

# The relationship between economic development and female labour participation: A within-country analysis of Mexico.

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## Abstract

Are women less likely to work in regions with a high percentage of industrial jobs? Claudia Goldin (1994) showed that female labour participation rates (FLPRs) tend to be lower in middle-income countries. Her argument is that, during structural transformation, a higher percentage of industrial jobs is usually associated with lower FLPRs since activities within this sector tend to be performed by men. After developing a novel empirical strategy, I evaluated this hypothesis using micro-data obtained from four rounds of Mexico's ENOE household survey between 2005 and 2019. The regression analysis is based on a probit model that estimates women's likelihood of being economically active depending on the percentage of jobs in agriculture, industry, and services in the municipality where they live. Surprisingly, a higher percentage of industrial jobs at the municipal level is positively associated with higher female labour participation. Expectedly, a higher percentage of service jobs showed an even stronger positive relationship. Conversely, a higher percentage of agricultural jobs decreases women's likelihood of being economically active. The previous results hold after controlling for individual, household, and municipal characteristics. An exploratory data analysis revealed that only 10% of the agricultural workforce are women while 90% are men, even when Mexico's estimations contemplate unpaid family farm workers and even self-consumption. The results indicate that the low FLPRs in Mexico do not stem from women's limited participation in industrial occupations. Instead, they are attributed to the low involvement of women in agricultural activities. Hence, this descriptive paper discovered an upward trend between FLPRs and different stages of economic development within Mexico. This represents new evidence for the literature which has usually found a U-shaped pattern in both cross-country (using cross-section and panel data) and within-country analyses (using cross-section and time series).

**Keywords:** Female labour force participation, sectoral distribution of employment, economic development, structural transformation, labour demand

**JEL Codes:** J16, J21, J23, J43, O54

# 1 Introduction

The U-shaped female labour force function in economic development formulated by Goldin (1994) indicates that female labour participation rates (FLPRs) tend to be high in agricultural countries, they experience a decline in countries with a high percentage of industrial jobs, and they rise again in developed countries with a service-oriented economy. Since the publication of this research paper, other authors have found evidence to support the existence of a U-shaped curve both across countries in a specific point in time (Clark et al., 2003; Heath & Jayachandran, 2016; Psacharopoulos & Tzannatos, 1989; Verick, 2014) and across countries over time (Luci, 2009; Mammen & Paxson, 2000; Olivetti, 2013). Nevertheless, Gaddis & Klasen (2014) have challenged the findings of some of the previously studies by criticizing the databases, the empirical strategies and the econometric techniques implemented in their analyses.

On the other hand, there are fewer studies making within-country analyses of the relationship between FLPRs and different stages of economic development. Goldin (1986) insightful economic history analysis corrected US census data of married women and reinforced the hypothesis that their FLPRs followed a U-shaped trend over time. Subsequent analysis made by Olivetti (2013) also confirmed that FLPRs from the US show a curve pattern during their structural transformation process. Notwithstanding, Gaddis & Klasen (2014) also mentioned that the U-shaped pattern does not necessary hold in within-country studies. In this case, they highlight a research by Lahoti & Swaminathan (2016) that did not find evidence to validate a U-shaped curve in India.

Despite the growing literature about the feminization U, there is a lack of studies analysing the relationship between female labour participation and the percentage of jobs in agriculture, industry, and services. Gaddis & Klasen (2014) criticized studies that used estimates of GDP per capita adjusted at purchasing power parities (PPP), since these estimations have large margins of error. Instead, they test the feminization U using sector-specific growth in value added and employment as a proxy of structural change. They also recognize that this could be a noisy measure of structural change, but they argue that the data previously used to test the U-shaped hypothesis are at least as problematic.

A theoretical underpinning of Goldin's theory is that the level of economic development and the type of jobs available in labour markets often influence the likelihood of a woman being economically active. Hence, this paper contributes to the literature of the feminization U by performing the first within-country analysis using microdata and a repeated cross-sectional dataset that captures both the sectoral distribution of employment in Mexican regions and the structural transformation over time. Instead of using GDP per capita or sector-specific growth as the key explanatory variable, this is the first paper using the percentage of jobs in agriculture, industry, and services as a proxy of different levels of economic development.

This is a relevant research topic because there is a lack of empirical assessments specifically investigating the relationship between female labour participation and the variations of sectoral distribution of employment within a country. Hence, the research questions that this study aims to answer are: Do Mexican women participate less in industrial jobs compared to agricultural or service

jobs? Do Mexican regions with a higher percentage of industrial jobs have the lowest female labour force participation rates? Do Mexican women living in regions with a high percentage of industrial jobs have a lower likelihood of being part of the workforce?

The research questions are based in a specific hypothesis of the U-shaped female labour force function developed by Claudia Goldin. This hypothesis indicates that one of the reasons behind low FLPRs in middle-income countries like Mexico is the abundance of industrial jobs in the labour market. The main argument is that jobs in this sector tend to be occupied by men as there is a social stigma towards women working in blue-collar jobs, especially if they are married. Most of the research papers analysing the U-shaped relationship have taken this specific hypothesis as a stylized fact. Nevertheless, there are no studies from middle-income countries that have empirically evaluated it.

Based on this hypothesis, the main goal of this paper is to analyse if there is currently a negative relationship between female labour participation and a high percentage of industrial jobs in different Mexican regions. Therefore, this paper should not be considered an empirical evaluation of the U-shaped feminisation hypothesis, since the paper is not undertaking a historical analysis to determine if FLPRs in Mexico have been following a U-shaped pattern across time. It is out of the scope of this research to study the evolution of FLPRs when Mexico was an agricultural country to modern times where industry and services jobs predominate. Instead, this paper aims to study if, during the 21<sup>st</sup> century, Mexican women have showed a lower likelihood of working in regions with a high percentage of jobs in the industrial sector.

Mexico is an interesting case study to answer these research questions for several reasons. First, because the country is part of the declining portion of the U-shaped relationship observed across countries (See Figure 1.1), and it has one of the lowest female labour participation rates in Latin America (See Figure 1.3). Second, because researchers could argue that low FLPRs could be related to the fact that Mexico is the Latin-American country with the highest percentage of jobs in the industrial sector (See Figure 1.2). Third, because Mexico has regional disparities, where the northern and central states have labour markets dominated by the industrial or the service sectors, while in the southern part of the country there is still a large percentage of jobs in the agricultural sector (See Figure 1.5) Finally, because Mexico has incredible microdata with a level of disaggregation that allows me to study the current relationship between FLPRs and different levels of economic development not only across-states but also within them.

While most of the studies in this subject perform an econometric analysis using aggregated data, this paper uses highly disaggregated data to study the relationship between female labour participation and sectoral distribution of employment in local labour markets. The data source is the ENOE household survey, which is the largest survey in the country and the main source of information about Mexico's labour markets. This survey has been conducted quarterly since 2005, but the extended version is only available in the first quarter of each year. Therefore, this paper considered the datasets from the first quarters of 2005, 2010, 2015, and 2019 to cover a period of 15 years and evaluate the hypothesis at four different points in time.

To execute the regression analysis, I had to develop an empirical strategy based on microdata. Hence, the econometric analysis relies in a probit model where the dependent variable takes value of 1 if the respondent is economically active and 0 otherwise. The three key explanatory variables are the percentage of jobs in agriculture, industry, and services at the municipal level. These variables capture the sectoral distribution of employment at a local level and their sum is always equal to 100. Therefore, my regression analysis is capturing both the sectoral distribution of employment and the structural transformation process of different regions in Mexico during the 21<sup>st</sup> century.

One of the main advantages of using microdata is that it allowed me to include control variables that could also be affecting women's likelihood of being part of the labour force. These control variables encompass individual characteristics of the respondent such as age, marital status, level of education, number of children, among others. The analysis also considers variables related to household characteristics, such sex, age, and educational level of the household head, the number of kids and number of household members, and whether the household location is in rural or urban areas of Mexico. Finally, the analysis also includes control variables at the municipal level such as the average age of women in the municipality, the percentage of people that migrated from their hometown to keep or obtain their job, the percentage of women that are single, the percentage of people in the municipality from a low socio-economic stratum, among others.

Despite the simplicity of the econometric model, the results are compelling. The regression analysis reveals a positive and statistically significant relationship between female labour force participation and a higher percentage of industrial jobs

at a local level. Moreover, the results show a stronger positive relationship between female labour force participation and a higher percentage of jobs in the service sector. Finally, the results indicate that there is a negative and statistically significant relationship between female labour participation and a higher percentage of jobs in the agricultural sector. It is also worth noting that the regression analysis considers both paid and unpaid labour in farms and businesses, and the results hold after controlling for individual, household, and municipal characteristics.

Previous results are not enough to establish a causal relationship between the sectoral distribution of employment and female labour participation. Nevertheless, national statistics indicate that during 2019, the total female labour force was distributed as follows: around 3% in agriculture, 17% in industry and almost 80% in services. Moreover, from the total labour force engaged in agriculture, 90% were men and only 10% were women. This demonstrates coherence behind the results derived from the regression analysis and national statistics indicating that the engagement of Mexican women in industrial jobs is at least five times bigger than their participation in agricultural activities.

This research makes several contributions to the literature that studies the relationship between female labour force participation and different stages of economic development. First, my findings contradict the “stylized fact” indicating that low FLPRs in a country like Mexico are related to the high percentage of jobs in the industrial sector. Instead, it shows that female labour participation is lower in regions with a high percentage of jobs in the agricultural sector.

This is also the first paper using sectoral distribution of employment as a proxy of economic development. By following this approach, the analysis can show

the relationship between female labour participation and three key explanatory variables that capture the percentage of jobs in agriculture, industry, and services. Hence, this paper contributes to the current debate of using GDP per capita or sector specific growth by proposing an alternative way to evaluate the U-shaped hypothesis. Finally, this study includes an innovative empirical strategy that can be replicated by other researchers to execute more within-country studies based on microdata. This is relevant since this kind of analysis offers a level of disaggregation that cannot be found in cross-country studies or within-country studies using time series.

The study is structured as follows. Section 2 contains a literature review of different studies that have analysed the U-shaped relationship. Section 3 presents different figures that provide relevant insights of Mexico's economy and its labour markets. Section 4 is dedicated to the methodology of the research paper, providing detailed information about the database, empirical strategy, and the economic model. Section 5 presents the results obtained from the regression analysis. Section 6 contains an extensive complementary data analysis that help to understand the results. Finally, section 7 presents the conclusion of the paper.

## 2 Literature Review

Goldin (1994) developed a whole theory of how the structural transformation of an economy in combination with factors such as fertility rates, educational attainment, marital status, and other sociological and cultural factors, are playing a role in the U-shaped pattern of FLPRs observed across countries. This theory can be divided into three parts that explain how female labour participation changes depending on whether women are living in an agricultural, industrial, or service-oriented economy.

The first part of this theory indicates that when countries are in the initial stage of economic development, women participate in the labour markets to a great extent. She argues that at this point, incomes are extremely low and most of the jobs are in the agricultural sector. In this context, women have very low levels of education, and they are usually working on family farms, in-home workshop production, or as own-account workers. Particularly, she argues that women are more likely to work in agrarian economies if they are oriented to the production of sugarcane, rice, cotton, peanuts, poultry, dairy, livestock, and tree crops.

The second part of the theory is much more complex. According to her theory, female labour participation declines when an agrarian economy starts to experience an industrialization process due to several reasons. The first one is that jobs in the industrial sector will tend to be occupied by men. This could be due to employers' preferences to hire men, or also because at this stage men tend to have higher levels of education. In other cases, it could be because women will prefer not to work in industrial activities that require a lot of physical effort (such as construction or mining). However, she argues that one of the main reasons for the decline of FLPRs in this context is because there is a social stigma towards women working in blue-

collar employment, especially among those that are married. According to her theory, a husband will not let her wife work because it could be perceived as a reflection of his poor ability to be the only provider for the family.

Considering that during the industrialization process there is a rise in incomes, she argues that the decline in female labour participation will happen not only because of the social stigma against working wives but also due to a strong income effect. At this stage, there is a movement of production from households, farms, and small businesses to the industrial sector which directly affects women. According to her theory, household-produced goods may become unprofitable to make and sell relative to industrial production, and sometimes it is not even attractive to participate in the labour market considering the fixed costs of working outside the home. In addition, she argues that the industrialization process also occurs in agriculture, and the introduction of new technologies in this sector could also decrease the demand for female labour. Therefore, the industrialization process combines several factors that translate into the perfect scenario for a decline in female labour participation.

The third part of the theory indicates that during the last stages of economic development there is an expansion of job opportunities in the service sector that will increase female labour participation for different reasons. First, because there is no social stigma towards white-collar jobs as they are not risky and they do not require a lot of physical effort, so the husband will not be judged as negligent by society. In addition, she argues that at this point women have higher levels of education, and they are usually no gender gaps in education, which increases the probability of women taking job opportunities in the service sector. Therefore, the combination of

greater education for women, a larger service sector, and the disappearance of the social stigma generates a rise in female labour participation.

Since the publication of this research paper, other authors have found evidence to support the feminisation U hypothesis observed across countries using both cross-sectional data (Clark et al., 2003; Heath & Jayachandran, 2016; Psacharopoulos & Tzannatos, 1989; Verick, 2014) and panel data (Luci, 2009; Mammen & Paxson, 2000; Olivetti, 2013). Nevertheless, Gaddis & Klasen (2014) argued that most of the empirical assessments that have validated the U-shaped relationship observed across countries have several methodological problems. First, they criticized those studies based on simple cross-sectional correlations between FLPRs and GDP per capita as a proxy of economic development (e.g. Clark et al., 2003; Heath & Jayachandran, 2016; Psacharopoulos & Tzannatos, 1989; Verick, 2014). They argue that using cross-sectional data leads to the ‘Kuznets fallacy’ since the relationship should also hold in a time-series context.

Gaddis and Klasen (2014) also highlighted various mistakes in the empirical strategy or in the econometric methods that previous researchers had employed to support the feminisation U. They criticised Çağatay and Özler (1995) for not exploiting the panel feature of their data, Mammen and Paxson (2000) for using a static model rather than a dynamic panel method, and Luci (2009) and Tam (2011) for not taking into consideration the potential endogeneity of GDP. Finally, they also mentioned that estimates of GDP per capita adjusted at purchasing power parities (PPP) have large margins of error, so they should not be used to make empirical evaluations of the U-shaped feminization hypothesis.

Based on these critiques, they decided to use sector-specific growth in value added and employment as an alternative measure of the structural transformation

process. Additionally, their analysis was done using dynamic panel data methods instead of using a static model. Their results show that the U-shaped vanishes when they use a dynamic model. Moreover, the results indicated that changes in sector-specific growth in agriculture, industry and services have different effects on FLPRs, but that they are particularly small in magnitude, so they concluded that there is little evidence to consider them as key drivers of FLPRs.

Gaddis and Klasen (2014) also recognised that some authors might judge their data on sector specific growth as a ‘noisy’ measure of structural change. They mentioned that a potential concern of their results is that other researchers could consider that using sectoral growth could bias the coefficients towards zero. However, they argued that their data is “at least as problematic” as the data that had previously been used in other studies to test the U-shaped feminisation hypothesis.

In a more recent study, Klasen (2019) also argued that the U-shaped hypothesis does not necessarily hold in within-country studies. He presented as an example the study by Lahoti and Swaminathan (2016), which followed a similar approach to Gaddis and Klasen (2014). They executed a state-level analysis in India using data from 1983 to 2012 to assess the U-shaped hypothesis. To do so, they analysed the relationship of FLPRs with net state domestic product (NSDP), as well as with sector-specific growth in value-added and employment across the 28 Indian states. However, they did not find evidence to support the U-shaped hypothesis.

On the other hand, some studies have found evidence of FLPRs following a U-shaped pattern within countries across time. For instance, Goldin (1986, 1990) showed that FLPRs in the United States followed a U-shaped pattern between 1890 and 1940. To do so, she had to make an economic history assessment, which showed that FLPRs in the United States were underestimated in the late 19<sup>th</sup> century. After

this correction, she found that FLPRs were high when the United States was primarily agricultural, there was a decline during the industrialization process, and finally, there was a rise of FLPRs during the service sector expansion. Olivetti (2013) provided additional evidence showing that from 1890-2005, the United States showed a consistent U-shaped relationship between FLPRs and different stages of economic development.

Gaddis and Klasen (2014) argued that while today's advanced economies may have experienced the U-shaped pattern during their process of economic development, today's developing countries may not be following the same path. This is in line with Olivetti (2013), who found that the U-shaped pattern is more muted when early developed OECD countries are not included in the cross-country analysis. She mentioned that a possible explanation to these results is that today's developing countries are not stigmatizing industrial jobs as much as today's advanced economies did, since industrial jobs are less brawn intensive than before.

Considering the previous discussion, the goal of this paper is to contribute to the literature by following a different approach. Instead of using GDP per capita or sector-specific growth, the paper uses "sectoral distribution of employment" as an alternative measure to capture the different stages of economic development. Moreover, instead of using time-series data, the paper relies on micro-data obtained from Mexico's National Household Surveys on Employment and Occupations (ENOE). Finally, this paper uses a repeated cross-sectional dataset, and it develops an innovative empirical strategy to be the first one showing the current dynamics between FLPRs and the percentage of jobs in agriculture, industry and services across different regions within a country.

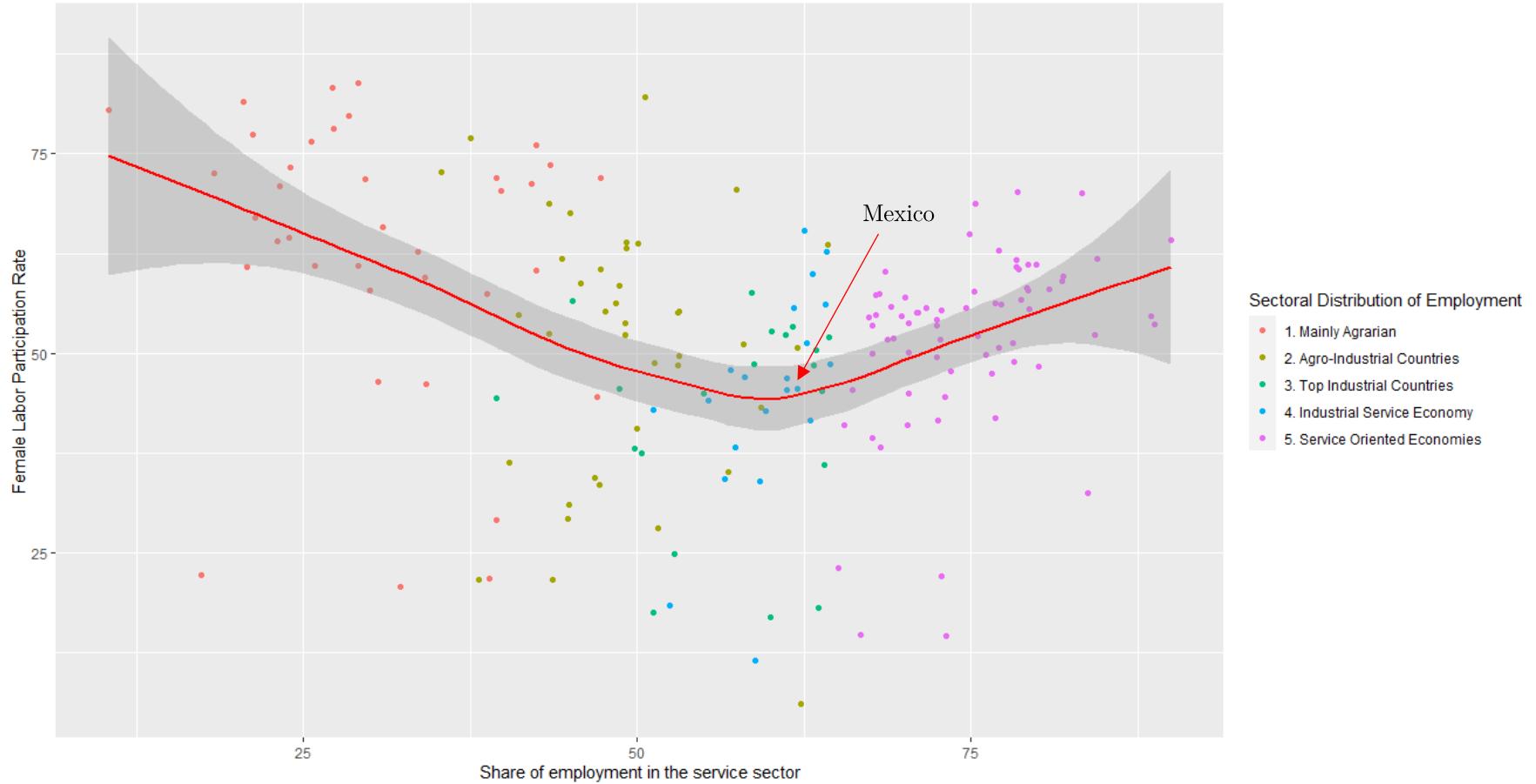
## **3 Background**

This section has three different objectives. The first is to show that Mexico is not an outlier of the U-shaped hypothesis in a cross-country comparison. Instead, it shows that the country is part of the downward portion of the curve. The second goal is to show that the U-shaped hypothesis holds up in a cross-country analysis after using “sectoral distribution of employment” as a proxy of economic development. Finally, it seeks to provide valuable insights about Mexico using different figures that illustrate the economic situation and the labour market characteristics of the country.

