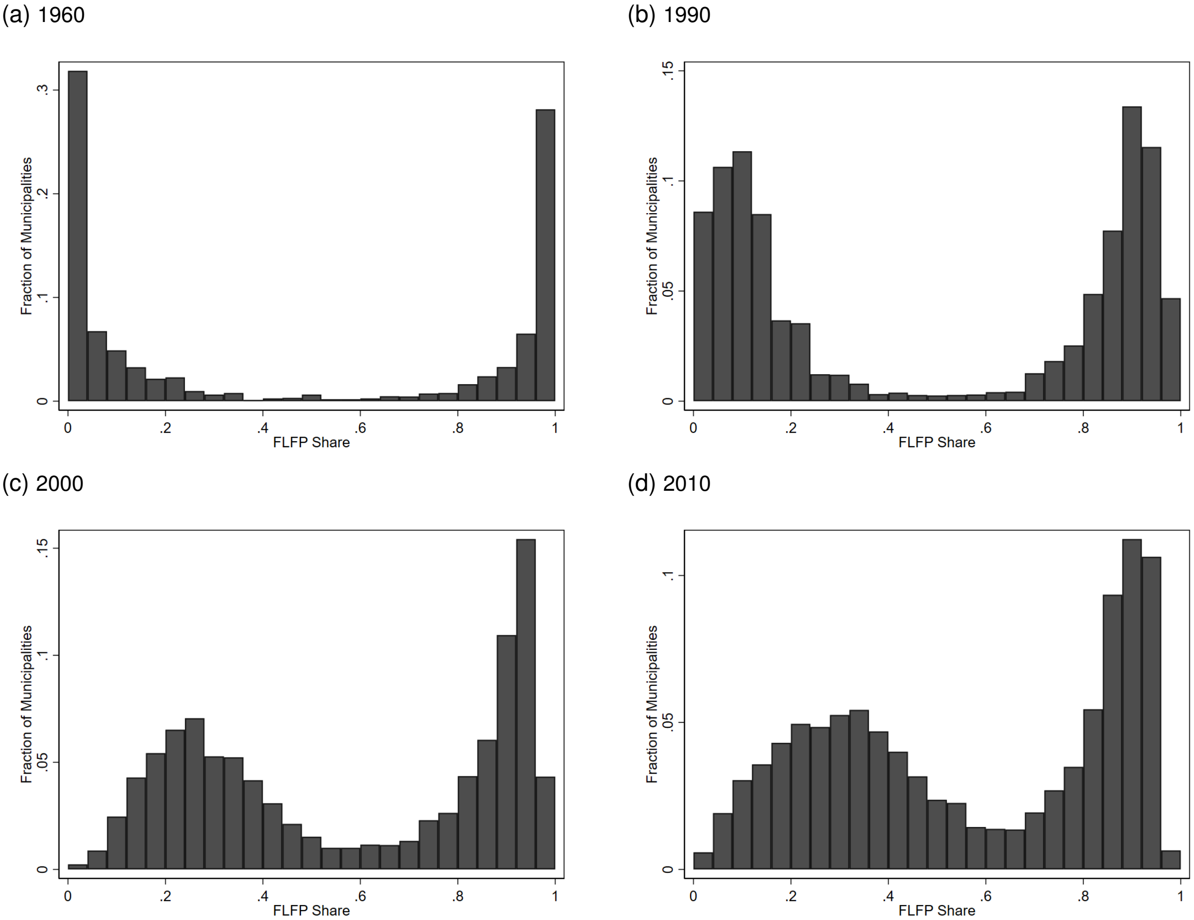
Note: panels (a) and (b) show the female share of employment for sectors that are mostly done by men and those where women have a relatively higher share. Panels (c) and (d) show the share of the workforce in each sector. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

The geography of FLFP. Changes in labour demand are typically unobserved, so we have to infer them through indirect channels. We adopt a commonly used strategy to predict demand, which involves exploiting spatial local variation in exposure to aggregate demand shocks which may include structural change, non-neutral technological change, and policy changes like trade agreements. Local differences in exposure can arise because of geographical, historical, or institutional conditions that shape the local economic environment. Aggregate shocks, either temporary or permanent, are rarely geographically uniform across local labour markets (Moretti 2011): depending on the nature of the shock, some locations will be more exposed than others, and those locations that are more exposed should be more responsive.