### **3.1 Cross-country analysis**

Despite the growing number of studies analysing the feminization U, most of them do not show the relationship between FLPRs and the percentage of jobs in agriculture, industry, and services as a share of total employment. Figure 1.1 illustrates the relationship across countries between their FLRPs and the share of jobs in the service sector. The data were obtained from the World Bank and it covers 187 countries during 2019. The figure also includes five categories based on the sectoral distribution of employment of each country.

Figure 1.1 - FLPRs and sectoral distribution of employment across countries (2019)



Source: World Bank, World Development Indicators. Employment in services (% of total employment),  
Labor force participation rate female (% of female population ages 15+) (modeled ILO estimate)

On the left-hand side of the figure are those countries with the highest percentage of jobs in the agricultural sector. They were classified as mainly agrarian if the percentage of jobs in the agricultural sector ranged from 40% to 80%. In the centre of the figure are the top industrial countries, which have more than 30% of jobs in this sector. On the right-hand side of the figure are the service-oriented countries, which have more than 65% of their jobs in this sector.

This figure includes two complementary categories based on the sectoral distribution of employment. Those countries classified as agro-industrial have between 25% and 40% of their jobs in the agricultural sector, and less than 30% of their jobs in the industrial sector. Those classified as industrial-service economies have more than 50% of their jobs in the service sector and fewer than 30% of their jobs in the industrial sector. Although this is an arbitrary classification, it helps to classify five different stages of economic development based on the sectoral distribution of employment across countries.

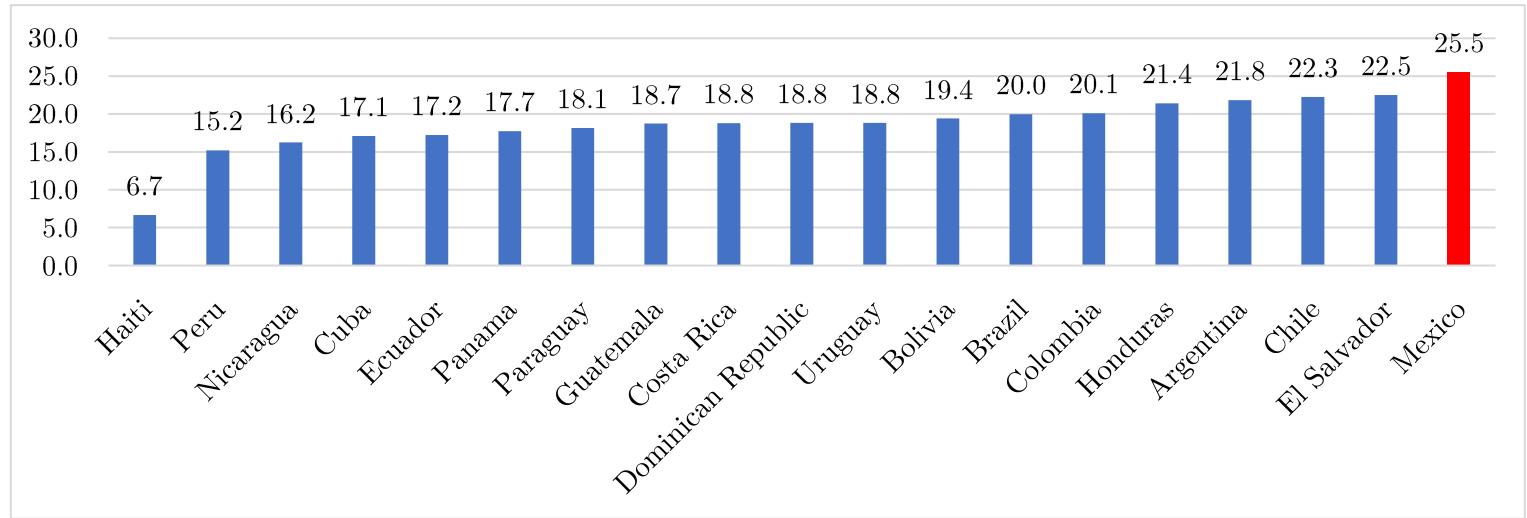
The figure shows that FLPRs are higher in agricultural countries, experience a decline in industrial countries and rise again in service-oriented countries. The Gaussian regression illustrates that there is a U-shaped pattern between the share of jobs in the service sector and FLPRs across countries. The figure also shows that Mexico is an industrial-service country, and it is part of the downward portion of the U-shaped curve.

Figure 1.13, included in the appendix, shows three additional scatterplots that are useful to compare the relationship between FLPRs and the percentage of jobs in each economic sector. The first scatterplot shows that FLPRs are higher in countries where there is a greater percentage of jobs in the agricultural sector as a share of total employment. The second shows that FLPRs decrease as the percentage

of jobs in the industrial sector increases. Finally, the last scatterplot shows that FLPRs are higher in countries where the service sector accounts for a higher share of total employment. Therefore, these three figures show that, across countries, there is a U-shaped pattern between FLPRs and the share of jobs in each economic sector.

In addition to this evidence, I present some interesting facts about Mexico compared to other Latin American countries. Figure 1.2 shows the percentage of industrial jobs as a share of total employment in 2019. It also illustrates that Mexico has the highest percentage of jobs in this sector compared to the other countries in the region. Moreover, Figure 1.3 shows the female labour participation rate among Latin-American countries. In this case, Mexico shows one of the lowest FLPRs in the region, just behind Guatemala, Cuba, Venezuela, and El Salvador.

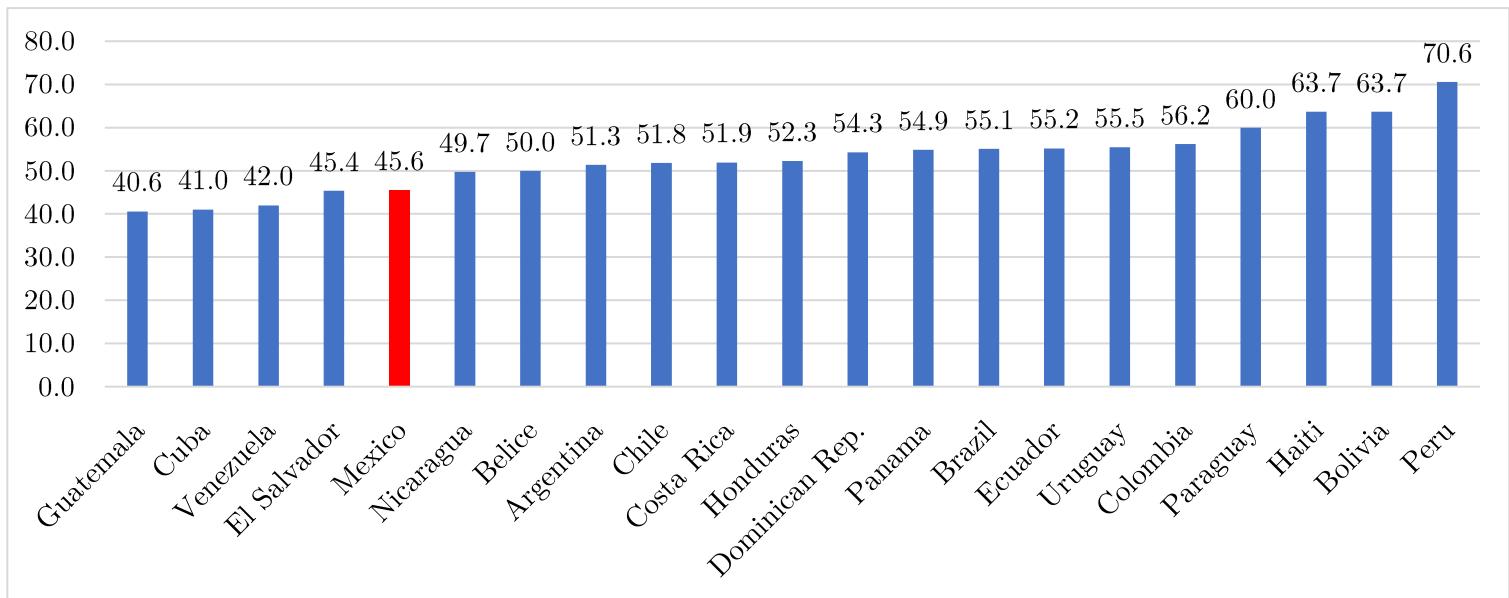
Figure 1.2 - Jobs in the industrial sector as a share of total employment in Latin American countries (2019)



Source: World Bank, World Development Indicators

Employment in industry (% of total employment).

Figure 1.3 - Female labour participation rates in Latin American Countries (2019)



Source: World Bank, World Development Indicators,  
Female Labour Participation (% of female population ages 15+).

This brief cross-country analysis shows evidence that supports the U-shaped hypothesis across countries, since agricultural and service-oriented countries have higher FLPRs than industrial countries. Moreover, Figure 1.1 showed that Mexico is part of the downward portion of the U. The analysis also highlights that in 2019 Mexico had the highest share of industrial jobs among Latin-American countries and the second lowest FLPR in the region. Based on this evidence, some researchers could infer that low FLPRs could be associated with the high percentage of jobs in the industrial sector and the social stigma towards women working on blue-collar jobs. Nevertheless, the following within-country analysis of Mexico shows that the low FLPRs in the country are not necessarily linked to the high percentage of jobs in the industrial sector.

### **3.2 Within-country analysis**

As discussed above, Mexico has one of the lowest FLPRs in Latin America. Unfortunately, not utilizing this female human capital implies a significant economic loss. Cuberes and Teignier (2018) estimated that the Mexican gender gap in labour force participation is leading to an economic loss of 22% in the final output of GDP. Therefore, understanding the reasons behind this phenomenon is relevant not only to the empowerment of women but also to promoting economic growth. In fact, the rise in FLPRs has been identified as one of the main factors driving the growth miracles in East Asian countries (Bloom & Williamson, 1998; Bloom et al., 2009; Bloom & Finlay, 2009).

Kaplan & Piras (2019) analysed gender gaps in Mexico's labour markets and found that the country has the second largest gender gap in labour force participation in Latin America. They noted that it has the sixth highest male labour participation rate in the region, while the FLPR is the fourth lowest. They argued that one of the reasons behind low FLPRs in Mexico is the high percentage of young women who neither study, work nor are looking for a job: that figure is the fourth highest in the region (only lower than in Guatemala, Honduras and El Salvador), while the percentage of young men in the same condition is the lowest in the entire region.

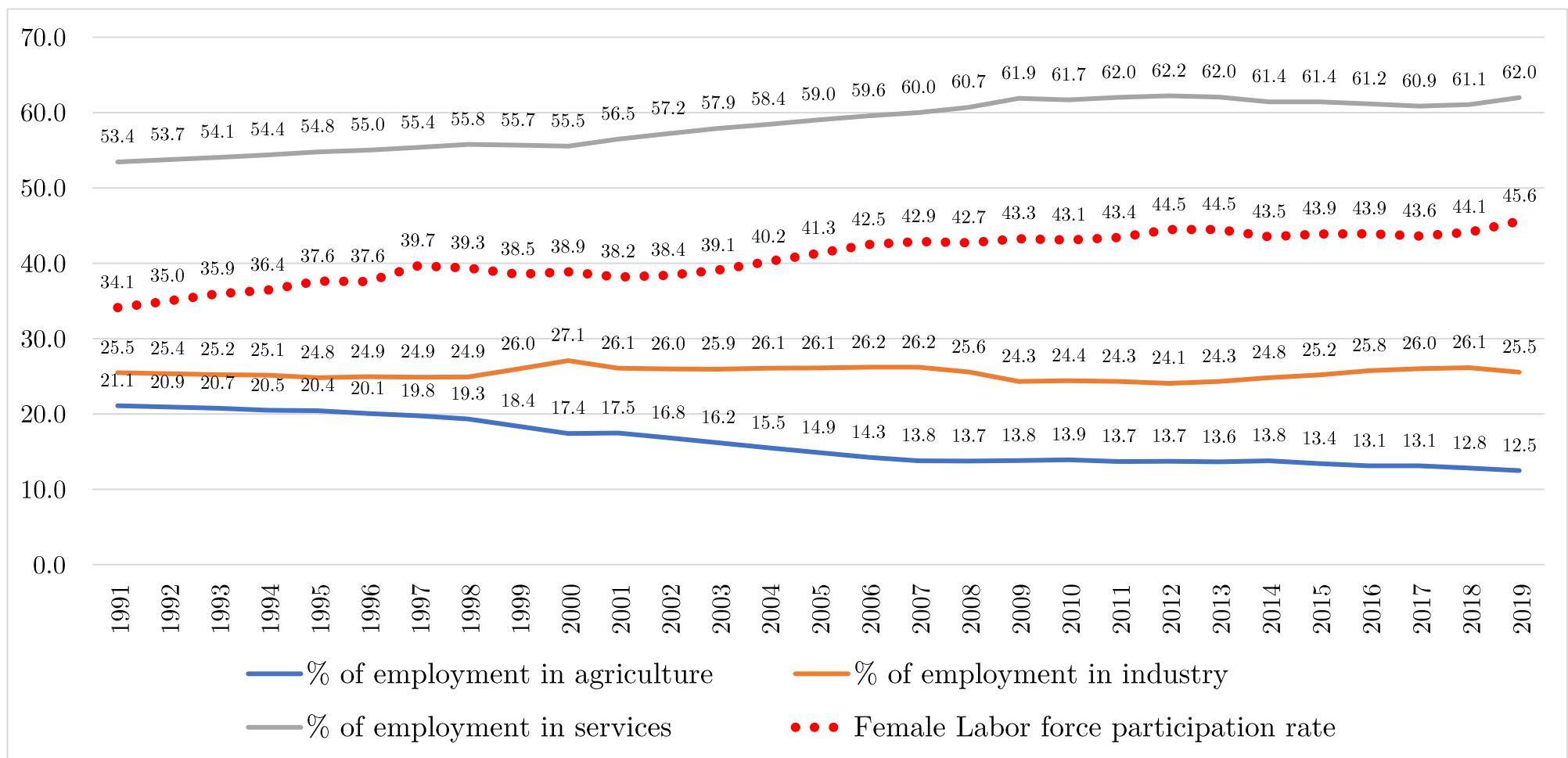
Kaplan & Piras (2019) also highlighted that the labour force participation of single or divorced women is similar to that in other Latin American countries, but the participation rate of married women is the lowest in the region. In addition, they showed that Mexican women with high levels of education have lower labour participation rates compared to other countries in the region. For example, the participation rate for women with at least 14 years of schooling is the second lowest

in the region (only higher than Bolivia's). Finally, they showed that Mexican women have the highest number of hours dedicated to unpaid work in Latin America.

Even though these factors are usually determinants of female labour participation, there is still scant evidence of how the sectoral distribution of employment at the local level affects women's ability to supply labour. The purpose of this study is to fill this gap by analysing how the distribution of jobs in agriculture, industry and services relates to the likelihood of women participating in labour markets. This sub-section therefore includes different figures that show key labour statistics from Mexico during the past few years.

It is important to illustrate that Mexico has made progress in its process of economic development during the last decades. This can be observed in Figure 1.4, which captures the labour shifts of the country from 1991 to 2019, as well as FLPRs during the same period. The figure shows that the industrial sector has accounted for around 25% of total employment over the past 30 years. During the same period, there is also a decline of 10 percentage points in agricultural jobs and a rise of 10 percentage points in services. Hence, Figure 1.4 shows that in the last decades Mexico has maintained its levels of industrialisation, decreased its agricultural activities, and increased the size of the service sector, which accounted for more than 60% of the total employment share in 2019. Finally, the figure illustrates that female labour participation rates have increased by more than 10 percentage points during the same period.

Figure 1.4 - Female labour participation rate and structural transformation in Mexico (1991- 2019)



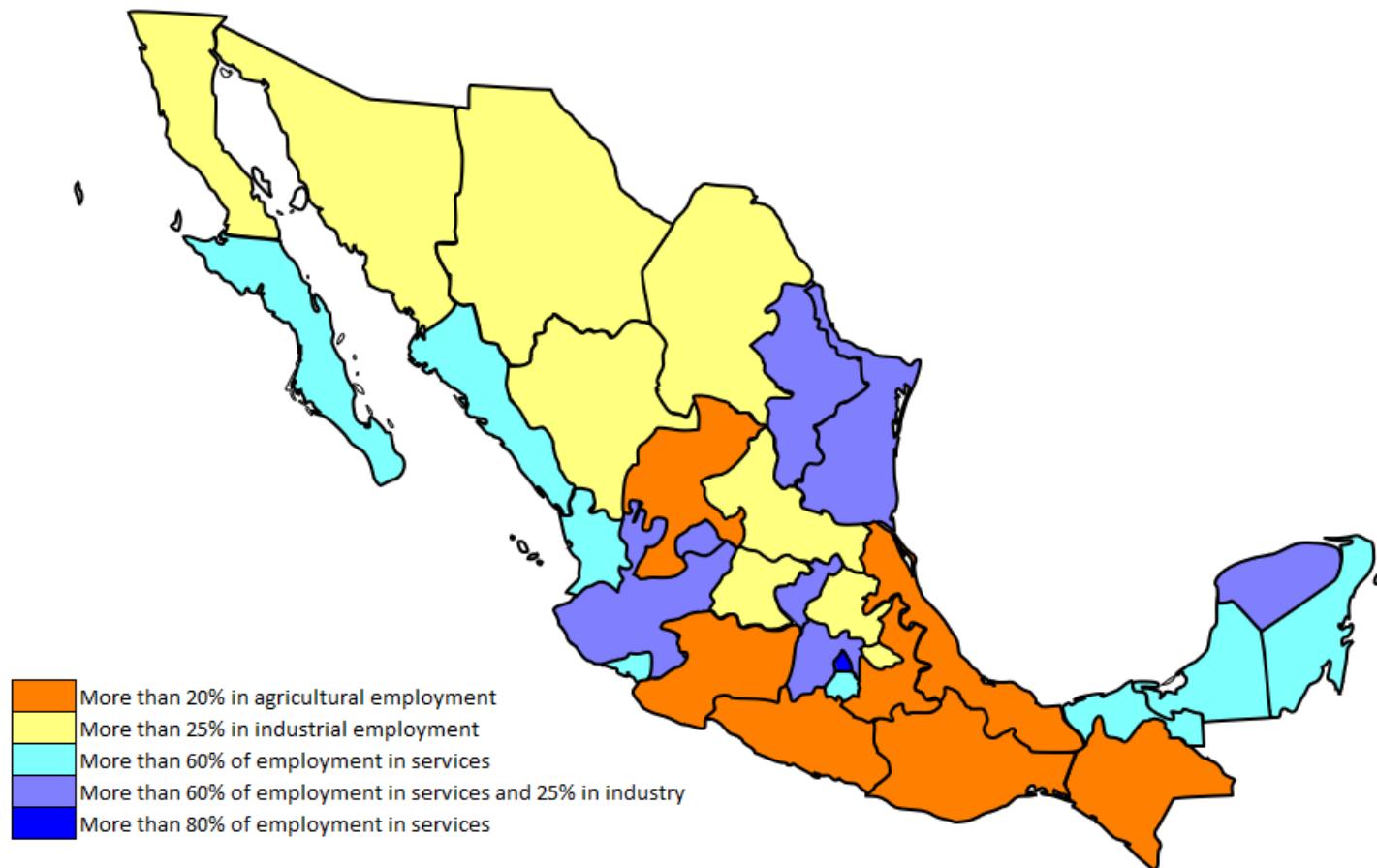
Source: World Bank, World Development Indicators.

It is also necessary to present an overview of the sectoral distribution of employment across mexican states. Figure 1.5 is a map with five different categories that illustrates the most relevant economic sectors in each state. The orange states, located in the southern part of Mexico, are those with the highest rates of agricultural employment. In all of them, there is a higher number of people working in agriculture than in industry. These mexican states have a similar sectoral distribution of employment to countries like Guatemala, Mongolia, Ecuador and Nigeria, where at least 20% of their total workforce is engaged in agriculture.

The yellow states from Figure 1.5 have between 25% and 38% of their jobs in industrial activities, similar to Central European countries like Serbia, Romania, Poland and Slovenia. Most of them are located in the northern part of the country, since they usually have plenty of *maquiladoras* dedicated to the manufacturing sector. The light-blue states have a service-oriented economy without a high percentage of jobs in the industrial sector. These states have a sectoral distribution of employment similar to countries like Colombia and Paraguay, where the share of employment in agricultural and industrial activities is roughly the same.

The purple-coloured states are those with a service-oriented economy and with a high percentage of jobs in the industrial sector. They have more than 60% of jobs in services and 25% in industrial activities, which is similar to countries like Austria, Germany and Russia. Finally, Mexico City is the only mexican state with a dark blue colour, as it is the only one with more than 80% of their jobs in the service sector. This is a similar distribution of employment to economies like Singapore, Macao and Hong Kong.

Figure 1.5 - Map of the sectoral distribution of employment in Mexican states (1<sup>st</sup> quarter of 2019)



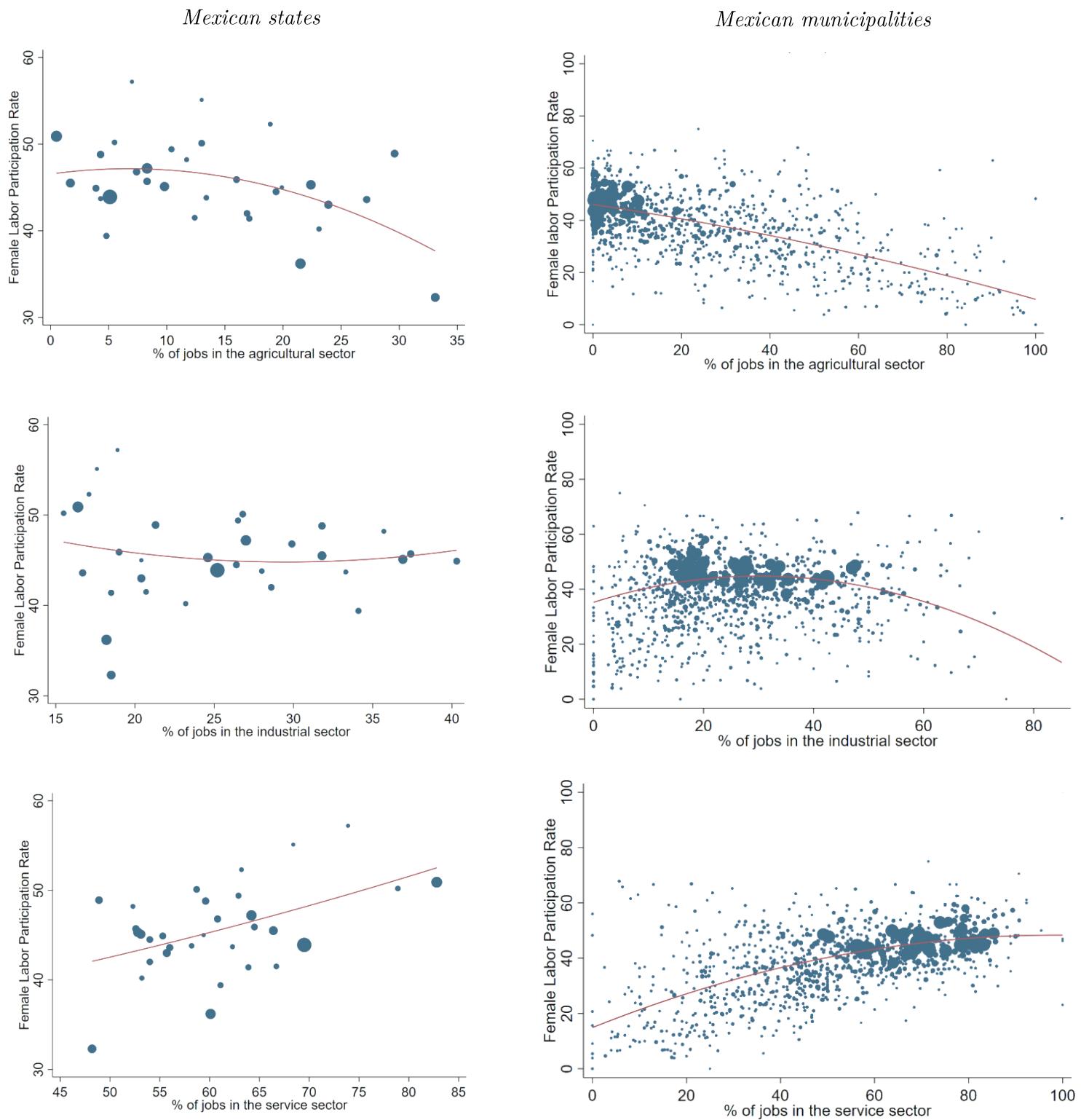
Source: Made by the author with data from ENOE.

It is also pertinent to show the relationship between the percentage of jobs in each economic sector and FLPRs within Mexico. Figure 1.6 includes six scatterplots showing the correlation between these two variables considering two different subnational territorial divisions of Mexico. The left side of the figure shows FLPRs and the percentage of jobs in agriculture, industry and services for each of the 32 Mexican states. The right side of the figure shows the relationship between the same variables but at the municipal level. The data were obtained from the ENOE survey, based on the first quarter of 2019.

The scatterplots show that FLPRs are lower in states and municipalities where there is a higher share of agricultural employment. They also illustrate the FLPRs tend to increase in regions of Mexico with a higher share of service jobs. On the other hand, the relationship between industrial jobs and FLPRs is not that evident. At the state level it seems like there is no relationship, while at the municipal level it shows an inverted U. Notwithstanding, none of them show the alleged negative relationship between lower FLPRs and higher percentage of jobs in the industrial sector.

To finish this within-country analysis, I present two additional figures to illustrate interesting aspects about the participation of women in Mexico's labour markets. Figure 1.7 shows the percentage of men and women in agriculture, industry, and services as a share of their total labour force. This figure shows that only around 3% to 4% of all women in the labour force are working in agriculture, around 17% are engaged in industrial jobs, while almost 80% are working in the service sector.

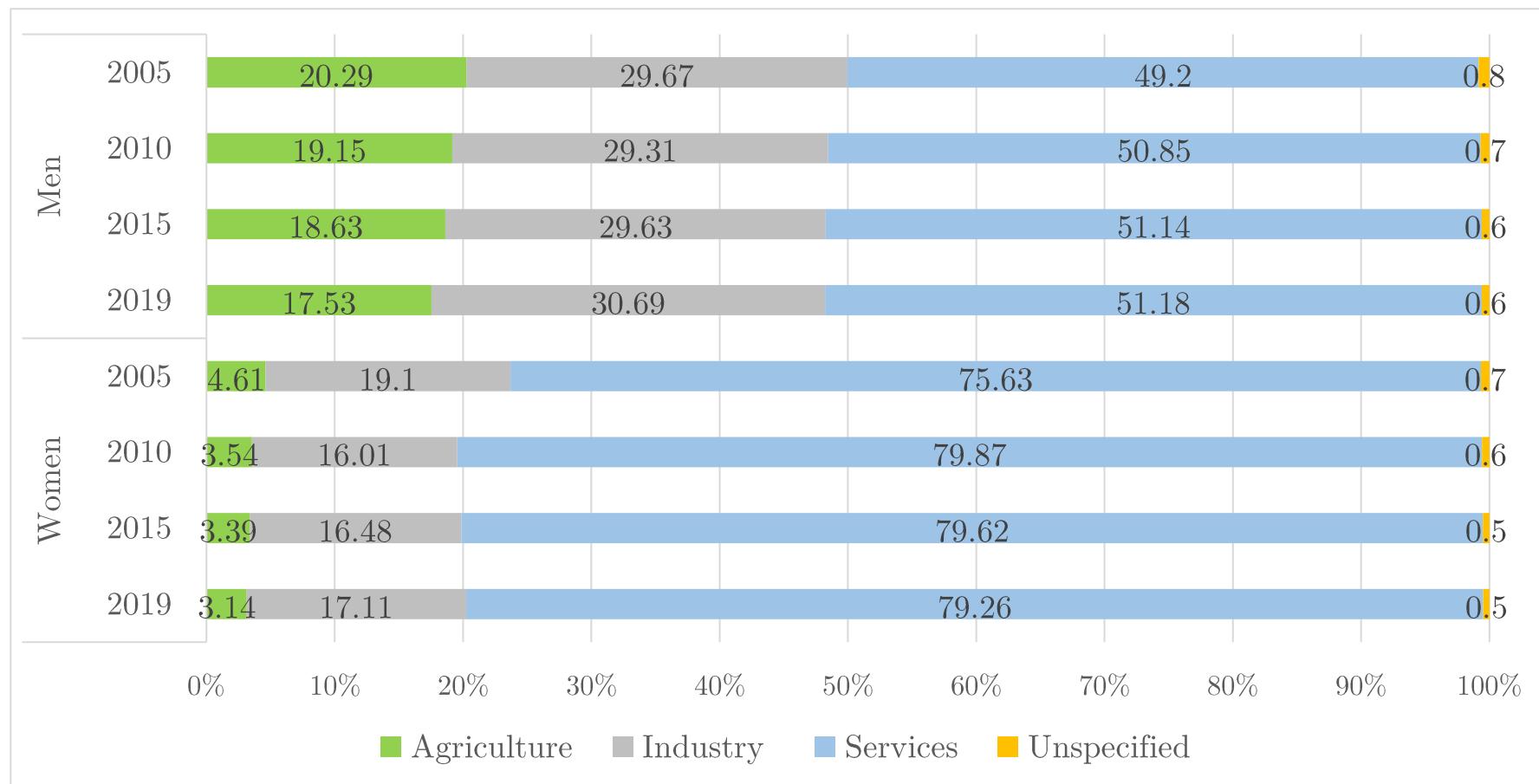
Figure 1.6 - FLPR and % of jobs in each economic sector  
 (Mexican states and Mexican municipalities, first quarter of 2019)



*Note: The size of the dots varies depending on the total population in each state.*

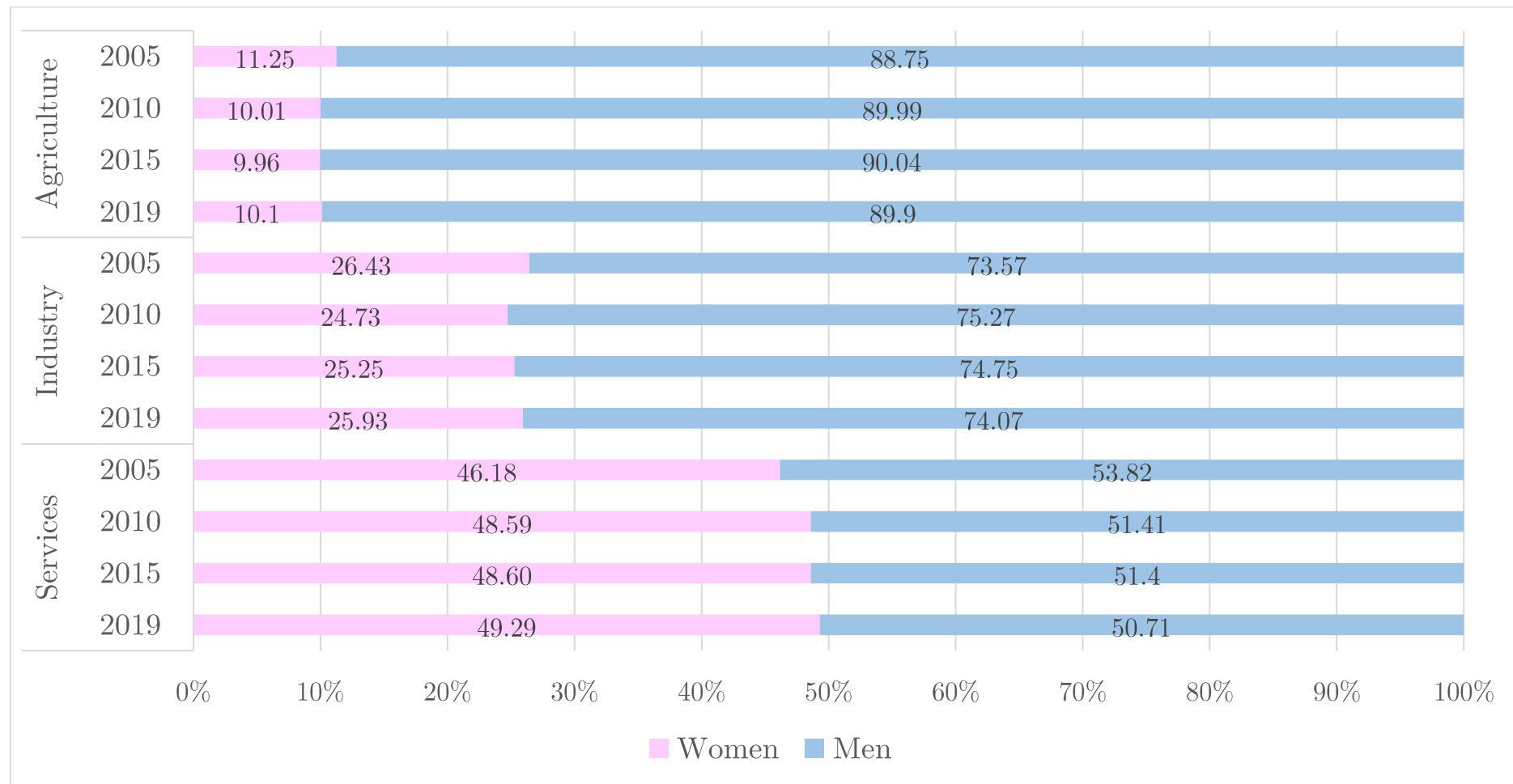
*Note: The size of the dots varies depending on the total number of surveys carried out in each municipality.*

Figure 1.7 - Percentage of men and women in agriculture, industry, and services as a share of their total workforce



Source: Made by the author with data from the ENOE household survey.

Figure 1.8 - Percentage of men and women in agriculture, industry, and services  
as a share of the total workforce in each economic sector.



Source: Made by the author with data from the ENOE household survey.

Moreover, Figure 1.8 shows the percentage of men and women in agriculture, industry, and services as a share of the total labour force in each economic sector. The figure shows that considering all the labour force in agriculture, 90% of them are men, and only 10% are women. In the case of the industrial sector, three-quarters of the workforce are men and one-quarter are women. Finally, the figure shows that the distribution of the workforce in the services sector is similar between men and women.

This within-country analysis has been useful to show the sectoral distribution of employment across Mexican states. It has also highlighted that there is no negative relationship between higher industrial jobs and lower female labour participation rates. On the other side, the scatterplots indicate that female labour participation in agricultural regions of Mexico tend to be low. This is corroborated by observing that of all women in the workforce, only 4% work in agriculture, while of the entire workforce employed in agriculture, only 10% are women. The following section delves into this topic by analysing the relationship with an innovative empirical strategy.

## 4 Methodology

This section outlines fundamental aspects regarding the methodology that was followed to execute the econometric analysis of this research. It commences with a description of the databases utilised. The next sub-section describes all the details of the empirical strategy to estimate the sectoral distribution of employment at the municipal level, relevant information about the control variables included in the analysis, and an explanation of how female labour participation can be studied using microdata instead of aggregated data. Subsequently, a comprehensive exposition of the econometric model is provided, culminating with the presentation of the descriptive statistics of the variables included in the econometric model.

## 4.1 Dataset

Most of the studies that have analysed the U-shaped hypothesis are based on aggregated data. Conversely, this study uses micro-level data obtained from the extended version of the ENOE survey, which is carried out by the National Institute of Statistics and Geography (INEGI), Mexico's national statistical office. The ENOE household surveys are the main source of information for most of the labour market statistics for the country. They were introduced in 2005 and collect employment statistics in quarterly periods by making household surveys. The sample in each dataset is large enough to adequately represent rural and urban areas in each of Mexico's 32 states. In addition, the surveys include information on the labour status of individuals and integrate socio-demographic information like educational level, marital status, number of children and access to social security, among others.

It is worth noting that, during the first quarter of each year, INEGI conducts an amplified survey, while in the second, third and fourth quarters, it conducts a basic survey. Therefore, this study considered four cross-sectional datasets using the ENOE surveys from the first quarters of 2005, 2010, 2015 and 2019. The surveys from the first quarter of these years were considered because they provide the most detailed information, whereas surveys conducted during the other three quarters omit specific questions that are exclusively available in the amplified survey.

Although there is usually a five-year difference between the selected surveys, I used the survey from the first quarter of 2019 because no survey was conducted during the first quarter of 2020 due to the covid-19 pandemic. Additionally, I considered relevant to have five-year intervals since this timeframe helps to take in consideration possible changes in the sectoral distribution of employment across Mexican municipalities. Therefore, such period spanning capture both the structural transformation of local economies and the changes in female labour participation over the years.

## 4.2 Empirical strategy

It is important to start this section emphasizing that this research is not an empirical evaluation of the U-shaped feminization hypothesis. This study is not carrying out an economic history analysis to determine whether FLPRs were high when Mexico was an agricultural country, if they decline during the industrial boom, or if they have been increasing during the service sector expansion. If such an approach had been chosen, this research would have turned into a similar analysis to previous research on this topic. As mentioned previously, several researchers have used aggregated data to make an empirical evaluation of the U-shaped feminisation hypothesis over time. Instead, I have chosen to follow a different approach that allows me to make an original contribution to the literature.

As mentioned before, the goal of this paper is to evaluate a specific hypothesis that tries to explain the reasons behind the declining portion of the U-shaped relationship observed across countries. This specific hypothesis indicates that labour markets in middle income countries like Mexico tend to have a high percentage of jobs in the industrial sector, and that women, especially those that are married, are less likely to participate in this sector for several reasons. To make an empirical evaluation of this hypothesis, I had to develop an empirical strategy that allowed to make a within-country analysis of the relationship between female labour force participation and the sectoral distribution of employment observed at different stages of economic development.

I am following this approach to fill a gap in the literature. Klasen (2019) noted that when using cross-country data, it is difficult to disaggregate labour force participation rates to identify and differentiate the level of participation of men and women in each economic sector. Consequently, I decided to perform a within-country analysis using micro-data, since doing so offers a level of disaggregation that cannot be found in studies using time series data or doing cross-country regressions.

Notwithstanding, one major limitation of following this approach is that it is necessary to delimit the analysis to the dates on which data are available. Given that Mexico's ENOE household survey started in 2005, I discarded the idea of making a long-run analysis and decided to study the current within-country dynamics of FLPRs under different scenarios of the sectoral distribution of employment. Therefore, while the paper takes some of the theoretical underpinnings of the U-shaped feminisation hypothesis, the goal is not to make an empirical evaluation of the whole theory.

#### **4.2.1 Estimation of female labour participation**

According to both the International Labour Organization (ILO) and INEGI, the labour force participation rate should be estimated by considering individuals who are over 15 years old. This approach helps to determine the proportion of the working-age population that is either employed or actively seeking employment, also known as the ‘economically active population’. Moreover, INEGI considers that people who are attending an educational institution or who are retired, as well as people engaged in household duties, or who are infirm or disabled, are part of the non-economically active population. Based on the previous explanation, I use the variable “economically active” to analyse female labour participation at the individual level. This implies that the value of this variable changes for each respondent, taking a value of 1 if they are economically active and 0 otherwise. By following this approach, I can restrict the sample to respondents over 15 years old and use the variable ‘economically active’ as a proxy to study female labour participation using microdata.

#### **4.2.2 Estimation of sectoral distribution of employment**

One of the main points to highlight from the empirical strategy is that I estimated the sectoral distribution of employment at the municipal level to use it as a proxy of economic development at the local level. The sectoral distribution of employment is based on three main variables, namely the percentages of jobs in agriculture, industry, and services as a share of the total employment in each municipality. Previous studies analysing the feminisation U-shaped hypothesis have used GDP per capita, as well as sector-specific growth in value-added or in employment as a proxy of the structural transformation process. As previously explained, Gaddis & Klasen (2014) criticised the studies that used GDP per capita, and proposed ‘sector-specific growth’ as an alternative variable to test the U-shaped hypothesis. Nevertheless, they recognised that this variable might raise concerns as it could be considered a noisy measure of the structural transformation process.

Due to the lack of consensus on this subject, my research proposes an alternative way to analyse the relationship between FLPRs and different stages of economic development. As stated above, Goldin (1994) implied that the sectoral proportion of jobs in local labour markets have an influence on FLPRs. Hence, my research considers that the percentage of jobs in each economic sector can be used as an alternative variable that captures both the structural transformation process and the different stages of economic development across time. This is in line with Perkins et al (2013) who argued that, at the lowest levels of income per capita, agriculture dominates both as a share of GDP and as a share of total employment. However, when the industry and the service sectors start growing, agriculture will account for a smaller share of both GDP and total employment.

To estimate the sectoral distribution of employment at the municipal level, I considered all individuals who reported being employed within each municipality, regardless of their sex. After doing this, I used the weight variable provided by INEGI,

also known as expansion factor, which indicates the weight of each individual in the sample. More precisely, the ‘expansion factor’ can be interpreted as the number of units in the population that each unit in the sample represents. For instance, if a person in the sample is categorised as ‘non-economically active’ and their ‘expansion factor’ is equal to 308, this means that there are 308 people in Mexico that are non-economically active and share the same socio-demographic characteristics. Hence, ‘expansion factor’ is a variable that assigns a certain weight to each individual in the sample, and it is used to obtain more precise estimations.

It is worth noting that the individuals interviewed in household surveys are selected through a random process and they also have different probabilities of selection. Hence, National Statistical Offices estimate the weight of each individual in the sample, which is equal to the inverse of the probability of being sampled. Omitting these sampling weights leads to biased estimates, which are far from the true values. Consequently, using sampling weights is useful to have a more precise estimation of the percentage of jobs in agriculture, industry, and services at the municipal level.