We will leverage spatial variation in baseline characteristics of municipalities to proxy local area exposure. There are clear differences in trends in female labour supply across municipalities (Figure 9). In 1960, 40 per cent of municipalities had FLFP rates below 10 per cent. By 2015, the FLFP rate of the municipality at the median was 56.6 per cent. These numbers conceal significant heterogeneities. The municipal distribution of the FLFP rate is bimodal, with some municipalities exhibiting very high FLFP rates (above 80 per cent) and others very low rates (Figure 10). Most of the rise of the FLFP rate comes from a rightward movement of the lower tail, which starts very low. Again, the rise of FLFP between 1990 and 2000 is striking.

Figure 9: Distribution of the FLFP rate across municipalities and years



Note: each panel shows the municipal distribution of the FLFP rate in a given census year. Sample restricted to individuals aged 25–55.

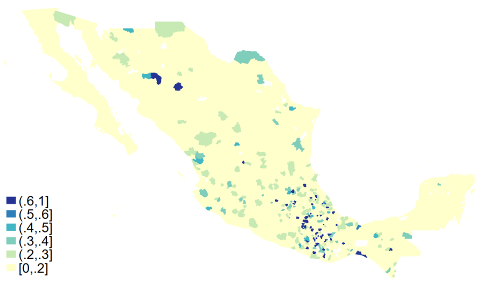
Source: authors' own calculations based on data from the ENIGH and Mexican Census.

The highest participation rates are observed in Mexico City and its surrounding states, located at the centre of the country (Figure 10). The two other locations with relatively high FLFP rates are the border regions in the north, which include the states of Baja California (north and south), Sonora, Chihuahua, Coahuila, and Nuevo León; and the Yucatán Peninsula in the south-east. Mexico City (and the central area in general) and the border states have a high share of national employment in manufacturing, and are the locations where most *maquiladoras* (foreign in-bond assembly plants) got established after the trade reforms (Hanson 1997). The Yucatán Peninsula, on the other hand, is a tourist hub. These three regions have the highest GDP per capita, and were the places where FLFP grew the most (Figure 11).

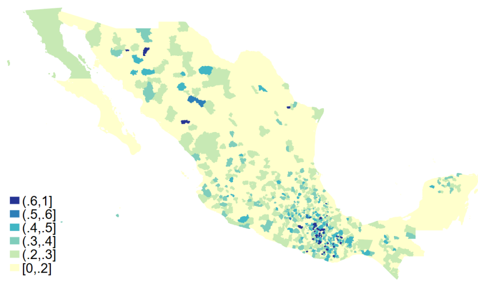
In the next section we exploit the geographical variation in FLFP rates across municipalities, and the aggregate changes in the sectoral and occupational composition of employment, to quantify the effects of demand-side shocks on female labour supply.