One advantage of using the weight variable is to have a more precise estimation of the people living in rural areas. Table 1.1 shows a comparison between the respondents from rural and urban areas in comparison with the estimations of the urban and rural population in Mexico after using the weight variable. The table shows that there is a higher proportion of respondents from urban areas than from rural areas. Nevertheless, the estimations show that there is a higher proportion of people living in rural areas than in urban areas after using the weight variable.

On the other hand, one of the main limitations of using the weight variable is that the ENOE survey is not representative at the municipal level, so the biggest municipalities are more likely to have a precise estimation of the sectoral distribution of employment, as they have a larger sample size. Meanwhile, the small municipalities will have larger measurement errors, as they have fewer respondents. Nevertheless, I

addressed this concern to a certain degree by devising a novel approach. After estimating the percentage of jobs in agriculture, industry and services for each municipality in the sample, all the individuals who were surveyed in municipality “ $x$ ” get the corresponding values of the sectoral distribution of employment in that municipality.

Based on the aforementioned, if a respondent lives in a small municipality, where only a few people reported having a job, the estimation may be less reliable, but their weight in the total sample will also be smaller. For instance, each ENOE survey considered for this analysis had more than 300,000 respondents. Hence, a municipality with more than 8,000 employed individuals has 100 times more weight in the sample than a municipality where only 80 employed individuals answered the survey. Despite recognising the innovation inherent in this empirical strategy, it is important to note that it is also a modest solution. Having a precise estimation of the sectoral distribution of employment at the municipal level would require using Small Area Estimation Methods, which is beyond the scope of this research.

Table 1.1 – Rural and urban respondents compared with rural and urban population.

	ENOE surveys			
	2005, 1Q	2010, 1Q	2015, 1Q	2019, 1Q
Total respondents from rural populations	121,178	125,150	124,932	115,718
Total respondents from urban populations	189,757	187,017	189,002	205,684
Total Sample Size	310,935	312,167	313,934	321,402
% of respondents from rural populations	38.97%	40.09%	39.80%	36.00%
% of respondents from urban populations	61.03%	59.91%	60.20%	64.00%
<i>Estimations after using the weight variable</i>				
Rural population in Mexico	45,610,450	49,824,887	53,919,098	53,975,674
Urban population in Mexico	34,790,028	38,172,950	41,012,411	46,940,369
Total population in Mexico	80,400,478	87,997,837	94,931,509	100,916,043
% of rural population in Mexico	56.73%	56.62%	56.80%	53.49%
% of urban population in Mexico	43.27%	43.38%	43.20%	46.51%

#### 4.2.3 Control variables

This sub-section includes a detailed explanation of different control variables that were included in the econometric model as they are potentially related to female labour participation. These variables encompass individual attributes of the respondents, household characteristics, and features of the respondents' living environment. Figure 1.17, included in the appendix section, presents different charts that show the relationship between female labour participation rates and some of the control variables discussed in this section.

The first two control variables at the individual level are age and 'age squared' since the relationship between labour status and age is usually non-linear. I also control for educational attainment, which is a categorical variable that captures the highest level of education each respondent has obtained. The literature on this topic indicates that the relationship between a woman's level of education and her participation in labour markets differs across countries, so it is incorrect to assume a positive and linear relationship. Klasen et al. (2021) offer an overview of this research subject and provide micro-level evidence on the differences in this relationship after analysing eight developing countries. They explain that, in some developing countries, educational attainment and female labour participation show a U-shaped pattern, while other countries show a common linear relationship. Figure 1.17 shows that Mexican women with low levels of education have the lowest labour participation rates, while highly educated women have the highest. Therefore, educational attainment is included in the model as a control variable that seems to have a positive and linear relationship with female labour participation.

The econometric model also includes a control variable that captures if the respondent is living in a household from a low, medium-low, medium-high or high socioeconomic strata. INEGI (2020) indicates that this variable is built using multivariate statistical methods based on 34 indicators that capture the economic

situation of the individuals, as well as the physical characteristics and the equipment in their households. Some of the indicators considered are access to medical services, educational attainment, illiteracy, a solid floor in the household (cement, wood, mosaic), household overcrowding, access to electricity, water and drainage piping as well as possession of items such as televisions, cars, cell phones, refrigerators and washing machines. Based on the previous explanation, I consider that the variable ‘socio-economic stratum’ can be used as a variable that captures the financial situation of the individuals in the sample.

It is important to include this control variable as there are studies indicating that it could be a determinant for female to engage in economic activities. For instance, Verick (2014) argued that poor women in low-income countries are the most likely to participate in the labour market, usually in subsistence activities and informal jobs. On the other hand, Lampietti and Stalker (2000) found that, in six out of the nine Latin American countries considered for the analysis, poor women had lower FLPRs than non-poor women. For the case of Mexico, Figure 1.17 shows that women from low socioeconomic strata have the lowest FLPRs.

Another control variable included in the model is the marital status of each woman, since Goldin (1994) explained that married women are usually less likely to work in blue-collar jobs. Surprisingly, Figure 1.17 shows that in Mexico married women have higher labour force participation rates than single women. Nevertheless, it worth noting that the dataset includes all women above 15 years old, so a considerable proportion of single women in the sample are teenagers who are still studying in high school or university. Something similar happens with the control variable that captures the number of children that each woman in the sample has given birth to. Figure 1.17 shows that women without children have similar FLRPs to married women. This could be counter-intuitive, since women without children are usually more likely to work, as they do not have a care burden. Nevertheless, the sample is considering every woman

above 15 years old as this is the proper way of estimating labour force participation rates according to ILO standards.

The econometric analysis also considers other control variables that capture household characteristics that tend to have a relationship with female labour participation. The econometric model includes variables to consider the age, sex, and level of education of the household head. Moreover, the regression analysis includes control variables that capture the total number of household members, and the number of kids below 5 years old in the household.

Finally, the econometric analysis also includes control variables that depict characteristics of the municipality. It is relevant to include these controls in the model since some of the main variable of interest in this analysis are the percentage of jobs in agriculture, industry, and services at the municipal level. Hence, the econometric analysis also considers other characteristics of the municipality where the respondents live to assess whether there is a statistically significant relationship between the types of jobs available in a municipality and the likelihood that a woman is economically active. The control variables at the municipal level are:

- average age of women in the municipality;
- percentage of women in the municipality with elementary schooling or less;
- percentage of women in the municipality with secondary schooling;
- percentage of women in the municipality with high-school education;
- percentage of single women in the municipality;
- percentage of women in the municipality who are married or in a free-union relationship;
- percentage of people in the municipality from a low socioeconomic stratum;
- percentage of people in the municipality from a medium-low socioeconomic stratum;
- average number of sons or daughters among women between 20 and 35 years old, to be used as a proxy of the fertility rate in the municipality.

### 4.3 Econometric model

The first part of the empirical analysis is based on a set of regressions to capture the relationship between female labour participation and the sectoral distribution of employment at the municipal level. The first set of regressions are based on a simple probit model with no control variables included. The model can be characterized with the following equation:

$$Y_{i,m,t} = \beta_0 + \beta_1 Share_{s,m,t} + \mu_{e,t} + \varepsilon_i , \quad (1)$$

Where  $Y$  is a binary variable that takes value of 1 if the respondent of the household survey is part of the economically active population, and 0 otherwise.  $Share$  is the main independent variable of the model, and it captures the percentage of jobs either in agriculture, industry, or services as a share of total employment.  $\beta_1$  is the coefficient of interest throughout the paper; it captures the positive or negative relationship of the sectoral distribution of employment in the likelihood that a woman is part of the economically active population.

Moreover,  $i \in \{1, \dots, N\}$  is an index for individuals,  $m \in \{1, \dots, M\}$  is an index for municipalities,  $t \in \{2005 1Q, 2010 1Q, 2015 1Q, 2019 1Q\}$  is an index for the specific years and quarters considered for this study,  $s \in \{\text{agriculture, industry, services}\}$  is an index that captures the percentage of jobs in each economic sector, and  $e \in \{1, \dots, 32\}$  is an index for the 32 states in Mexico. Finally,  $\mu$  represents the fixed effects included in the model to control for unobserved heterogeneity across time or across states.

This model does not include control variables at individual, household and municipal level as its objective is to demonstrate the relationship between female labour participation and the percentage of jobs in agriculture, industry, and services before incorporating control variables. Moreover, this model is not restricted solely to

women, as the aim is also to compare the relationship between these variables for both men and women.

The second set of regressions are based on a discrete choice probit model that are now controlling for individual and household characteristics and is used to run separate regressions for both men and women in the sample. The model is characterized with the following equation:

$$Y_{i,m,t} = \beta_0 + \beta_1 Share_{s,m,t} + \beta_x X'_{i,t} + \beta_x HH'_{i,t} + \mu_{e,t} + \varepsilon_i , \quad (2)$$

Where  $X$  is a vector of potential explanatory variables that control for the individual characteristics of each respondent in the sample. The first two controls are age and ‘age squared’ since the relationship between labour status and age is usually non-linear. I also control for educational attainment, which is a categorical variable that captures the highest level of education that each respondent in the sample has obtained. Moreover, this model includes variables to control for marital status, and number of kids that each woman in the sample has given birth to.

$HH$  is a vector of control variables that capture different household characteristics, which include: 1) socio-economic stratum of the household, 2) number of kids below five years old in the household, 3) total household members, 4) sex of the household head, 5) age of the household head, and 6) level of education of the household head.

The econometric model also includes two variables that capture characteristics the household location: 1) population size of the locality, 2) rural or urban location. These two variables are included in the model since some studies have identified them as explanatory variables of FLPR. For instance, according to estimates obtained by López-Acevedo et al. (2021), residing in a Mexican urban household is linked with an 11.1 percentage point increase in woman’s likelihood of being employed in both 2007 and 2017. Therefore, including this dummy variable as a control is particularly relevant, especially because it can also be correlated to the estimations of the sectoral

distribution of employment, since rural areas tend to be agriculture-oriented, while urban areas usually have a higher percentage of jobs in industry and services. Moreover, Falk and Leoni (2010) found that population density is positively associated with FLPRs in Austria. Their interpretation is that densely populated areas provide a larger and better array of employment opportunities for female workers. Therefore, I also included this variable as a proxy of population density in Mexico.

The third set of regressions are based in probit model that is restricted to women and it includes control variables at the municipal level. It can be characterized with the following equation:

$$Y_{i,m,t} = \beta_0 + \beta_1 Share_{s,m,t} + \beta_x X'_{i,m,t} + \beta_x HH'_{i,m,t} + \beta_x \vartheta'_{m,t} + \mu_{e,t} + \varepsilon_i, \quad (3)$$

Where  $\vartheta$  is a vector of control variables that captures different characteristics of the municipality where each woman lives. These control variables were estimated after using the weight variable that the ENOE survey assigns to each individual in the sample. The control variables at the municipal level included in the model aim to test if the relationship between the dependent variable (female labour participation) and the main independent variable (sectoral distribution of employment) is not spurious or biased. By doing so, I can evaluate whether the relationship remains statistically significant or not.

The fourth set of regressions are based in a probit model restricted to women that is now controlling for individual, household, and municipal characteristics, but it also includes a squared variable for the percentage of jobs in agriculture, industry, and services at the municipal level. This is done to evaluate if there is a non-linear relationship between female labour participation and the variables that capture the sectoral distribution of employment. The model can be characterized with the following equation:

$$Y_{i,m,t} = \beta_0 + \beta_1 Share_{s,m,t} + \beta_2 Share_{s,m,t}^2 + \beta_x X'_{i,m,t} + \beta_x HH'_{i,m,t} + \beta_x \vartheta'_{m,t} + \mu_{e,t} + \varepsilon_i, \quad (4)$$

Finally, the last set of regressions of the empirical analysis are based in a probit model restricted to men that is only controlling for individual and household characteristics, but it also includes a squared variable for the percentage of jobs in agriculture, industry, and services at the municipal level. As most of the control variables at the municipal level capture characteristics of women living in the municipality, it is not appropriate to include these variables in the regressions restricted to men. The only goal of this last set of regressions is to check if there is a non-linear relationship and compare the results obtained for both for men and women. This model can be characterized with the following equation:

$$Y_{i,m,t} = \beta_0 + \beta_1 Share_{s,m,t} + \beta_2 Share_{s,m,t}^2 + \beta_x X'_{i,m,t} + \beta_x HH'_{i,m,t} + \mu_{e,t} + \varepsilon_i , \quad (5)$$

To conclude this section, Table 1.2 shows the descriptive statistics of all the variables that were considered in the regression analyses.

Table 1.2 – Descriptive statistics

	Women						Men					
	Obs.	%	Mean	Std. Dev.	Min	Max	Obs.	%	Mean	Std. Dev.	Min	Max
<b>Dependent variable</b>												
Economically Active	613,154	-	0.444	0.497	0	1	550,681	-	0.777	0.417	0	1
<b>Main dependent variables</b>												
% of jobs in agriculture	613,154	-	10.285	16.896	0	100	550,681	-	10.526	17.230	0	100
% of jobs in industry	613,154	-	25.041	10.345	0	100	550,681	-	25.151	10.460	0	100
% of jobs in services	613,154	-	64.106	16.710	0	100	550,681	-	63.734	16.890	0	100
% of unspecified jobs	613,154	-	0.569	1.356	0	27.42	550,681	-	0.589	1.401	0	27.42
<b>Individual characteristics</b>												
Age	613,154	-	39.660	17.609	15	98	550,681	-	38.668	17.478	15	98
<i>Marital status</i>												
Free Union	75,547	12.32	-	-	-	-	72,283	13.13	-	-	-	-
Separated	28,811	4.7	-	-	-	-	13,325	2.42	-	-	-	-
Divorced	13,137	2.14	-	-	-	-	5,909	1.07	-	-	-	-
Widowed	46,022	7.51	-	-	-	-	11,667	2.12	-	-	-	-
Married	263,724	43.01	-	-	-	-	255,261	46.35	-	-	-	-
Single	185,864	30.31	-	-	-	-	192,191	34.9	-	-	-	-
Missing values	49	0.01	-	-	-	-	45	0.01	-	-	-	-
<i>Level of education</i>												
No studies at all	38,870	6.34	-	-	-	-	25,905	4.7	-	-	-	-
Preschool	306	0.05	-	-	-	-	276	0.05	-	-	-	-
Primary school	161,873	26.4	-	-	-	-	135,404	24.59	-	-	-	-
Secondary school	161,956	26.41	-	-	-	-	157,299	28.56	-	-	-	-
High school	102,557	16.73	-	-	-	-	107,695	19.56	-	-	-	-
Teacher training college	7,341	1.2	-	-	-	-	3,265	0.59	-	-	-	-
Technical career	42,777	6.98	-	-	-	-	16,037	2.91	-	-	-	-
Bachelor's degree	90,589	14.77	-	-	-	-	96,573	17.54	-	-	-	-
Master's degree	5,851	0.95	-	-	-	-	6,693	1.22	-	-	-	-
Ph.D. degree	634	0.1	-	-	-	-	1,083	0.2	-	-	-	-
Missing values	400	0.07	-	-	-	-	451	0.08	-	-	-	-

	Women						Men					
	Obs.	%	Mean	Std. Dev.	Min	Max	Obs.	%	Mean	Std. Dev.	Min	Max
<b><i>Household characteristics</i></b>												
Total household members	613,154	-	4.497	2.067	1	27	550,681	-	4.501	2.065	1	27
Number of kids in the household (5 years old or less)	613,154	-	0.423	0.714	0	8	550,681	-	0.386	0.688	0	8
Household located in urban/rural area	613,154	-	0.621	0.485	0	1	550,681	-	0.613	0.487	0	1
<i>Population size of the household location</i>												
More than 100,000 inhabitants	373,749	60.96	-	-	-	-	331,556	60.21	-	-	-	-
Between 15,000 and 99,999	73,024	11.91	-	-	-	-	65,125	11.83	-	-	-	-
Between 2,500 and 14,999	73,724	12.02	-	-	-	-	66,086	12	-	-	-	-
Less than 2,500 inhabitants	92,657	15.11	-	-	-	-	87,914	15.96	-	-	-	-
<i>Socioeconomic strata</i>												
Low	81,920	13.36	-	-	-	-	76,847	13.95	-	-	-	-
Medium-low	296,761	48.4	-	-	-	-	270,567	49.13	-	-	-	-
Medium-high	168,893	27.54	-	-	-	-	146,769	26.65	-	-	-	-
High	65,580	10.7	-	-	-	-	56,498	10.26	-	-	-	-
<b><i>Household head characteristics</i></b>												
Age of the household head	610,503	-	50.02	14.78444	15	98	549,489	-	49.41	14.55243	15	98
Sex of the household head	610,503	-	0.31	0.4613919	0	1	549,489	-	0.15	0.36149	0	1
<i>Level of education of the household head</i>												
No studies at all	46,919	7.69	-	-	-	-	39,992	7.26	-	-	-	-
Preschool	374	0.06	-	-	-	-	357	0.06	-	-	-	-
Primary school	212,162	34.78	-	-	-	-	190,242	34.55	-	-	-	-
Secondary school	138,122	22.64	-	-	-	-	128,128	23.27	-	-	-	-
High school	75,130	12.32	-	-	-	-	70,977	12.89	-	-	-	-
Teacher training college	7,889	1.29	-	-	-	-	5,895	1.07	-	-	-	-
Technical career	30,002	4.92	-	-	-	-	21,437	3.89	-	-	-	-
Bachelor's degree	88,471	14.5	-	-	-	-	82,111	14.91	-	-	-	-
Master's degree	9,404	1.54	-	-	-	-	8,390	1.52	-	-	-	-
Ph.D. degree	1,515	0.25	-	-	-	-	1,486	0.27	-	-	-	-
Missing values	3,166	0.52	-	-	-	-	1,666	0.3	-	-	-	-

	Women						Men					
	Obs.	%	Mean	Std. Dev.	Min	Max	Obs.	%	Mean	Std. Dev.	Min	Max
<b>Municipal characteristics</b>												
% of people who migrated to keep or maintain their current job	612,610	-	2.679	3.629	0	100	-	-	-	-	-	-
% of women in the municipality with primary school or less	613,154	-	33.036	14.168	0	100	-	-	-	-	-	-
% of women in the municipality with secondary school	613,154	-	26.503	6.588	0	100	-	-	-	-	-	-
% of women in the municipality with high school	613,154	-	16.653	5.450	0	60	-	-	-	-	-	-
% of women in the municipality that are single	613,154	-	30.041	5.358	0	66.67	-	-	-	-	-	-
% of women in the municipality that are married	613,154	-	43.343	7.664	0	100	-	-	-	-	-	-
% of women in the municipality that are in a free-union relationship	613,154	-	12.429	6.697	0	100	-	-	-	-	-	-
% of people in the municipality from a low socioeconomic stratum	613,154	-	14.172	26.548	0	100	-	-	-	-	-	-
% of people in the municipality from a medium-low socioeconomic stratum	613,154	-	49.111	24.457	0	100	-	-	-	-	-	-
Average children per woman aged 20-35 in the municipality	613,117	-	1.286	0.342	0	4.33	-	-	-	-	-	-
Average age of women in the municipality	613,154	-	39.566	2.713	26.67	59.79	-	-	-	-	-	-
<b>Year/quarter</b>												
1st quarter of 2005	150,393	24.53	-	-	-	-	133,154	24.18	-	-	-	-
1st quarter of 2010	152,094	24.81	-	-	-	-	136,520	24.79	-	-	-	-
1st quarter of 2015	152,944	24.94	-	-	-	-	138,216	25.1	-	-	-	-
1st quarter of 2019	157,723	25.72	-	-	-	-	142,791	25.93	-	-	-	-

	Women						Men					
	Obs.	%	Mean	Std. Dev.	Min	Max	Obs.	%	Mean	Std. Dev.	Min	Max
<b>Mexican states</b>												
Aguascalientes	18,621	3.04	-	-	-	-	16,654	3.02	-	-	-	-
Baja California	20,117	3.28	-	-	-	-	19,521	3.54	-	-	-	-
Baja California Sur	12,934	2.11	-	-	-	-	12,767	2.32	-	-	-	-
Campeche	17,275	2.82	-	-	-	-	15,832	2.87	-	-	-	-
Coahuila	20,106	3.28	-	-	-	-	18,958	3.44	-	-	-	-
Colima	16,455	2.68	-	-	-	-	14,986	2.72	-	-	-	-
Chiapas	22,045	3.6	-	-	-	-	19,081	3.46	-	-	-	-
Chihuahua	18,568	3.03	-	-	-	-	17,065	3.1	-	-	-	-
Mexico City	16,401	2.67	-	-	-	-	14,251	2.59	-	-	-	-
Durango	18,496	3.02	-	-	-	-	16,138	2.93	-	-	-	-
Guanajuato	26,183	4.27	-	-	-	-	22,965	4.17	-	-	-	-
Guerrero	18,846	3.07	-	-	-	-	16,310	2.96	-	-	-	-
Hidalgo	16,781	2.74	-	-	-	-	14,172	2.57	-	-	-	-
Jalisco	22,315	3.64	-	-	-	-	20,251	3.68	-	-	-	-
México	28,042	4.57	-	-	-	-	25,199	4.58	-	-	-	-
Michoacán	19,140	3.12	-	-	-	-	16,516	3	-	-	-	-
Morelos	17,190	2.8	-	-	-	-	14,901	2.71	-	-	-	-
Nayarit	17,471	2.85	-	-	-	-	15,975	2.9	-	-	-	-
Nuevo Leon	20,576	3.36	-	-	-	-	19,998	3.63	-	-	-	-
Oaxaca	21,928	3.58	-	-	-	-	18,273	3.32	-	-	-	-
Puebla	23,516	3.84	-	-	-	-	20,292	3.68	-	-	-	-
Querétaro	18,151	2.96	-	-	-	-	16,062	2.92	-	-	-	-
Quintana Roo	14,513	2.37	-	-	-	-	14,339	2.6	-	-	-	-
San Luis Potosí	18,786	3.06	-	-	-	-	16,693	3.03	-	-	-	-
Sinaloa	17,989	2.93	-	-	-	-	16,683	3.03	-	-	-	-
Sonora	16,587	2.71	-	-	-	-	15,813	2.87	-	-	-	-
Tabasco	18,414	3	-	-	-	-	16,271	2.95	-	-	-	-
Tamaulipas	19,506	3.18	-	-	-	-	17,870	3.25	-	-	-	-
Tlaxcala	18,188	2.97	-	-	-	-	15,925	2.89	-	-	-	-
Veracruz	21,472	3.5	-	-	-	-	18,084	3.28	-	-	-	-
Yucatán	17,409	2.84	-	-	-	-	16,029	2.91	-	-	-	-
Zacatecas	19,133	3.12	-	-	-	-	16,807	3.05	-	-	-	-

## 5 Results

The results derived from the regression analyses are compelling. As mentioned before, the uses a repeated cross-sectional dataset that covers the first quarters of 2005, 2010, 2015 and 2019. The results were obtained after running probit regressions that estimate whether the percentages of jobs in agriculture, industry or services at the municipal level have a positive or negative relationship with women's likelihood of being economically active. In all cases, the regressions are restricted to women at least 15 years old, since this is the legal age to start working in Mexico and it is also used by INEGI and ILO as the minimum age for estimating FLPRs. All regressions were run using probability weights and they include fixed effects at the state level to control for unobserved heterogeneity across the 32 federal entities. Finally, the standard errors are clustered at the municipal level since the sectoral distribution of employment and the control variables at the local level were estimated using as a reference the territorial divisions of Mexican municipalities.