Figure 10: The geography of FLFP between 1960 and 2015

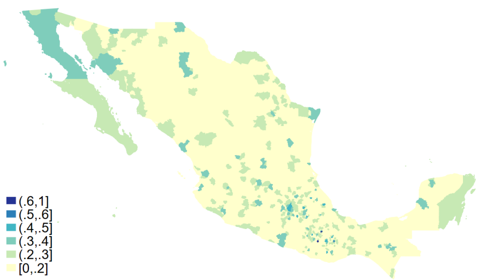
(a) 1960



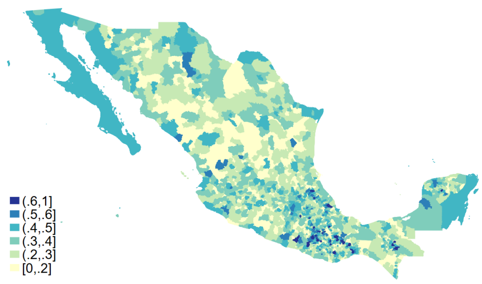
(b) 1970



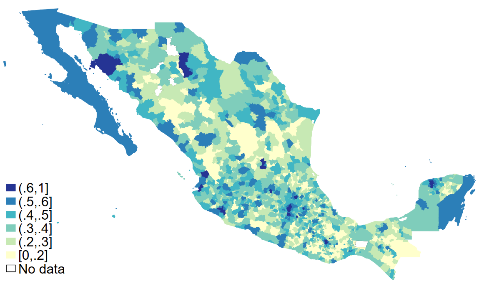
(c) 1990



(d) 2000



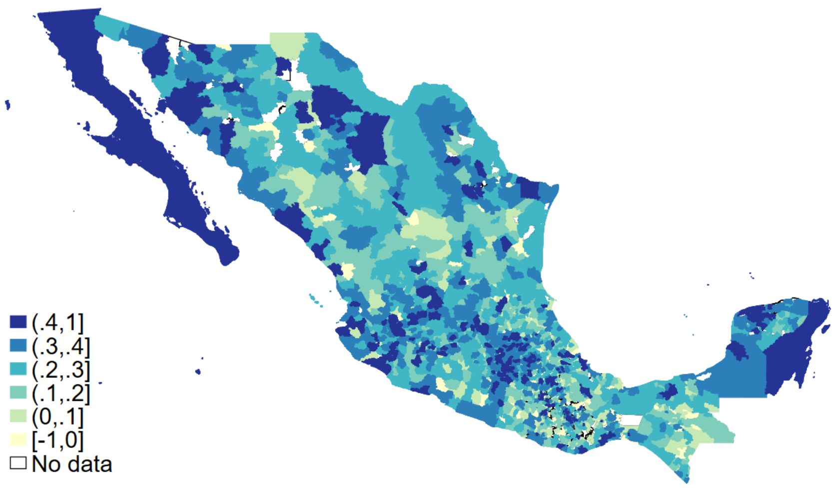
(e) 2015



Note: each map shows the FLFP rate for every municipality in a different census year. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

Figure 11: Changes in FLFP by municipality between 1960 and 2015



Note: the map shows the change in the FLFP rate for every municipality between 1960 and 2015. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

5.1 Relative importance of demand-side shocks

Let $m \in \{1,...,M\}$ index municipalities, $t \in \{1960, 1970, 1990, 2000, 2010, 2015\}$ index census years, $s \in \{1,...,S\}$ index states,[8] and $k \in \{1,...,K\}$ index either occupations or sectors. Let $\Delta FLFP_{m,t}$ be the municipality-specific change in the FLFP rate between consecutive census years. Our measure of changes in the demand for female labour is given by $\Delta \log L^f_{m,t}$, defined as the change in the (log) number of females employed in the municipality. In fact, $\Delta \log L^f_{m,t}$ is an equilibrium object defined by the interaction of supply and demand for female labour. We will discuss this in detail in the next paragraphs. For the moment, the *naive* econometric model is

$$\Delta FLFP_{m,t} = \beta \Delta \log L^f_{m,t} + \gamma X^f_{m,t} + \eta_{t,s} + \alpha_m + e_{m,t} \tag{3}$$

where α_m is a municipality fixed effect capturing all idiosyncratic determinants of FLFP that are time-invariant—for example, geographical characteristics like distance to trade ports or major cities—and ingrained cultural norms that are time-invariant in the medium-run; $\eta_{t,s}$ is a state-specific flexible time trend capturing all determinants of FLFP that are time-varying but common across municipalities within a state, such as economic cycles and demographic trends that might vary at a regional level; and $e_{m,t}$ is the stochastic idiosyncratic term. Given the fixed effects set-up, the variation we use for identification is restricted to within-municipal *changes* in female labour demand that deviate from state-specific trends.

$X^f_{m,t}$ is a vector of controls that includes (1) the change in the (log) number of women with each level of schooling (primary, secondary, or tertiary) in the municipality; (2) the change in the (log) number of women with each marital status (married or single/divorced) in the municipality, and (3) the change in the municipal average (log) number of own children aged five or younger and over the age of five living in the households. These variables aim to control for the supply-side determinants of FLFP discussed in the previous sections. Consistent with the individual-level analysis, municipalities where education attainment (fertility) increased (declined) more over the period had higher gains in FLFP (Figure 12(a,c)). At the municipality level, in contrast to the aggregate data, we do not see any relation between changes in marriage rates and the labour supply of women (Figure 12(b)).

$\Delta \log L^f_{m,t}$ increases as total female employment increases. In that sense, the parameter of interest, β, can be interpreted as the semi-elasticity of the FLFP rate with respect to changes in labour demand for female workers. But $\Delta FLFP_{m,t}$ and $\Delta \log L^f_{m,t}$ are also mechanically related within a municipality. In particular, $\Delta L^f_{m,t} \approx N^f_{m,t} \Delta FLFP_{m,t}$, where $N^f_{m,t}$ is total female population in the municipality at time t. To isolate this mechanical relation and distinguish between sectoral and occupational demand changes we use a shift-share design.

Shift-share design. First, note that we can express $\Delta \log L^f_{m,t}$ as the weighted sum of occupation- or sector-specific changes in (log) total (male + female) employment, $\Delta \log L_{m,k,t}$, where the weights, $z_{m,k,t}$, correspond to the female employment share in the respective occupation/sector. In particular:

$$\begin{aligned} \Delta \log L^f_{m,t} &= \sum_k \frac{L^f_{m,k,t}}{L_{m,k,t}} \Delta \log L_{m,k,t} \\ &= \sum_k z_{m,k,t} \Delta \log L_{m,k,t} \end{aligned} \tag{4}$$

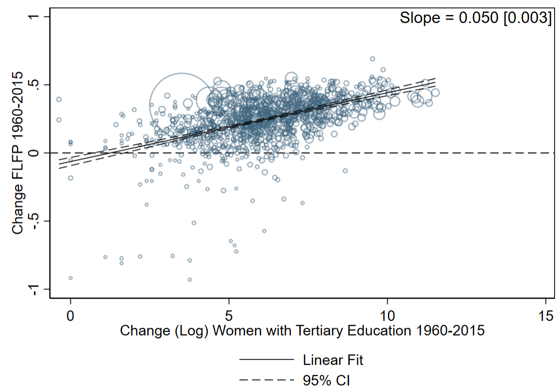
$\Delta \log L^f_{m,t}$ increases as the *total* demand for labour in an occupation/sector increases, but the importance of each occupation/sector is proportional to its female share of employment. If the occupational or sectoral composition of the economy changes, labour will have to reallocate within each labour market.

[8] There are 32 states in Mexico, including Mexico City.

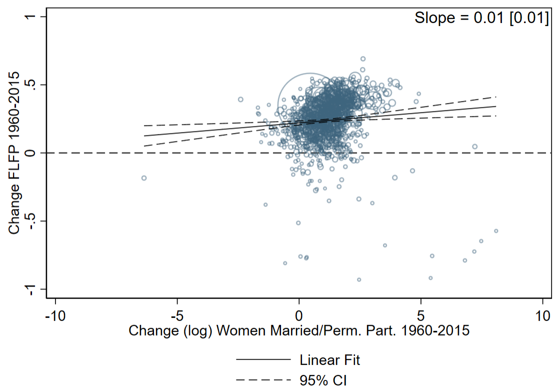
The effect on female labour will depend on whether the occupations or sectors that are growing in importance tend to use more or less female labour. If they do, this would be equivalent to a positive shock to female labour demand. This set-up is flexible enough to allow us to analyse occupation- and sector-specific demand shifts separately.

Figure 12: Changes in FLFP and changes in education, marital status, and child burden by municipality: 1960–2015

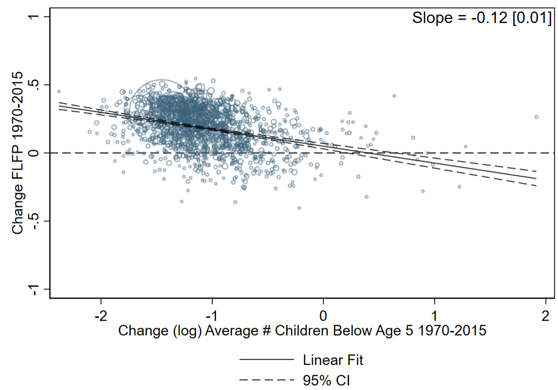
(a) Education



(b) Marital status



(c) Fertility



Note: panel (a) shows the relation between changes in the municipal FLFP rate and changes in the (log) number of women with tertiary education between 1960 and 1990. Panels (b) and (c) replicate this exercise using the (log) number of women who are married and the municipal average number of own children aged five or younger living in the household respectively.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

To isolate the mechanical relation between FLFP and employment locally, we decompose occupation-/sector-specific changes in (log) total employment within a municipality between country-wide shifts, excluding the municipality and idiosyncratic shifts:

$$\Delta \log L_{m,k,t} = \Delta \log L_{k,t}^{-m} + \varepsilon_{m,k,t} \tag{5}$$

where $\varepsilon_{m,k,t} \equiv \Delta \log L_{m,k,t} - \Delta \log L_{k,t}^{-m}$ and the superscript $-m$ indicates that the sum across municipalities is taken net of municipality m.[9] $\Delta \log L_{k,t}^{-m}$ then captures aggregate trends in occupation-/sector-specific labour demand which are not mechanically driven by local shifts in female labour supply.