The results are presented in different formats. Table 1.3 shows the outcomes obtained from different probit regressions. Table 1.4 – included in the appendix – shows the average marginal probabilities of being economically active depending on sex and the percentage of jobs in agriculture, industry, and services at the municipal level. The results show that there is a non-linear relationship between variations in sectoral distribution of employment and female labour participation. Hence, Figure 1.9 is included to visualize and interpret the regressions results reported in Table 1.4.

One of the main aspects to highlight is that the results reject the hypothesis that a higher share of industrial jobs is associated with lower female labour participation. On the other hand, the results show that a higher percentage of agricultural jobs at the municipal level is negatively associated with a woman's likelihood of being economically active. This indicates that women living in agricultural

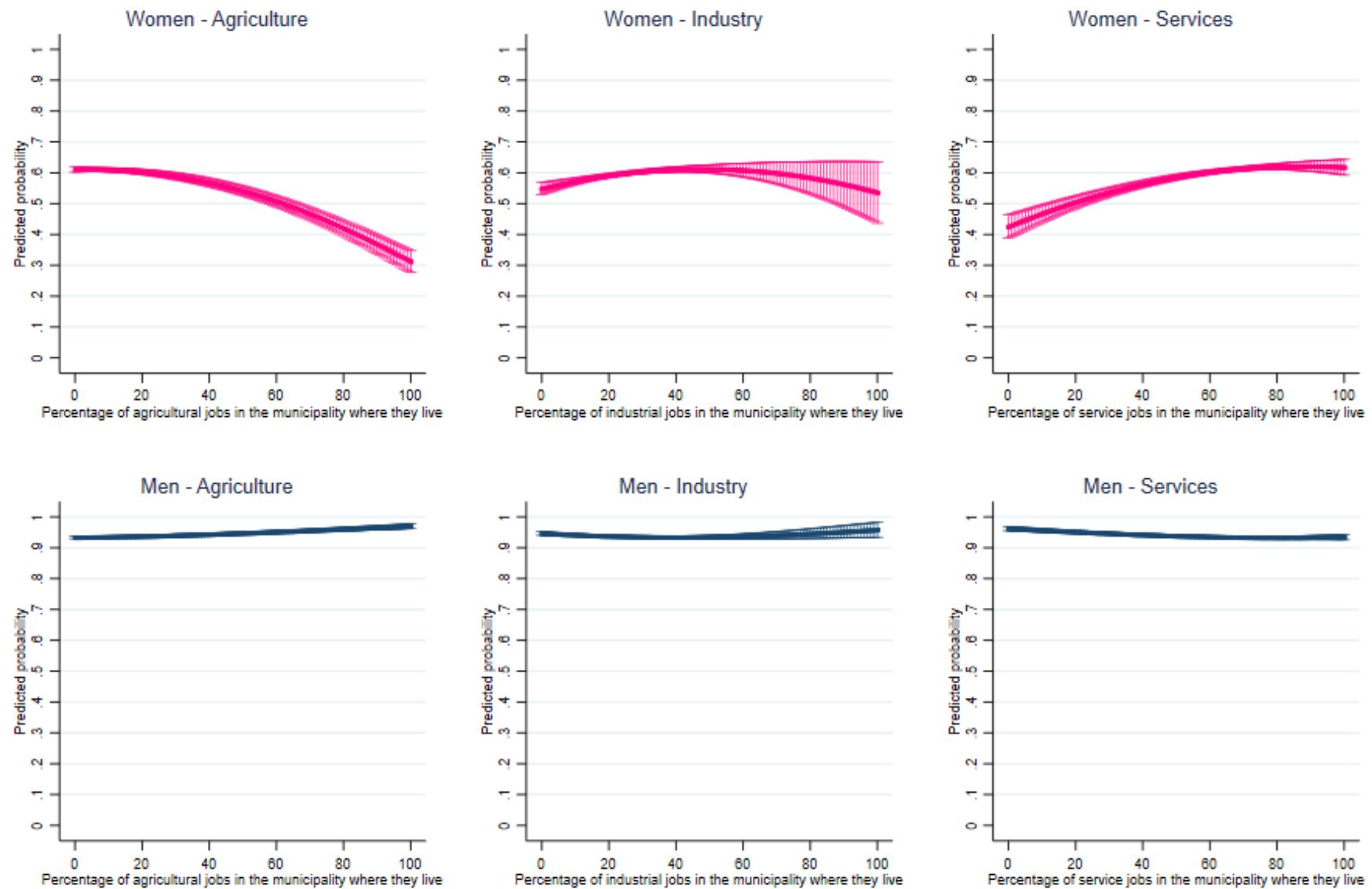
municipalities are less likely to be part of the labour force. Finally, the regression results show that there is a strong and positive relationship between female labour participation and a higher percentage of jobs in the service sector.

Although it is not possible to make causal claims from these results, it is important to emphasise that the variables capturing the sectoral distribution of employment at the municipal level are statistically significant after controlling for both the individual characteristics of women, as well as the characteristics of the place where they live. It is also worth noting that the regression analysis considered both paid and unpaid jobs in farms and businesses. In fact, in Mexico an individual is considered part of the economically active population even if they are family workers without a salary or if they are only producing food for self-consumption. Therefore, there are no evidence indicating that the lack of female labour participation in agricultural activities is because INEGI is not considering unpaid agricultural labour.

Based on these results, it seems that one possible explanation for the low levels of female labour participation in Mexico is that women living in agricultural communities are very unlikely to work. Moreover, the results indicating that there is a positive relationship between female labour participation and a higher share of industrial jobs is a meaningful contribution to the literature. Researchers have taken the previous hypothesis as a stylized fact even when this is the first paper that has empirically evaluated it. Therefore, this paper shows that the sectoral distribution of employment in local labour markets are explanatory variables of female labour participation, but not necessarily in the same way that the U-shaped feminization hypothesis suggests.

Table 1.3 - Probability that men and women are economically active depending on the percentage of jobs in agriculture, industry, and services at the municipal level.

Figure 1.9 – Predicted probability that Mexican men and women are economically active depending on the % of agricultural, industrial or service jobs in the municipality where they live



## 5.1 Robustness check

To the best of my knowledge, there is only one study that has analysed the relationship between FLPRs and sectoral employment rates within a country. Roncolato (2016) studied the feminization hypothesis in South Africa and found a U-shaped relationship between the share of non-agricultural employment at the municipal level and women's probability of being in the labour force. Although the empirical strategy of Roncolato (2016) is similar to mine, there are different aspects that vary between both studies.

One of the main differences is that she considers that structural change occurs after a decline of the share of employment in the agricultural sector. Hence, she uses "share of non-agricultural jobs" as the main independent variable of the econometric model. Conversely, my analysis considers three variables that show the percentage of jobs in agriculture, industry, and services. By following this approach, I estimated the relationship between being economically active and variations in sectoral distribution of employment commonly observed at different levels of economic development. Consequently, I was able to test the hypothesis indicating that a high percentage of jobs in the industrial sector tends to be associated with lower female labour participation.

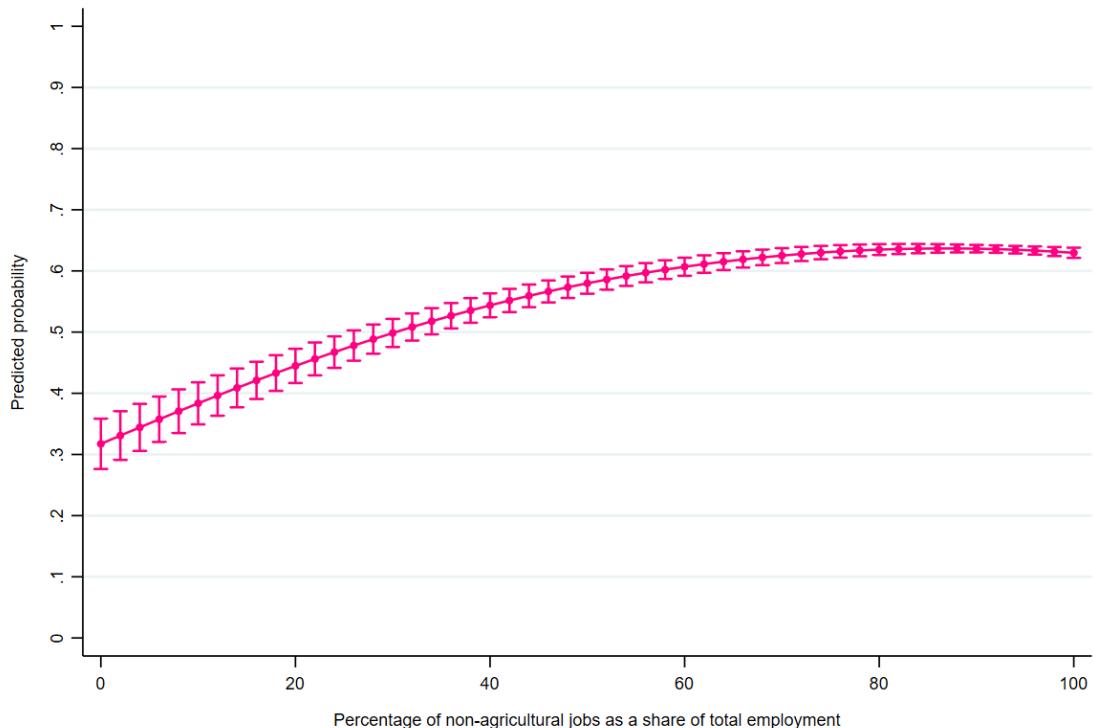
Another difference is that she was not able to control for integral migration in her analysis since the dataset does not include information on this subject. As she explained, it is much easier for workers within a country to move across borders of certain municipalities compared to moving across country borders. Fortunately, ENOE household surveys include a question asking respondent if they moved from their hometown to keep or maintain their current job.

Another difference is that she used a cross-sectional dataset from 2017, while my analysis uses a repeated cross-sectional dataset covering 4 different surveys between

2005 and 2019. By following this approach, my regression analyses not only considered the sectoral distribution of employment, but also structural transformation at the municipal level over a period of 15 years. Another minor difference between both studies is that she restricted the regression analysis to women between 15 to 65 years old, while I decided to follow ILO's standards that considers all women above 15 years old. Finally, in her analysis she excluded students, sick and disabled people from her sample, while I maintained them as part of the non-economically active population.

I decided to follow the empirical strategy of Roncolato (2016) to compare the outcomes and test if my previous results hold under her specifications. Figure 1.10 shows the average marginal probabilities that Mexican women are part of the labour force depending on the percentage of non-agricultural jobs at the municipal level. The regression results following her methodology and the average marginal probabilities obtained at the means of the covariates are included in the appendix.

Figure 1.10 – Predicted probability that Mexican women are economically active depending on the share of non-agricultural jobs at the municipal level



As mentioned previously, Roncolato (2016) found a U-shaped pattern between female labour force participation and the share of non-agricultural jobs at the municipal level. Notwithstanding, my results are not showing a U-shaped pattern within Mexico. The previous figure confirms that women's probability of being in the labour force is lower in municipalities with a high percentage of jobs in the agricultural sector, and it increases as the share of non-agricultural jobs increases. Therefore, while Roncolato found a U-shaped pattern within South Africa, my results show an upward linear trend between female labour participation and the share of non-agricultural jobs at the municipal level.

## 6 Complementary Data Analysis

One of the most striking results from this research is that female labour participation tends to be lower in agricultural municipalities of Mexico. This section is to discuss a potential explanation to this phenomenon. Goldin (1994) noted that, during the structural transformation process, the introduction of new technologies can displace female labour force with machinery that tends to be operated by men, generating a complex demand effect. This is in line with findings of Afridi et al. (2020), which showed that technological changes in agriculture led to a significant decline in demand for women's labour on farms in India. Therefore, a potential explanation of low FLPRs in Mexico's agricultural municipalities is that the country could have an agricultural sector that is capital-intensive, while in low-income countries the agricultural sector tends to be labour-intensive.

In a recent study, Deshpande and Singh (2021) also found that the decline of FLPRs in India is a consequence of a lower demand for female workers. Their results show that the decline is not necessarily happening because women are voluntarily dropping out of the labour force due to an income-effect, or because they are not

participating because of conservative social norms. Instead, they show that it is the result of the unavailability of steady gainful employment.

Following an analogous line of reasoning, I decided to examine whether women's low labour force participation rates in agricultural activities were related to the lack of female labour demand in this sector. To do so, I used remarkable disaggregated data obtained from different questions in the ENOE survey. In the ENOE questionnaire, there are two questions that can be used to estimate in which parts of the country the lack of labour demand is affecting FLPRs. The first question asks non-economically active population what their main activity is. This question helps identify those individuals who are non-economically active because they are retired, studying, dedicated to household chores, or because they have a disability. Furthermore, the second question helps identify the primary reason for their lack of involvement in the labour market. The options are:

1. I am waiting for a response to an application, or an employer will call me soon.
2. There is no work in my field my field, occupation, or profession.
3. I do not have enough education, documentation, or experience to perform a job.
4. I think that due to my age or my appearance I wouldn't be accepted for a job.
5. In my locality there are no jobs, or they are only available during certain seasons of the year.
6. Public insecurity or excessive paperwork are discouraging me to start an economic activity.
7. I'm recovering from an illness or accident.
8. I'm pregnant.
9. I have no one to take care of the children, elderly, or sick people in the household.
10. A relative is not letting me work.
11. Other market reasons.
12. Other personal reasons.

Based on these options, I decided to execute an exploratory data analysis to examine whether low FLPRs in Mexico's agricultural municipalities could be explained

by a lack of female labour demand. The analysis was restricted to working-age women classified as non-economically active and who indicated that they were not working or looking for a job because they were dedicated to household chores. Figure 1.11 offers different insights about the main reasons why women with these characteristics are not working. This figure shows that in 2019 the primary cause for not working was because they did not have anyone to help them take care of their children, or of elderly or disabled people living in the household. The second reason was that there were no jobs in their locality, or these were only available during certain seasons of the year.

A deeper analysis revealed that the lack of female labour demand is an important reason why women in agricultural regions of Mexico are not working. Figure 1.12 shows that almost all women who are not working due to the lack of demand for their labour are living in rural areas. Figure 1.13 shows the responses of all women who selected the labour demand option across all the ENOE surveys available from 2005 to 2019 and confirms that almost all women who selected this option are living in rural areas. Finally, Figure 1.14 shows that in localities with more than 100,000 inhabitants the lack of labour demand is not a problem, but in small localities with fewer than 2,500 inhabitants more than 25% of working age women indicated that they are not working because of the lack of labour demand.

To conclude with this section, I included two additional figures that show interesting insights about the lack of demand for female labour in agricultural activities. Figure 1.15 shows that, on average, the agricultural sector is the most relevant in localities with fewer than 2,500 inhabitants, accounting for more than 40% of total employment. This demonstrates that small localities in Mexico are predominantly agricultural, and a considerable number of women living in those regions are not working due to lack of labour demand. Finally, Figure 1.16 is useful to identify the Mexican states where there is a higher percentage of women indicating that there are no jobs in their localities, or they are only available in certain seasons.

Figure 1.11 - Reasons for not working among working-age women (18–65) who are engaged in domestic chores, Mexico (2019)

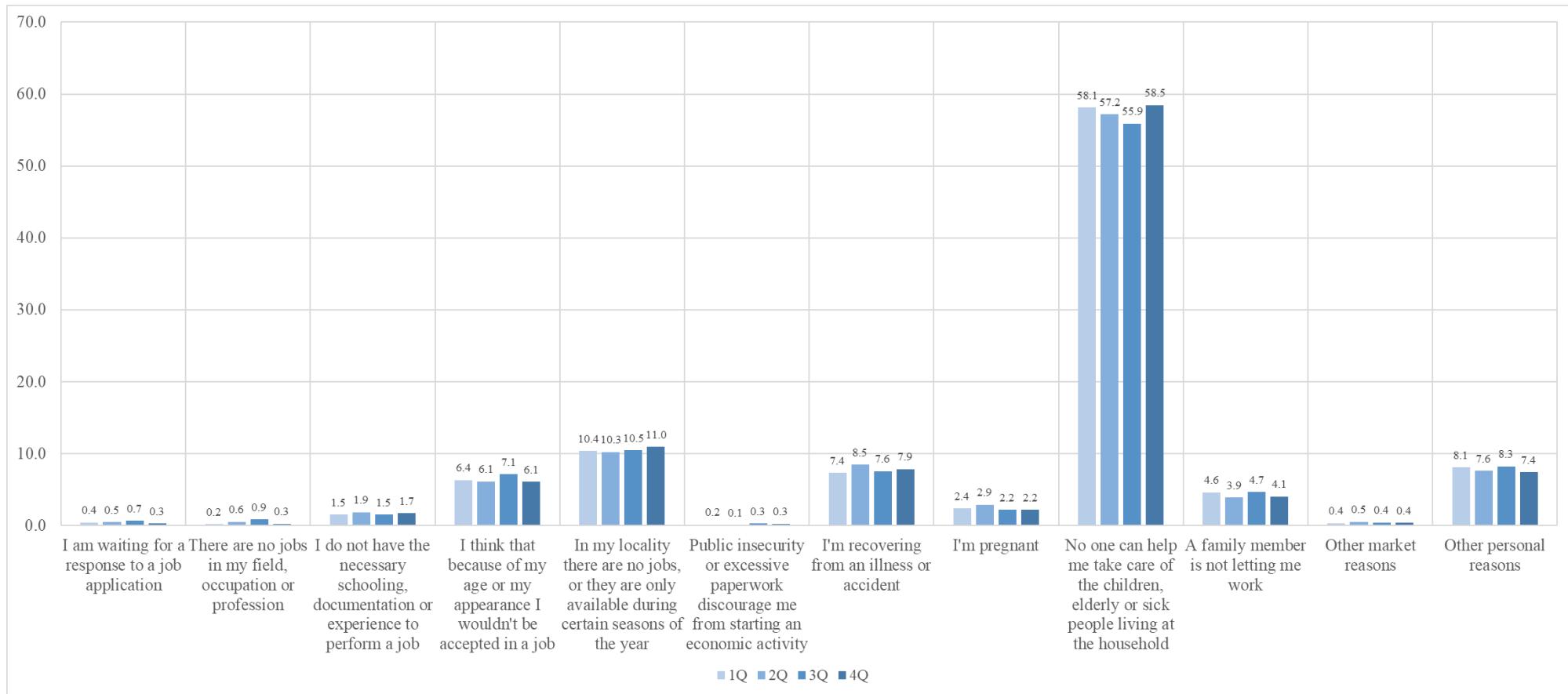


Figure 1.12 - Reasons for not working among working-age women (18–65) engaged in domestic chores, differentiating by urban and rural areas (Mexico, first quarter of 2019)

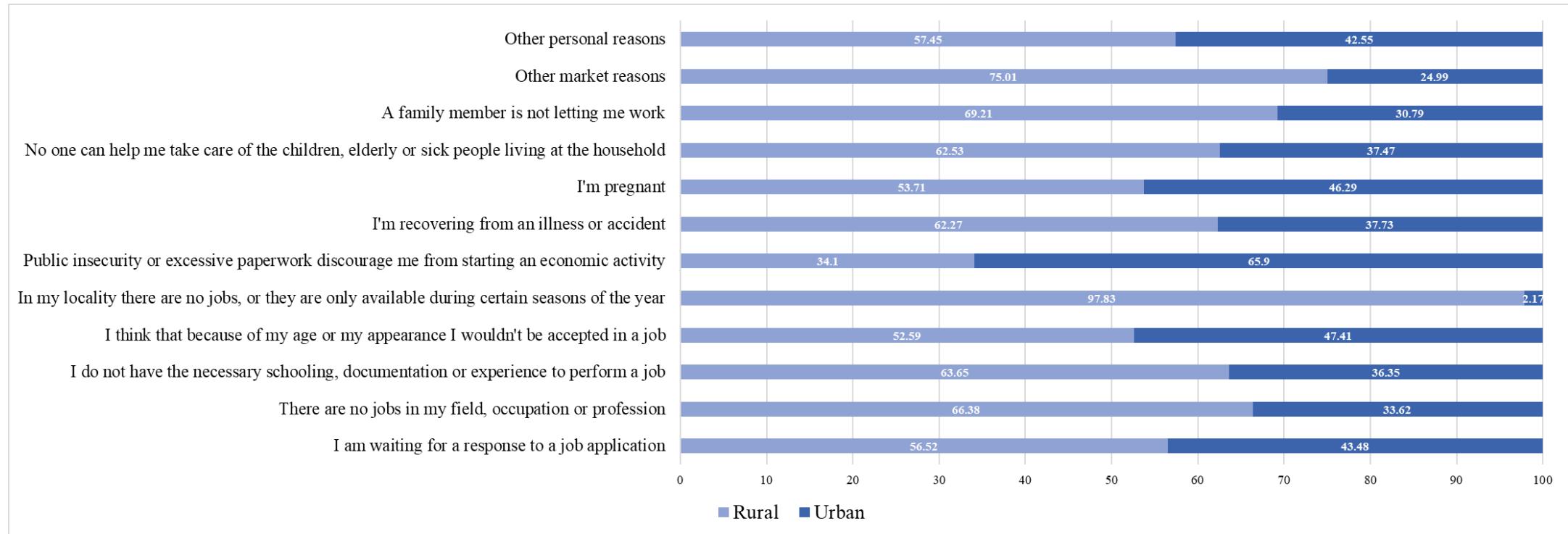


Figure 1.13 - Non-working women due to lack of labour demand, differentiated by urban and rural areas  
 (Mexico, 2005–2019)

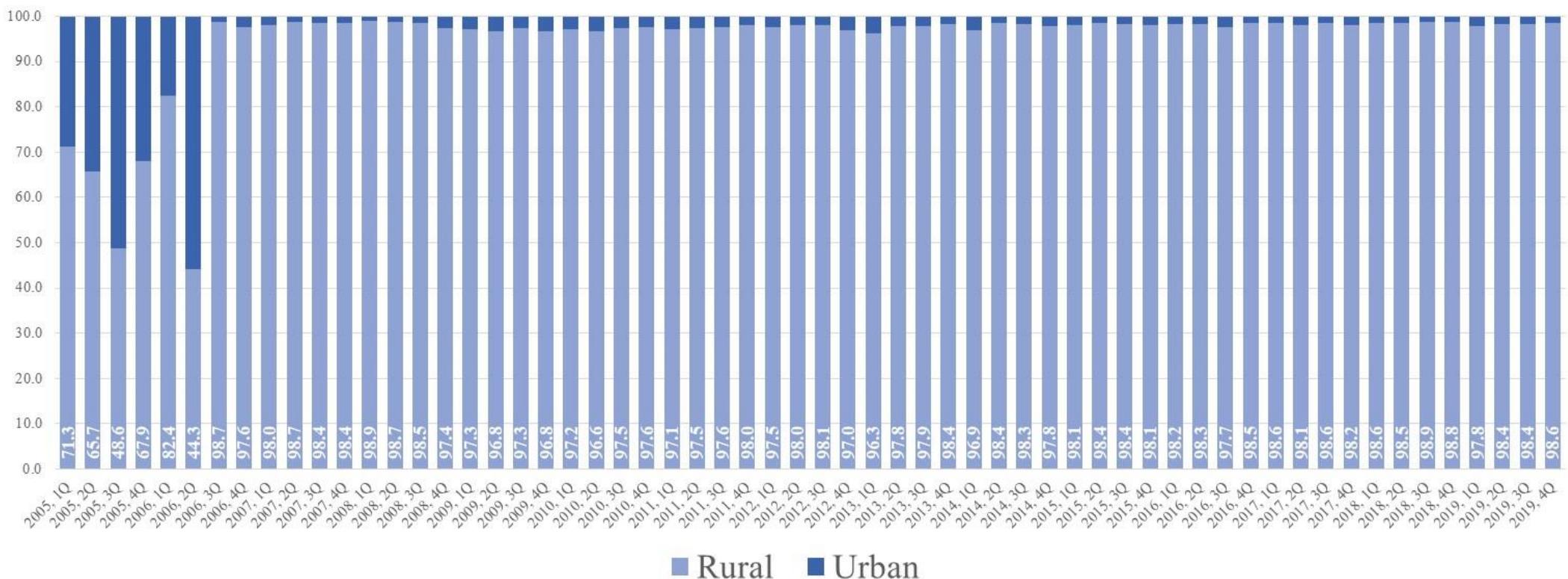


Figure 1.14 - Reasons for not working among working-age women (18–65) engaged in domestic chores,  
differentiated by locality size (Mexico, first quarter of 2019)

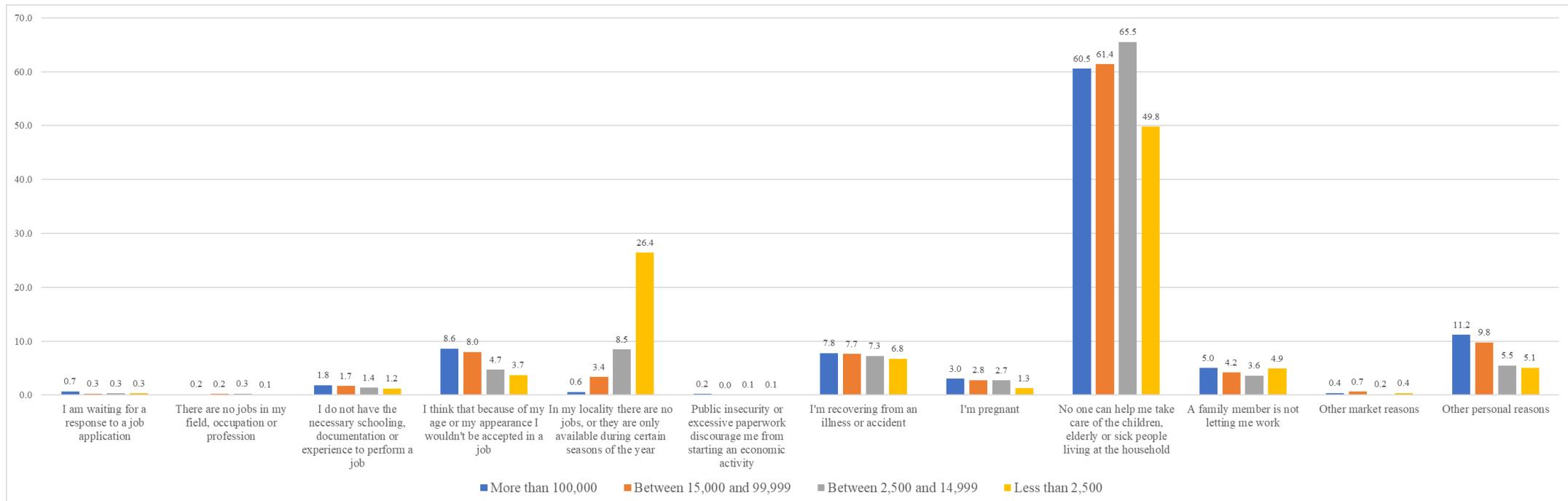


Figure 1.15 - Sectoral distribution of employment in relation to the population size of the locality (Mexico, first quarter of 2019)

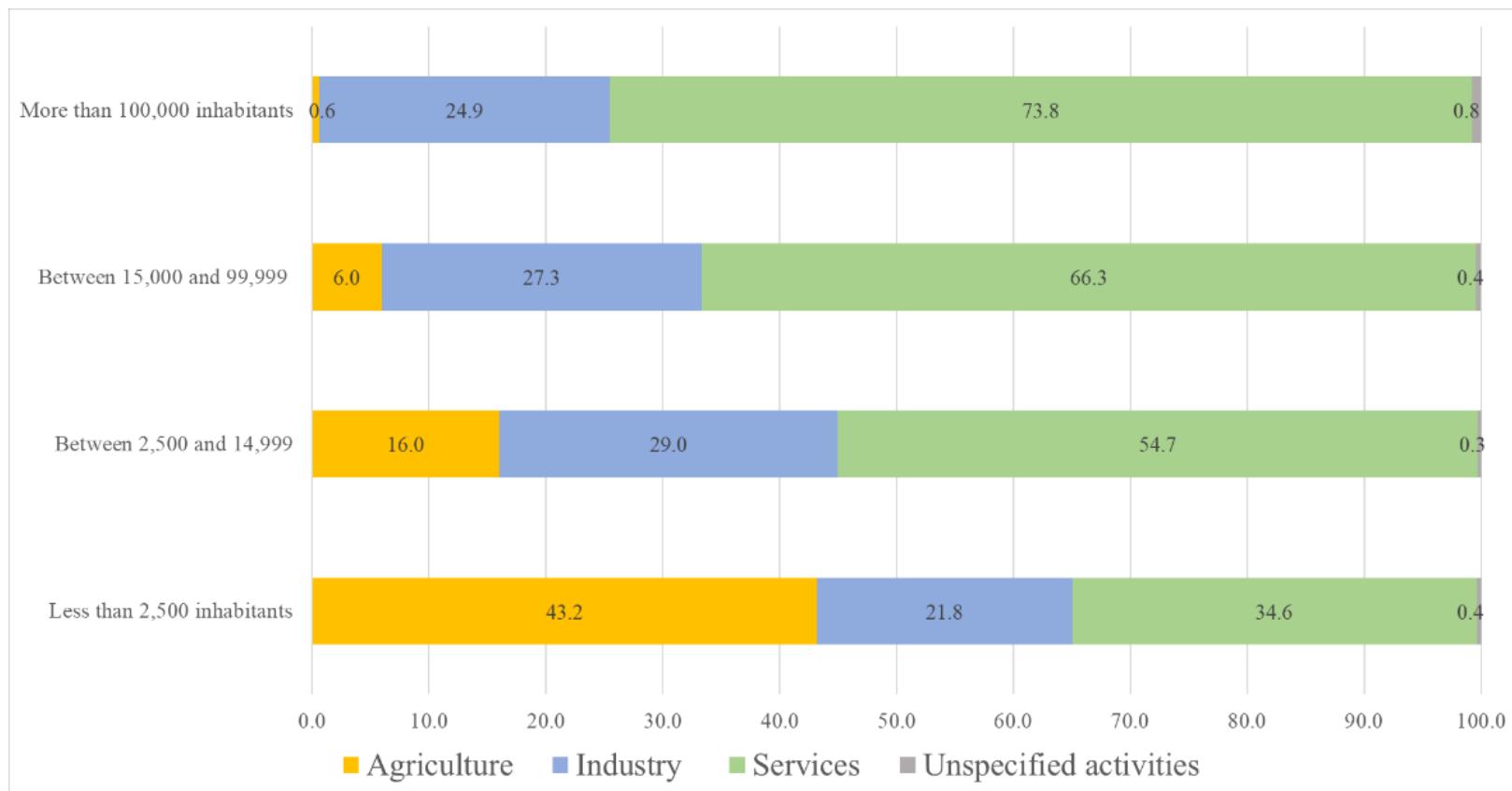
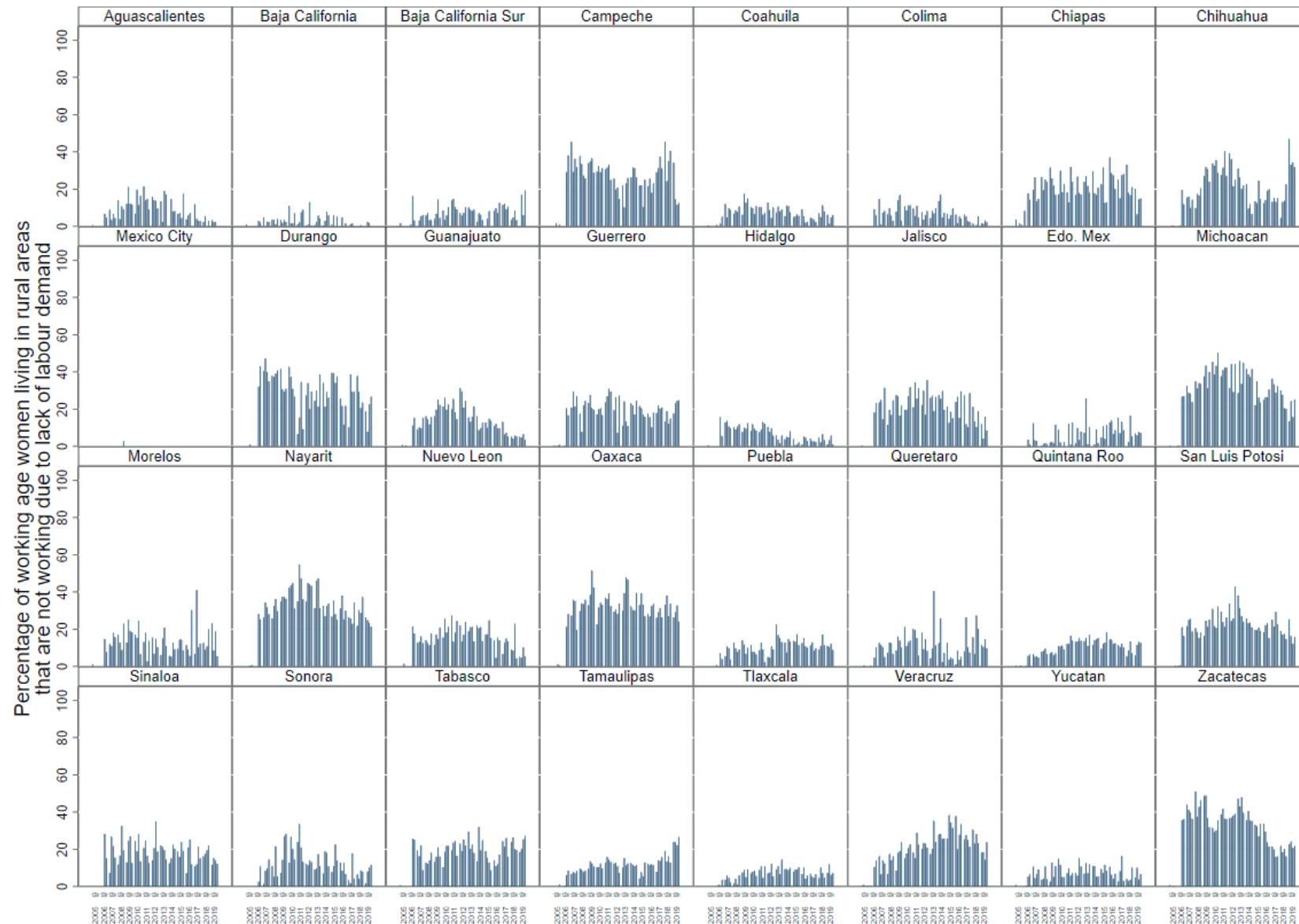


Figure 1.16 – Percentage of women living in localities with less than 2,500 who indicated that they are not working due to lack of labour demand. (Mexican states, 2005-2019)



The exploratory data analysis suggests that the low FLPRs in Mexico's agricultural municipalities could be related to the lack of demand for female labour in this sector. This could also be a potential explanation of why women from the lower socioeconomic stratum have lower FLPRs than women from middle and high socioeconomic strata. This might be judged an unusual result but, according to Lampietti and Stalker (2000), the lack of labour participation among poor women is common in Latin America. Hence, a possible explanation for the low FLPRs among poor women in Mexico could be that the demand for a female labour force in the agricultural sector is particularly low. This hypothesis is in line with Psacharopoulos and Tzannatos (1989), since they noted that subsistence activities and labour-intensive jobs in the agricultural sector tend to decline during the structural transformation process, generating a reduction in FLPRs. If this hypothesis is true, the results are suggesting that, even if the Mexican government were to implement a subsidised childcare programme in agricultural communities, FLPRs would not necessarily greatly increase, since the demand for female labour in rural areas of Mexico tends to be low.

## 7 Conclusion

Mexico is the Latin American country with the highest percentage of jobs in the industrial sector, while it also has one of the lowest FLPRs in the region. One of the main explanations for the downward portion of the U-shaped relationships is that middle-income countries are experiencing an expansion of the industrial sector, and FLPRs tend to experience a decline as there is a social stigma towards women working in blue-collar jobs. Several papers have found that women tend to be excluded from participating in blue-collar jobs during the structural transformation process. Pampel & Tanaka (1986) posited that women are usually excluded from early industrial jobs

because of physical limitations, gender discrimination and the domestic demands attached to higher fertility rates. Following the same argument, Goldin (1994) contended that in developing countries there is usually a social stigma that excludes women from participating in industrial jobs, especially those that are married.

Due to the lack of studies that have empirically evaluated this ‘stylised fact’, this paper fills a gap in the literature by evaluating if there is a negative relationship between female labour participation and a high percentage of jobs in the industrial sector. To do so, I analysed the within-country relationship between FLPRs and the sectoral distribution of employment using micro-data that helps to provide empirical evidence at the local level. This is relevant since researchers have assumed that the existence of a social stigma towards blue-collar jobs is a universal norm in developing countries.

The regression analyses executed in this study revealed interesting results. First, it shows that there is no negative relationship between female labour participation and a higher percentage of industrial jobs at the municipal level. The exploratory data analysis also showed that in 2019 about 16% of economically active women worked in the manufacturing sector. Moreover, the scatterplots at the state and municipal levels do not show the assumed negative relationship between FLPRs and a higher percentage of jobs in the manufacturing sector. Finally, the probit regressions showed that the existence of a higher percentage of jobs in the industrial sector has a positive relationship with female labour participation.

On the other hand, the analysis showed that one of the potential reasons behind the low levels of female labour participation in Mexico is the lack of labour participation of women in agricultural activities. The exploratory data analysis showed that, in the first quarter of 2019, only 4% of the economically active women were working in the agricultural sector. Additionally, the scatterplots at both the state and

municipal levels showed that female labour participation tends to decrease as the percentage of agricultural jobs increases. Finally, the probit regressions confirmed that the higher the percentage of agricultural jobs at the municipal level, the lower the probability that women are economically active. It is worth noting that the regression analysis considered both salaried and non-salaried employment and confirmed that the negative relationship holds even after controlling for individual, household, and municipal characteristics.

The previous results are particularly relevant because they have important policy implications for Mexico. The cultural beliefs of each country are difficult to change and usually take a long time to uproot in a society. Fortunately, it seems that the social stigma towards women working in blue-collar jobs is not strong in Mexico. Hence, designing and implementing policies to increase FLPRs in the industrial sector may be easier in Mexico than in other countries where social norms are more influential and difficult to change.

The regression analysis confirmed that women have a greater likelihood of being economically active in municipalities with a higher percentage of jobs in this sector, which is in line with most of the literature on this topic. Nevertheless, there are additional aspects related to the service sector that could be analysed in the future. For instance, the theory indicates that the rise in FPLRs in service-oriented economies is a result of the absence of a social stigma towards white-collar jobs. However, this hypothesis fails to recognise that not all jobs in the service sector are white-collar jobs, since some of the jobs in this sector are part of the informal sector. In the case of Mexico, there are plenty of informal jobs in this sector even when the country, state or municipality is at the final stage of the structural transformation process. Therefore, it would be interesting to examine whether there are differences in FLPRs in formal and informal jobs in the service sector.

It is also important to note the main limitations of this research. The first is that this paper does not evaluate the U-shaped hypothesis considering historical trends. Perhaps it is true that, when Mexico was an agricultural country, FLPRs were particularly high. It can also be true that FLPRs experienced a decline during the expansion of the industrial sector. Nevertheless, the goal of this research was not to evaluate the U-shaped hypothesis from a long-term perspective. Instead, its goal is to take some of its theoretical underpinning and study the current within-country relationship between sectoral distribution and female labour participation rates.