The weight of each occupation/sector, $z_{m,k,t}$, is given by its female share of employment, but female shares are also changing in time both as a result of shifts in female labour supply and female labour demand. We fix the *exposure* of a municipality to aggregate changes in female labour demand using the female share in the occupation/sector at a baseline census year t_0, which in our case is 1960.

[9] For example, $\Delta \log L_{k,t}^{-m} = \sum_{i \neq m}^{M} \Delta \log L_{i,k,t}$.

We thus construct the variable

$$B_{m,t} = \sum_k z_{m,k,t_0} \Delta \log L_{k,t}^{-m} \quad (6)$$

$B_{m,t}$ is the traditional Bartik instrument. In recent work, Goldsmith-Pinkham et al. (2019) argue that the instrument is valid if the baseline shares, z_{m,k,t_0}, are exogenous, that is, if other unobserved determinants of the change of FLFP are orthogonal to the initial distribution of female workers across occupations/sectors. This is an identifying assumption that is not testable, but allows us to discuss in more detail possible sources of endogeneity.

The question is whether municipalities with different baseline distributions of female employment across occupations/sectors would have had differential *changes* in FLFP absent the changes in the occupational/sectoral composition of the economy. Two points are worth stressing here. First, the exogeneity of the 'baseline' shares is defined in terms of the growth of the relevant variables, not their levels. It is likely that municipalities that differ in how female employment is distributed across occupations/sectors also have different participation rates, but this does not invalidate the strategy since we focus on changes of FLFP. Second, the exogeneity assumption must hold conditional on municipality and state × year fixed effects, and the vector of supply-side controls. That is, we are already imposing significant restrictions on the variation used for identification.

In a closely related paper, Borusyak et al. (2018) argue that the validity of the instrument relies on the aggregate shocks to labour demand, $\Delta \log L_{k,t}^{-m}$, being as if randomly assigned. The question here is whether the relative country-level growth of some occupations/sectors is orthogonal to other unobserved local determinants of the change in FLFP, conditional on both fixed effects and the control variables. As previously discussed, the evolution of employment growth across occupations has been mostly linked to technological change that is biased towards certain tasks. The task content of an occupation, on its own, is plausibly orthogonal to other local determinants of the *change* of FLFP in Mexico. A developing country like Mexico is more prone to being an importer of new technologies than to creating them. The way technologies that impact the task content of occupations evolve is then unlikely to be related to local characteristics of Mexican municipalities. Sectoral shifts in labour demand can be more problematic. These can reflect broad changes to the economic environment, like openness to trade or shifts in the demand for service goods based on changing preferences as the earnings capacities of individuals grow. Again, part of these shifts will be captured by the fixed effects included in the regression, but maybe not all. We are cautious, then, to give a fully causal interpretation to the results of this exercise.

Table 3 presents the results of estimating Equation 3 using seven different specifications, depending on whether we include fixed effects, supply-side controls, or we instrument the variable of interest, $\Delta \log L_{m,t}^{f}$. In columns 4 and 5 we show the instrumental variable (IV) estimates using the Bartik instrument constructed from the occupational distribution of employment. Columns 6 and 7 replicate the previous two columns using the sectoral distribution of employment. To facilitate interpretation, we report the standardized effects in terms of standard deviations at the bottom of the table.[10] The F-test showing the significance of the IV in the first stage is also reported in the lower panel of the table. In all cases, the instrument is statistically significant at standard levels of confidence.

[10] The standardized effect corresponds to the effect of an increase of one standard deviation in female labour demand relative to the standard deviation of the FLFP rate.

Table 3: Effect of female labour demand on FLFP growth

	Dep. var.: = Δ FLFP rate						
	Correlation (1)	FE (2)	FE + controls (3)	Bartik IV occ. FE (4)	Bartik IV occ. FE + controls (5)	Bartik IV sect. FE (6)	Bartik IV sect. FE + controls (7)
Δ Female labour demand ($\Delta L^{f}_{m,t}$)	0.025***	0.018***	0.019***	0.029**	0.030**	0.004	0.003
	(0.003)	(0.002)	(0.002)	(0.010)	(0.013)	(0.003)	(0.004)
Observations	10,772	10,762	10,762	8,476	8,476	8,281	8,281
E-standardized effect	0.320	0.240	0.250	0.400	0.410	0.080	0.080
F-test first stage				16.365	12.226	44.964	49.152
Municipality FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Year × state FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Supply-side controls	No	No	Yes	No	Yes	No	Yes

Note: *$p < 0.10$, **$p < 0.05$, $p < 0.01$. Robust standard errors, clustered by municipality. The table reports the results of estimating Equation 3 for seven different specifications, depending on whether we include fixed effects, supply-side controls, or we instrument the variable of interest. The standardized effect corresponds to the effect of an increase of one standard deviation in female labour demand relative to the standard deviation of the FLFP rate.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

There are two main takeaways from the results. First, FLFP has been responsive to changes in the occupational structure of employment, but not to changes in the sectoral structure of employment. In our preferred specification (column 5), a one standard deviation increase in female labour demand, driven by a shift in the occupation structure of employment, is associated with an increase of 0.41 standard deviations of the FLFP rate. Between 1960 and 2015, the average (log) number of prime-age females employed in the municipalities increased by 4.58. Our estimates suggest that this led to a 13.7 pp rise of the FLFP rate. Given that the FLFP rate grew by 34.2 pp, the result implies that this demand-side shock can account for close to 40.1 per cent of the total rise over the period (Table 4).

Table 4: Effect of female labour demand on FLFP growth: Bartik instrument decomposition

	Occupations				Sectors			
	1960–2015	1960–90	1990–2000	2000–15	1960–2015	1960–90	1990–2000	2000–15
Δ FLFP rate	0.342	0.117	0.156	0.069	0.342	0.117	0.156	0.069
$\Delta \log L^{f}_{m,t}$	4.580	1.532	1.025	2.023	4.580	1.532	1.025	2.023
Predicted Δ FLFP	0.137	0.046	0.030	0.060	0.001	0.005	0.003	0.006
100 × share of Δ FLFP accounted by demand								
	40.058	39.316	19.23	86.956	0.292	4.274	1.923	8.696

Note: the table reports the share of the change of the FLFP rate that can be accounted for by demand-side changes associated with either changes in the occupational or sectoral structure of employment. We arrive at these numbers by multiplying the cross-municipality weighted average of the change in (log) total female employment during each period ($\Delta log L^{f}_{m,t}$), with the estimated semi-elasticity of the preferred specification from Table 3, and then dividing by the percentage-point increase in the FLFP rate during the period.

Source: authors' own calculations based on data from the ENIGH and Mexican Census.

The results are consistent with the descriptive trends described in previous sections. The occupational share of employment in 'female occupations' increased over the period, especially in the case of services and sales. At the same time, the female share within these occupations also increased. The combination of these two trends suggests that women were benefiting from rising demand in occupations in which they have a greater tendency to work. The fall of the sectoral share of a 'male-intensive' sector like agriculture did not have a major effect on the FLFP rate. Nor did the rise in the female share within manufacturing. At least on the extensive margin, the occupational dimension appears to be the main channel through which labour demand impacts the decisions of women to enter the workforce. This also suggests that non-neutral technical change benefited women.

Second, rising demand for female labour can account for close to 19.2 per cent of the increase of the FLFP rate during the 1990s (Table 4). We arrive at this number by multiplying the cross-municipality weighted average of the change in (log) total female employment during the period (1.025) with the estimated semi-elasticity of the preferred specification (0.030), and then dividing by 0.156, the percentage-point increase in the FLFP rate during the decade. Similarly to the results from the decomposition of the supply-side determinants of the FLFP rate, we find that the demand-side shocks can account for a large share of the increase in the FLFP rate during the periods of sluggish growth (1960–90) and deceleration (2000–15), but less so during the period of acceleration.