It is important to emphasise the last point. This analysis should not be considered an empirical evaluation of the U-shaped feminisation hypothesis, since the paper is not undertaking a historical analysis of FLPRs in Mexico. As previously mentioned, the study is based on micro-data from Mexico's ENOE surveys available from the first quarter of 2005 onwards. According to World Bank data, the sectoral distribution of employment in Mexico during 2005 was 15% in agriculture, 26% in industry and 59% in services. Hence, to evaluate the U-shaped hypothesis in Mexico, it would be necessary to have historical data on FLPRs when most of the jobs in Mexico were in agriculture.

After exploring potential reasons for my results, and discuss the main limitations of the study, I would like to emphasise the value of this research paper in the current body of literature on this subject. First, my research followed an innovative empirical strategy that can be replicated by other researchers. Following this micro-econometric approach can provide valuable empirical evidence of the within-country relationship between FLPRs and the sectoral distribution of employment in local labour markets. Following this empirical strategy is particularly relevant because it offers a level of disaggregation that cannot be replicated in cross-country analysis using macro-level data.

This research also suggests that the percentage of jobs in agriculture, industry and services can be used as a variable that captures both the level of economic development and the structural transformation process. Moreover, the research provides empirical evidence that contradicts the premise of a negative relationship between female labour participation and a high percentage of jobs in the industrial sector. Instead, it shows that there is a lack of participation of women in agricultural activities, and one of the potential drivers is the lack of female labour demand in this sector. These are meaningful contributions to the literature given the lack of within-country studies evaluating specific hypotheses of the female labour force function developed by Goldin (1994).

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# 9 Appendix

Figure 1.17 – FLPRs and % of jobs in agriculture, industry, and services across countries (2019)

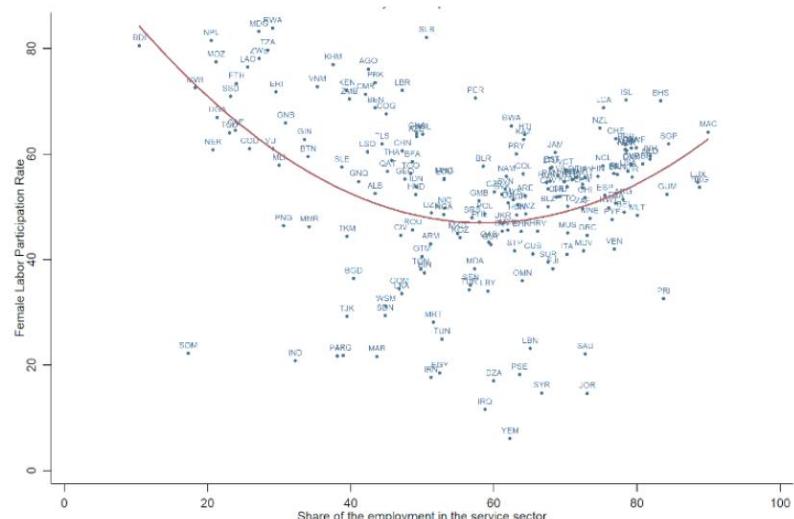
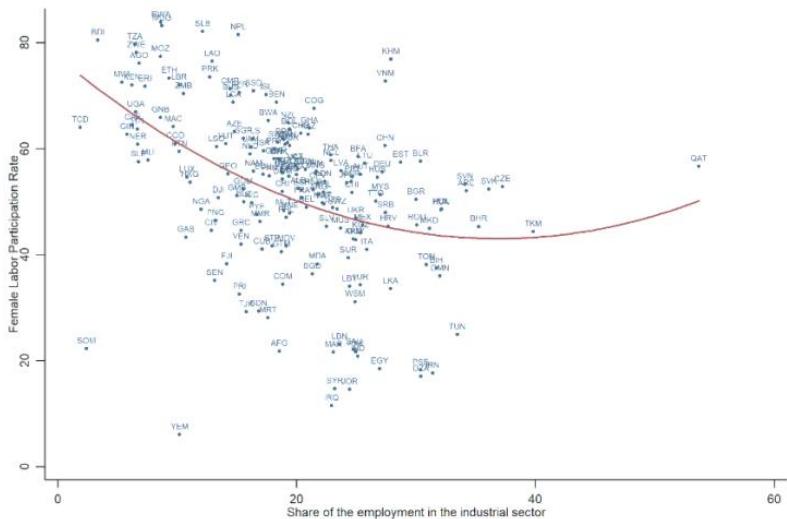
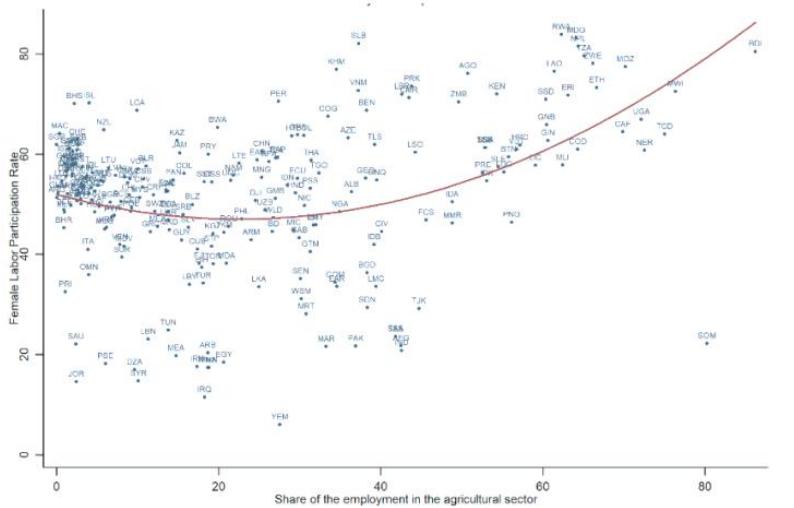
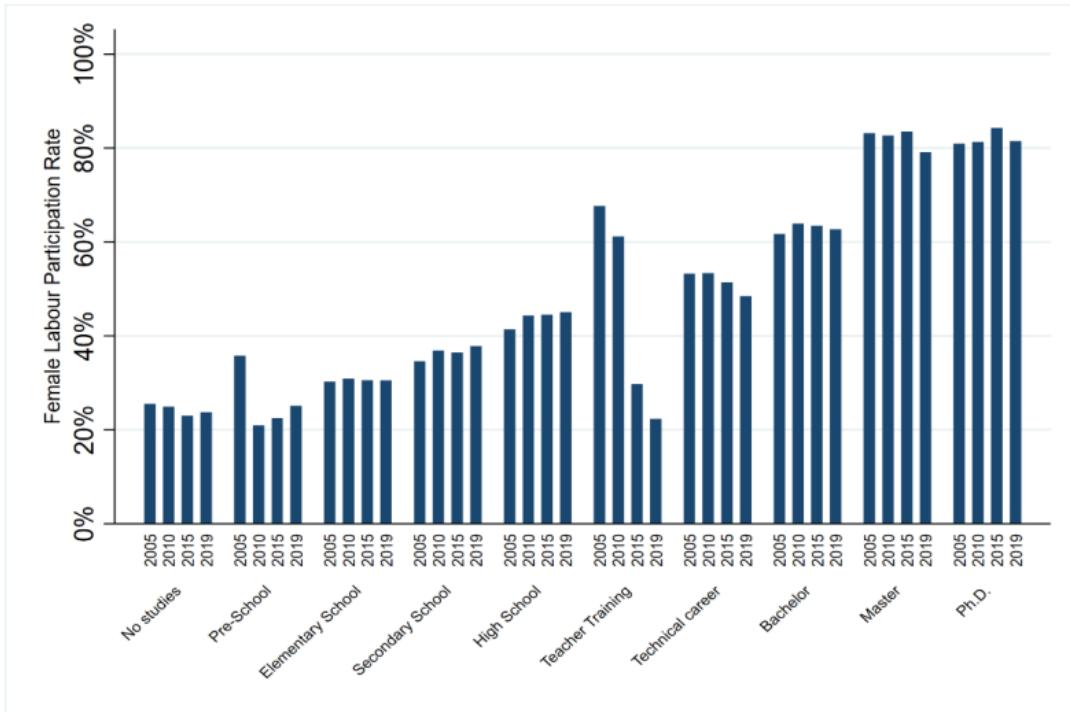
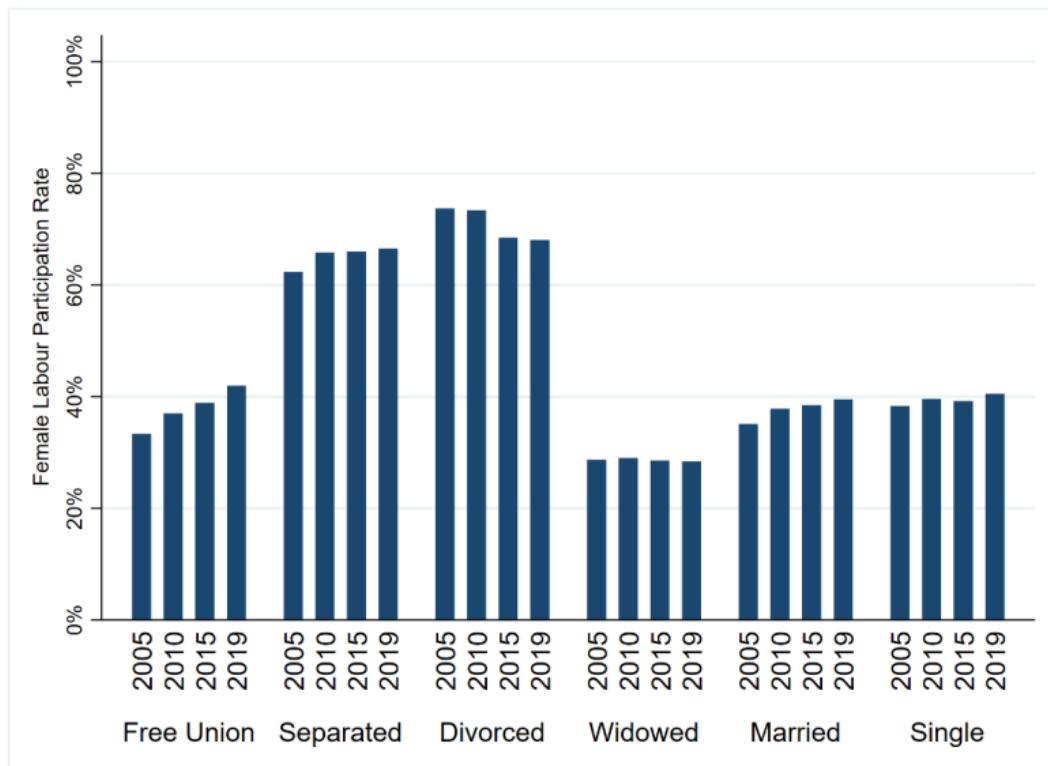


Figure 1.18 – Control variables

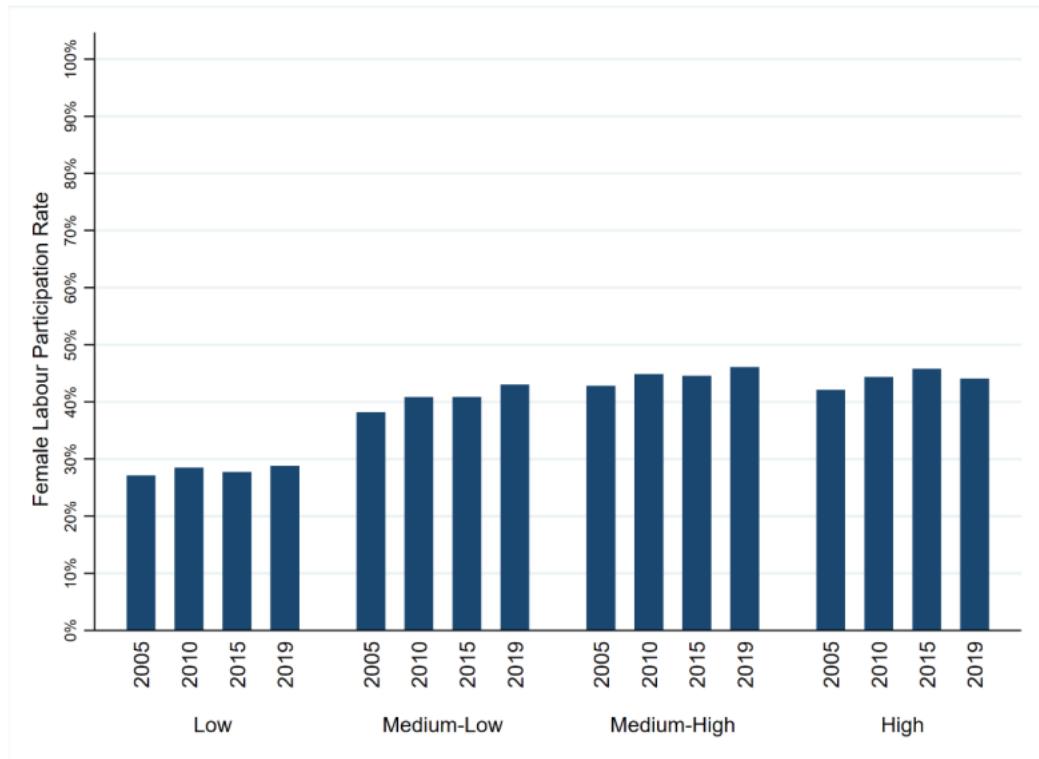
FLPRs depending on different education levels (2005 – 2019)



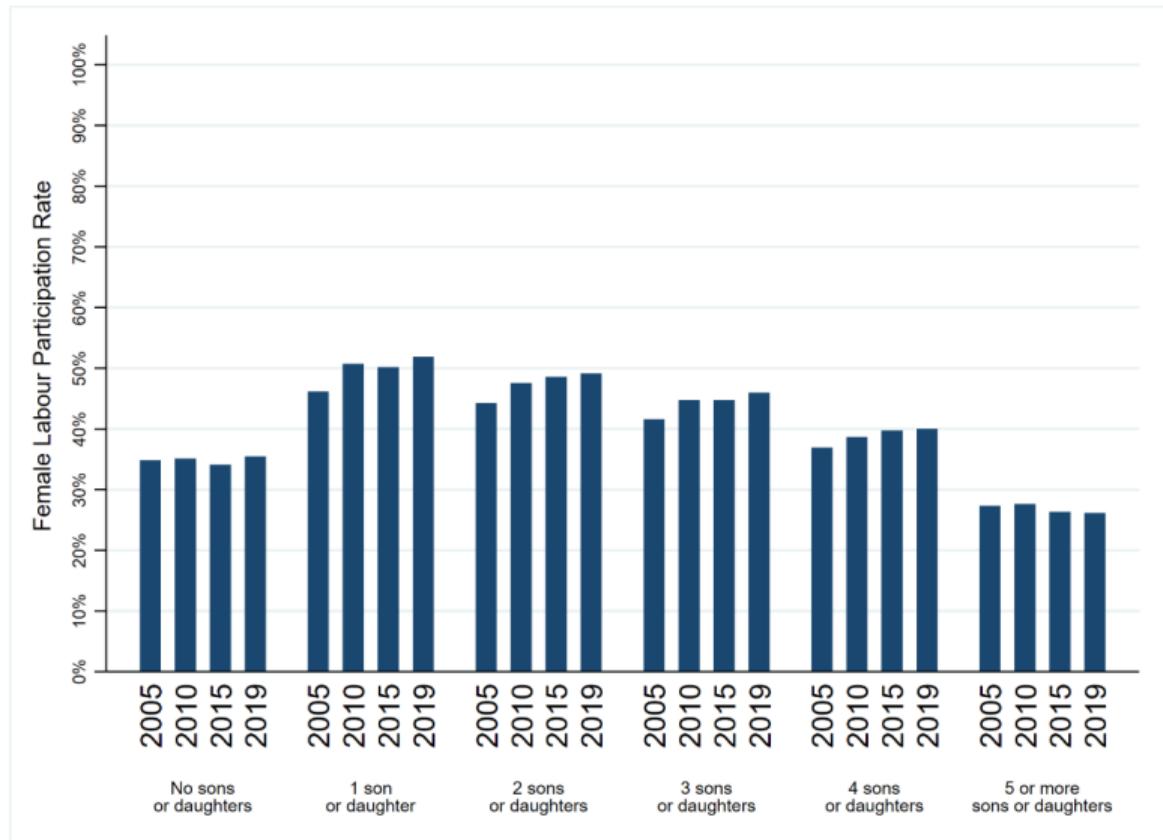
FLPRs depending on marital status (2005 – 2019)



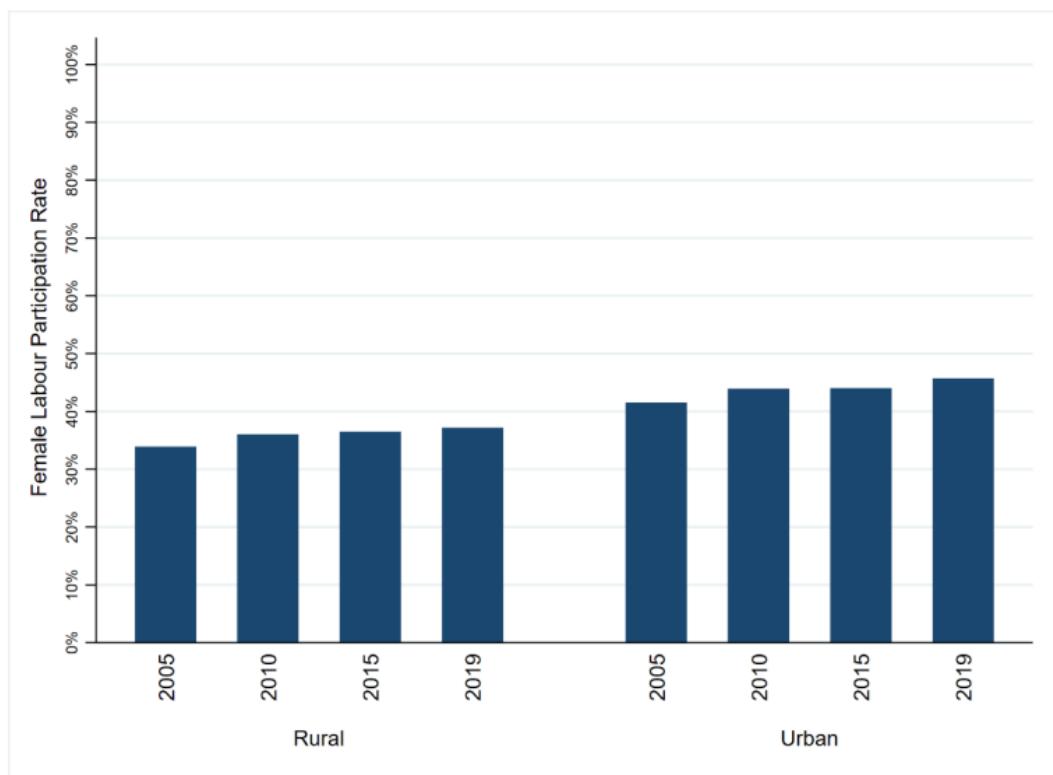
FLPRs depending on socioeconomic strata (2005 – 2019)



FLPRs depending on number of children (2005 – 2019)



FLPRs in rural and urban areas (2005 – 2019)



FLPRs depending on population size of the household location (2005 - 2019)

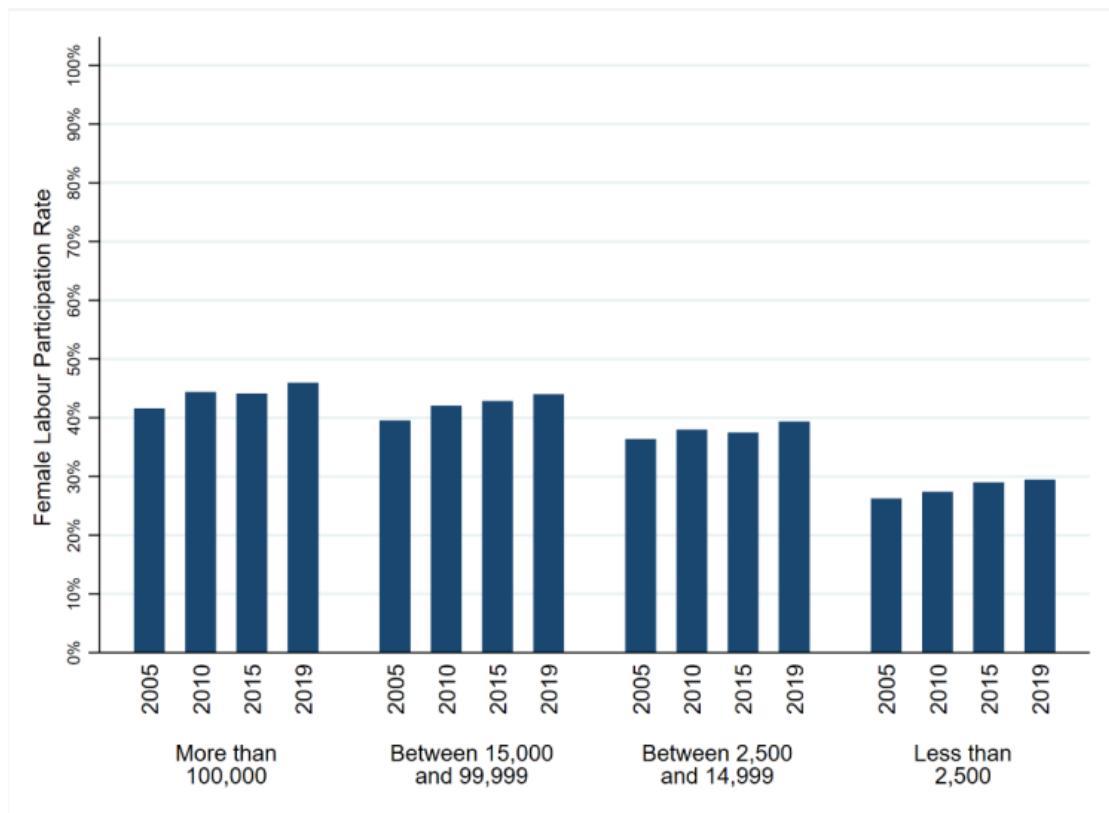


Table 1.4 - Average marginal probabilities of being economically active depending on sex and the % of jobs in agriculture, industry, and services at the municipal level.