6 Conclusion

We characterized and analysed trends in women's labour force participation over the long period from 1960 to 2015, with an additional focus on the 1990s, when there was particularly rapid growth. We found that education, fertility, and marriage are all empirically significant supply-side factors, with education—particularly tertiary education—dominating. On the demand side, occupational shifts appear to have made a significant contribution to drawing women into the labour force. Although there were substantial sectoral shifts, these do not explain spatial differences in the growth of women's labour force participation. Overall, taken together, education, fertility, and occupational shifts that increased the demand for female labour can almost entirely explain the total increase in participation through the 55-year period. However, they explain a much smaller share of the upturn in participation in the 1990s. This suggests that this upturn was predominantly the result of factors that either we do not have measures of or that we cannot identify because, while important, they did not vary sufficiently between municipalities over time. A candidate explanation that a number of recent theoretical papers suggest is that changing social norms 'liberated' women into the labour market and, by the nature of this process, the marginal woman became more likely to join as the share of women in the labour force in her local area or friendship or family network became larger.

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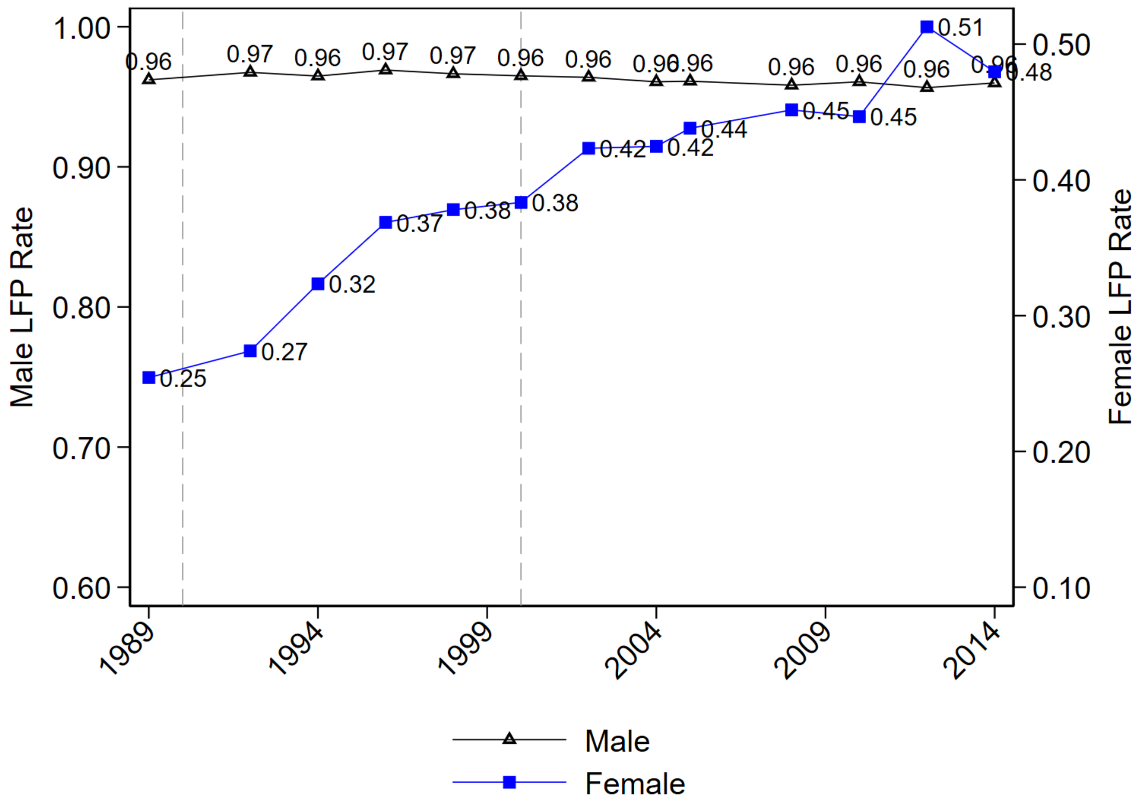
Appendix

Figure A1: Labour force participation rate by year and sex: ENIGH survey



Note: each series shows the evolution of the labour force participation rate for men (black) and women (blue) between 1989 and 2014 using the ENIGH survey. Sample restricted to individuals aged 25–55.

Source: authors' own calculations based on data from the ENIGH.