% of jobs in	Women			Men		
	Agriculture	Industry	Services	Agriculture	Industry	Services
1	0.6105*** (0.0041)	0.5484*** (0.0100)	0.4256*** (0.0191)	0.9336*** (0.0020)	0.9467*** (0.0032)	0.9622*** (0.0035)
2	0.6107*** (0.0040)	0.5511*** (0.0094)	0.4300*** (0.0186)	0.9337*** (0.0020)	0.9461*** (0.0030)	0.9616*** (0.0034)
3	0.6108*** (0.0038)	0.5537*** (0.0089)	0.4344*** (0.0181)	0.9339*** (0.0019)	0.9456*** (0.0029)	0.9611*** (0.0034)
4	0.6109*** (0.0037)	0.5563*** (0.0084)	0.4387*** (0.0175)	0.9340*** (0.0019)	0.9450*** (0.0028)	0.9605*** (0.0033)
5	0.6110*** (0.0036)	0.5588*** (0.0079)	0.4430*** (0.0170)	0.9341*** (0.0019)	0.9445*** (0.0027)	0.9599*** (0.0032)
6	0.6109*** (0.0035)	0.5613*** (0.0074)	0.4472*** (0.0165)	0.9342*** (0.0019)	0.9440*** (0.0026)	0.9594*** (0.0032)
7	0.6108*** (0.0034)	0.5637*** (0.0070)	0.4514*** (0.0160)	0.9344*** (0.0019)	0.9435*** (0.0025)	0.9588*** (0.0031)
8	0.6107*** (0.0034)	0.5660*** (0.0066)	0.4555*** (0.0155)	0.9345*** (0.0019)	0.9430*** (0.0024)	0.9583*** (0.0031)
9	0.6104*** (0.0034)	0.5683*** (0.0062)	0.4596*** (0.0151)	0.9347*** (0.0019)	0.9425*** (0.0023)	0.9577*** (0.0030)
10	0.6101*** (0.0034)	0.5705*** (0.0058)	0.4637*** (0.0146)	0.9349*** (0.0019)	0.9420*** (0.0022)	0.9572*** (0.0030)
11	0.6098*** (0.0034)	0.5727*** (0.0055)	0.4677*** (0.0141)	0.9350*** (0.0019)	0.9416*** (0.0022)	0.9566*** (0.0029)
12	0.6094*** (0.0035)	0.5748*** (0.0051)	0.4716*** (0.0137)	0.9352*** (0.0019)	0.9411*** (0.0021)	0.9561*** (0.0029)
13	0.6089*** (0.0036)	0.5768*** (0.0048)	0.4755*** (0.0132)	0.9354*** (0.0019)	0.9407*** (0.0020)	0.9556*** (0.0028)
14	0.6083*** (0.0036)	0.5788*** (0.0046)	0.4794*** (0.0128)	0.9356*** (0.0019)	0.9402*** (0.0020)	0.9550*** (0.0028)
15	0.6077*** (0.0037)	0.5807*** (0.0043)	0.4832*** (0.0124)	0.9358*** (0.0020)	0.9398*** (0.0019)	0.9545*** (0.0027)
16	0.6070*** (0.0038)	0.5826*** (0.0041)	0.4870*** (0.0120)	0.9360*** (0.0020)	0.9394*** (0.0019)	0.9539*** (0.0027)
17	0.6063*** (0.0040)	0.5844*** (0.0039)	0.4907*** (0.0116)	0.9362*** (0.0020)	0.9390*** (0.0019)	0.9534*** (0.0026)

18	0.6055*** (0.0041)	0.5862*** (0.0038)	0.4943*** (0.0112)	0.9364*** (0.0020)	0.9387*** (0.0019)	0.9529*** (0.0026)
19	0.6046*** (0.0042)	0.5879*** (0.0037)	0.4979*** (0.0109)	0.9367*** (0.0020)	0.9383*** (0.0019)	0.9524*** (0.0026)
20	0.6037*** (0.0043)	0.5895*** (0.0035)	0.5015*** (0.0105)	0.9369*** (0.0021)	0.9380*** (0.0018)	0.9518*** (0.0025)
21	0.6027*** (0.0044)	0.5911*** (0.0035)	0.5050*** (0.0102)	0.9371*** (0.0021)	0.9376*** (0.0018)	0.9513*** (0.0025)
22	0.6016*** (0.0046)	0.5926*** (0.0034)	0.5084*** (0.0098)	0.9374*** (0.0021)	0.9373*** (0.0018)	0.9508*** (0.0025)
23	0.6005*** (0.0047)	0.5941*** (0.0034)	0.5118*** (0.0095)	0.9376*** (0.0021)	0.9370*** (0.0018)	0.9503*** (0.0024)
24	0.5993*** (0.0048)	0.5955*** (0.0033)	0.5152*** (0.0092)	0.9379*** (0.0022)	0.9367*** (0.0019)	0.9498*** (0.0024)
25	0.5980*** (0.0050)	0.5969*** (0.0033)	0.5185*** (0.0089)	0.9382*** (0.0022)	0.9364*** (0.0019)	0.9493*** (0.0024)
26	0.5967*** (0.0051)	0.5982*** (0.0033)	0.5217*** (0.0086)	0.9384*** (0.0022)	0.9362*** (0.0019)	0.9488*** (0.0023)
27	0.5953*** (0.0052)	0.5994*** (0.0033)	0.5249*** (0.0083)	0.9387*** (0.0022)	0.9359*** (0.0019)	0.9483*** (0.0023)
28	0.5938*** (0.0054)	0.6006*** (0.0034)	0.5281*** (0.0081)	0.9390*** (0.0023)	0.9357*** (0.0019)	0.9478*** (0.0023)
29	0.5923*** (0.0055)	0.6017*** (0.0034)	0.5312*** (0.0078)	0.9393*** (0.0023)	0.9355*** (0.0019)	0.9473*** (0.0023)
30	0.5907*** (0.0056)	0.6028*** (0.0034)	0.5342*** (0.0076)	0.9396*** (0.0023)	0.9353*** (0.0019)	0.9468*** (0.0023)
31	0.5891*** (0.0057)	0.6038*** (0.0035)	0.5372*** (0.0074)	0.9399*** (0.0023)	0.9351*** (0.0020)	0.9464*** (0.0023)
32	0.5873*** (0.0058)	0.6048*** (0.0035)	0.5401*** (0.0071)	0.9402*** (0.0023)	0.9350*** (0.0020)	0.9459*** (0.0022)
33	0.5855*** (0.0060)	0.6057*** (0.0036)	0.5430*** (0.0069)	0.9405*** (0.0023)	0.9348*** (0.0020)	0.9454*** (0.0022)
34	0.5837*** (0.0061)	0.6065*** (0.0037)	0.5458*** (0.0067)	0.9408*** (0.0024)	0.9347*** (0.0020)	0.9450*** (0.0022)
35	0.5818*** (0.0062)	0.6073*** (0.0038)	0.5486*** (0.0065)	0.9412*** (0.0024)	0.9346*** (0.0020)	0.9445*** (0.0022)
36	0.5798*** (0.0063)	0.6080*** (0.0038)	0.5513*** (0.0064)	0.9415*** (0.0024)	0.9345*** (0.0021)	0.9441*** (0.0022)

37	0.5777*** (0.0064)	0.6087*** (0.0039)	0.5540*** (0.0062)	0.9418*** (0.0024)	0.9344*** (0.0021)	0.9437*** (0.0022)
38	0.5756*** (0.0065)	0.6093*** (0.0040)	0.5566*** (0.0060)	0.9422*** (0.0024)	0.9343*** (0.0021)	0.9432*** (0.0022)
39	0.5734*** (0.0066)	0.6099*** (0.0042)	0.5591*** (0.0059)	0.9425*** (0.0024)	0.9343*** (0.0021)	0.9428*** (0.0022)
40	0.5711*** (0.0067)	0.6104*** (0.0043)	0.5616*** (0.0057)	0.9429*** (0.0024)	0.9342*** (0.0022)	0.9424*** (0.0022)
41	0.5688*** (0.0068)	0.6109*** (0.0044)	0.5641*** (0.0056)	0.9432*** (0.0024)	0.9342*** (0.0022)	0.9420*** (0.0022)
42	0.5664*** (0.0069)	0.6113*** (0.0046)	0.5665*** (0.0055)	0.9436*** (0.0024)	0.9342*** (0.0022)	0.9416*** (0.0022)
43	0.5639*** (0.0070)	0.6116*** (0.0048)	0.5688*** (0.0053)	0.9440*** (0.0024)	0.9342*** (0.0023)	0.9412*** (0.0022)
44	0.5614*** (0.0071)	0.6119*** (0.0050)	0.5711*** (0.0052)	0.9443*** (0.0024)	0.9342*** (0.0023)	0.9408*** (0.0022)
45	0.5588*** (0.0072)	0.6122*** (0.0052)	0.5734*** (0.0051)	0.9447*** (0.0024)	0.9343*** (0.0024)	0.9405*** (0.0021)
46	0.5561*** (0.0073)	0.6124*** (0.0054)	0.5756*** (0.0050)	0.9451*** (0.0024)	0.9343*** (0.0024)	0.9401*** (0.0021)
47	0.5534*** (0.0074)	0.6125*** (0.0056)	0.5777*** (0.0049)	0.9455*** (0.0024)	0.9344*** (0.0025)	0.9397*** (0.0021)
48	0.5506*** (0.0075)	0.6126*** (0.0059)	0.5798*** (0.0048)	0.9459*** (0.0024)	0.9345*** (0.0026)	0.9394*** (0.0021)
49	0.5477*** (0.0076)	0.6126*** (0.0062)	0.5818*** (0.0047)	0.9463*** (0.0025)	0.9346*** (0.0026)	0.9390*** (0.0021)
50	0.5447*** (0.0077)	0.6125*** (0.0065)	0.5838*** (0.0046)	0.9467*** (0.0025)	0.9348*** (0.0027)	0.9387*** (0.0021)
51	0.5417*** (0.0078)	0.6124*** (0.0068)	0.5857*** (0.0045)	0.9471*** (0.0025)	0.9349*** (0.0028)	0.9384*** (0.0021)
52	0.5386*** (0.0078)	0.6123*** (0.0072)	0.5876*** (0.0044)	0.9475*** (0.0025)	0.9351*** (0.0029)	0.9380*** (0.0021)
53	0.5355*** (0.0079)	0.6121*** (0.0075)	0.5894*** (0.0043)	0.9479*** (0.0025)	0.9352*** (0.0030)	0.9377*** (0.0021)
54	0.5323*** (0.0080)	0.6118*** (0.0079)	0.5912*** (0.0042)	0.9483*** (0.0025)	0.9354*** (0.0031)	0.9374*** (0.0021)
55	0.5290*** (0.0081)	0.6115*** (0.0083)	0.5929*** (0.0042)	0.9487*** (0.0025)	0.9356*** (0.0032)	0.9371*** (0.0021)

56	0.5256*** (0.0082)	0.6112*** (0.0088)	0.5946*** (0.0041)	0.9491*** (0.0025)	0.9358*** (0.0033)	0.9369*** (0.0020)
57	0.5222*** (0.0084)	0.6107*** (0.0092)	0.5962*** (0.0040)	0.9496*** (0.0025)	0.9361*** (0.0035)	0.9366*** (0.0020)
58	0.5187*** (0.0085)	0.6103*** (0.0097)	0.5977*** (0.0039)	0.9500*** (0.0025)	0.9363*** (0.0036)	0.9363*** (0.0020)
59	0.5151*** (0.0086)	0.6097*** (0.0102)	0.5993*** (0.0039)	0.9504*** (0.0025)	0.9366*** (0.0037)	0.9361*** (0.0020)
60	0.5115*** (0.0087)	0.6091*** (0.0107)	0.6007*** (0.0038)	0.9508*** (0.0025)	0.9369*** (0.0039)	0.9358*** (0.0020)
61	0.5078*** (0.0088)	0.6085*** (0.0113)	0.6021*** (0.0037)	0.9513*** (0.0025)	0.9372*** (0.0040)	0.9356*** (0.0020)
62	0.5041*** (0.0089)	0.6078*** (0.0118)	0.6035*** (0.0037)	0.9517*** (0.0025)	0.9375*** (0.0042)	0.9354*** (0.0020)
63	0.5002*** (0.0091)	0.6070*** (0.0124)	0.6048*** (0.0036)	0.9522*** (0.0025)	0.9378*** (0.0044)	0.9351*** (0.0019)
64	0.4963*** (0.0092)	0.6062*** (0.0130)	0.6061*** (0.0036)	0.9526*** (0.0025)	0.9381*** (0.0045)	0.9349*** (0.0019)
65	0.4924*** (0.0093)	0.6054*** (0.0136)	0.6073*** (0.0036)	0.9531*** (0.0025)	0.9385*** (0.0047)	0.9347*** (0.0019)
66	0.4883*** (0.0095)	0.6044*** (0.0143)	0.6084*** (0.0035)	0.9535*** (0.0026)	0.9389*** (0.0049)	0.9346*** (0.0019)
67	0.4842*** (0.0096)	0.6035*** (0.0150)	0.6096*** (0.0035)	0.9540*** (0.0026)	0.9393*** (0.0051)	0.9344*** (0.0019)
68	0.4801*** (0.0098)	0.6024*** (0.0157)	0.6106*** (0.0035)	0.9544*** (0.0026)	0.9396*** (0.0053)	0.9342*** (0.0019)
69	0.4759*** (0.0100)	0.6013*** (0.0164)	0.6116*** (0.0036)	0.9549*** (0.0026)	0.9401*** (0.0055)	0.9341*** (0.0019)
70	0.4716*** (0.0101)	0.6002*** (0.0171)	0.6126*** (0.0036)	0.9553*** (0.0026)	0.9405*** (0.0057)	0.9339*** (0.0019)
71	0.4672*** (0.0103)	0.5990*** (0.0179)	0.6135*** (0.0036)	0.9558*** (0.0027)	0.9409*** (0.0059)	0.9338*** (0.0019)
72	0.4628*** (0.0105)	0.5977*** (0.0187)	0.6144*** (0.0037)	0.9562*** (0.0027)	0.9414*** (0.0061)	0.9336*** (0.0019)
73	0.4583*** (0.0107)	0.5964*** (0.0195)	0.6152*** (0.0038)	0.9567*** (0.0027)	0.9418*** (0.0063)	0.9335*** (0.0019)
74	0.4538*** (0.0109)	0.5951*** (0.0203)	0.6159*** (0.0039)	0.9572*** (0.0027)	0.9423*** (0.0065)	0.9334*** (0.0019)

75	0.4492*** (0.0111)	0.5936*** (0.0211)	0.6166*** (0.0040)	0.9576*** (0.0028)	0.9428*** (0.0067)	0.9333*** (0.0020)
76	0.4445*** (0.0113)	0.5921*** (0.0220)	0.6173*** (0.0042)	0.9581*** (0.0028)	0.9433*** (0.0069)	0.9333*** (0.0020)
77	0.4398*** (0.0116)	0.5906*** (0.0229)	0.6179*** (0.0043)	0.9586*** (0.0028)	0.9438*** (0.0072)	0.9332*** (0.0020)
78	0.4351*** (0.0118)	0.5890*** (0.0238)	0.6185*** (0.0045)	0.9590*** (0.0029)	0.9443*** (0.0074)	0.9331*** (0.0021)
79	0.4302*** (0.0120)	0.5873*** (0.0248)	0.6190*** (0.0047)	0.9595*** (0.0029)	0.9448*** (0.0076)	0.9331*** (0.0021)
80	0.4254*** (0.0123)	0.5856*** (0.0257)	0.6195*** (0.0050)	0.9600*** (0.0030)	0.9453*** (0.0078)	0.9330*** (0.0022)
81	0.4204*** (0.0125)	0.5838*** (0.0267)	0.6199*** (0.0052)	0.9605*** (0.0030)	0.9459*** (0.0081)	0.9330*** (0.0022)
82	0.4154*** (0.0128)	0.5820*** (0.0277)	0.6203*** (0.0054)	0.9609*** (0.0030)	0.9464*** (0.0083)	0.9330*** (0.0023)
83	0.4104*** (0.0130)	0.5801*** (0.0287)	0.6206*** (0.0057)	0.9614*** (0.0031)	0.9470*** (0.0085)	0.9330*** (0.0023)
84	0.4053*** (0.0133)	0.5782*** (0.0298)	0.6208*** (0.0060)	0.9619*** (0.0031)	0.9476*** (0.0087)	0.9330*** (0.0024)
85	0.4002*** (0.0136)	0.5762*** (0.0308)	0.6211*** (0.0063)	0.9623*** (0.0032)	0.9482*** (0.0090)	0.9330*** (0.0025)
86	0.3950*** (0.0139)	0.5741*** (0.0319)	0.6212*** (0.0066)	0.9628*** (0.0032)	0.9487*** (0.0092)	0.9330*** (0.0026)
87	0.3898*** (0.0141)	0.5720*** (0.0331)	0.6214*** (0.0069)	0.9633*** (0.0033)	0.9493*** (0.0094)	0.9330*** (0.0027)
88	0.3845*** (0.0144)	0.5698*** (0.0342)	0.6214*** (0.0073)	0.9638*** (0.0033)	0.9500*** (0.0096)	0.9331*** (0.0028)
89	0.3792*** (0.0147)	0.5676*** (0.0353)	0.6215*** (0.0076)	0.9642*** (0.0034)	0.9506*** (0.0098)	0.9331*** (0.0029)
90	0.3738*** (0.0150)	0.5653*** (0.0365)	0.6214*** (0.0080)	0.9647*** (0.0034)	0.9512*** (0.0100)	0.9332*** (0.0030)
91	0.3684*** (0.0153)	0.5629*** (0.0377)	0.6214*** (0.0084)	0.9652*** (0.0035)	0.9518*** (0.0103)	0.9333*** (0.0031)
92	0.3630*** (0.0156)	0.5605*** (0.0390)	0.6213*** (0.0088)	0.9656*** (0.0035)	0.9524*** (0.0105)	0.9334*** (0.0033)
93	0.3575*** (0.0159)	0.5580*** (0.0402)	0.6211*** (0.0092)	0.9661*** (0.0036)	0.9531*** (0.0107)	0.9335*** (0.0034)

	94	0.3520*** (0.0162)	0.5555*** (0.0415)	0.6209*** (0.0096)	0.9666*** (0.0036)	0.9537*** (0.0109)	0.9336*** (0.0035)
	95	0.3465*** (0.0165)	0.5529*** (0.0427)	0.6206*** (0.0101)	0.9671*** (0.0037)	0.9544*** (0.0111)	0.9337*** (0.0036)
	96	0.3409*** (0.0168)	0.5502*** (0.0441)	0.6203*** (0.0105)	0.9675*** (0.0037)	0.9550*** (0.0113)	0.9338*** (0.0038)
	97	0.3354*** (0.0172)	0.5475*** (0.0454)	0.6199*** (0.0110)	0.9680*** (0.0038)	0.9557*** (0.0115)	0.9339*** (0.0039)
	98	0.3297*** (0.0175)	0.5448*** (0.0467)	0.6195*** (0.0115)	0.9684*** (0.0038)	0.9563*** (0.0117)	0.9341*** (0.0041)
	99	0.3241*** (0.0178)	0.5419*** (0.0481)	0.6191*** (0.0120)	0.9689*** (0.0039)	0.9570*** (0.0119)	0.9343*** (0.0042)
	100	0.3185*** (0.0181)	0.5390*** (0.0495)	0.6185*** (0.0125)	0.9694*** (0.0039)	0.9577*** (0.0120)	0.9344*** (0.0044)
Observations		609,070	609,070	609,070	1,158,454	1,158,454	1,158,454
Standard errors in parentheses							
*** p<0.01, ** p<0.05, * p<0.1							

Note: the average marginal probabilities were obtained after considering the means of the other covariates estimated from the regression analysis.