The missing U-shaped relationship between economic development and female labour participation: micro-level evidence from Mexico.

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Abstract:

Claudia Goldin showed that female labour participation rates (FLPRs) tend to peak in low-income countries where agriculture predominates, decline in middle-income countries with a growing industrial sector, and rise again in high-income countries with a service-oriented economy. The main hypothesis to explain the decline of FLPRs in middle-income countries is that this pattern is driven by the expansion of industrial activities in some regions of these countries, as jobs in this sector are typically performed by men. This descriptive paper is the first to evaluate that specific hypothesis of the U-shaped feminization theory using subnational data. The analysis uses microdata from Mexico, the Latin American country with the highest share of industrial jobs and one of the lowest FLPRs in the region. The empirical strategy relies on probit regressions to estimate women's likelihood of participating in the workforce depending on the share of jobs in agriculture, industry, and services in the municipality where they reside. The analysis is based on a repeated cross-sectional dataset derived from household surveys conducted between 2005 and 2019. Surprisingly, the results are not in line with the hypothesis. Women's likelihood of working increases as the share of jobs in the industrial sector is higher, while it declines if they live in municipalities with a higher percentage of agricultural jobs. The data suggests that lack of labour demand is one of the main reasons why women living in agricultural regions of Mexico are not working. Hence, this paper did not find the U-shaped pattern between FLPRs and different stages of economic development across regions within the same country. Nevertheless, the study highlights that some upper-middle-income countries like South Africa, Peru, Turkey, and Indonesia are exhibiting the U-shaped pattern, while others, including Mexico, Malaysia, Colombia, and China, are reporting an upward trend in female labour participation.

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

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

1 Introduction

One of the most relevant theories in the literature on gender economics is the U-shaped female labour force function developed by Claudia Goldin (1994), winner of the Nobel Prize in 2023. In this seminal research, she exhibited the U-shaped relationship between female labour participation rates (FLPRs) and different levels of economic development across countries. More specifically, her theory posits that FLPRs are typically high in low-income countries with intensive agricultural activities, decline in middle-income countries with a high percentage of industrial jobs, and rise again in developed countries with a service-oriented economy.

The main argument of Goldin (1994) to explain the declining portion of the U-shaped pattern is that the expansion of the industrial sector in middle-income countries generates a fall in FLPRs because most of these jobs are predominantly held by men. This hypothesis has been a stylized fact since the publication of this paper, even though it has not been empirically tested yet. This prompts the question: Are women less likely to work in regions of a country with a higher share of industrial jobs? This paper answers this inquiry by conducting a within-country analysis that examines how women's likelihood of participating in the workforce varies depending on the sectoral distribution of employment in their place of residence.

Mexico is an optimal country to evaluate this hypothesis for several reasons. It is part of the declining portion of the U-shaped relationship observed across countries (See Figure 1.1). It has the highest percentage of industrial jobs in Latin America (See Figure 1.2). It has one of the lowest female labour participation rates in the region (See Figure 1.3). Additionally, the northern states are intensive in industrial activities, the central states tend to be service-oriented, while in southern states the agricultural sector is still a relevant economic sector (See Figure 1.5). Finally, because Mexico has incredible microdata with a level of disaggregation that is not available in most middle-income countries.

After the publication of Goldin's theory, the literature has adopted four different approaches to study the U-shaped relationship between female labour participation and different levels of economic development. Cross-country analysis using cross-sectional data (Çağatay and Özler, 1995; Clark *et al.*, 2003; Heath and Jayachandran, 2016; Psacharopoulos and Tzannatos, 1989; Verick, 2014). Cross-country analysis using data across time (Gaddis and Klasen, 2013; Gottlieb *et al*., 2023; Luci, 2009; Mammen and Paxson, 2000; Olivetti, 2013; Tam, 2011). Studies examining the U-shaped relationship within a country and across time (Lahoti and Swaminathan, 2016; Ngai *et al*., 2022, Olivetti, 2013). Within-country analysis using cross-sectional data to study specific points in time (Roncolato, 2016).

The details of all these research areas, and their open debates, are extensively discussed in the literature review. Nevertheless, this paper argues that the fourth strand of literature on this topic has been largely overlooked. Multiple empirical evaluations of this theory have been conducted across and within countries, but they always rely on aggregated data. This limitation was mentioned by Gaddis and Klasen (2013), arguing that there was little degree of disaggregation in most studies on this topic. Hence, there is a lack of within-country studies employing highly disaggregated data often found in household surveys to scrutinise the micro-foundations of this macro-economic theory. This research paper aims to fill this gap in the literature.

The dataset used to conduct this study is Mexico's ENOE household survey, which is the main source of information about the country's labour market statistics.

This survey has been conducted quarterly since 2005, but the extended version is only available in the first quarter of each year. Hence, the paper uses data from the first quarters of 2005, 2010, 2015, and 2019 to cover a period of 15 years and evaluate the hypothesis at different points in time. By using a repeated cross-sectional dataset, the analysis captures not only the sectoral distribution of employment in different regions of Mexico, but also the structural transformation they experienced over time.

To execute the regression analysis using data at the individual level, I improved the methodology and empirical strategy developed by Roncolato (2016). The econometric analysis is also based on probit regressions where the dependent variable takes value of 1 if the respondent is economically active and 0 if they are not. Nevertheless, my paper does not divide the local labour markets based on their share of agricultural and non-agricultural jobs. Instead, I employ three explanatory variables to consider the share of jobs in agriculture, industry, and services at the municipal level. This approach allows for a clearer understanding of the sectoral effects at the local level while capturing the structural transformation over the years. It is worth noting that I do not include all three sectoral share variables in the model simultaneously to avoid multicollinearity. Rather, I include each variable independently to explore their relationship with female labour participation.

The results obtained from the regression analysis are noteworthy. Contrary to the U-shaped hypothesis, a higher share of industrial jobs increases women's likelihood of being economically active. Conversely, a higher share of agricultural jobs decreases women's probability of participating in the labour markets. The results of the service sector are the only ones in line with the U-shaped hypothesis. In this case, the regression results reported that a higher share of service jobs are associated with higher female labour participation. These results remained statistically significant at the 99% confidence level after controlling for characteristics of the individuals, the households, the household heads, and the municipalities. Finally, it is worth emphasising that subsistence farming and unpaid family workers are part of the labour force estimations in Mexico, so the lack of women participating in agriculture is not related to this measurement concern.

For some readers, the results of this descriptive paper might not be enough to establish a causal relationship between women's likelihood of working and the sectoral distribution of employment in their place of residence. Nevertheless, Mexico's labour statistics align with the outcomes of this research. An analysis of the female workforce distribution across the three economic sectors shows that 80% are working in services, 17% in industry, and only 3% in agriculture. Furthermore, the agricultural workforce in Mexico comprises 90% men and just 10% women. Hence, this data shows that the engagement of Mexican women in industrial jobs is at least five times greater than their participation in agricultural activities.

Based on this evidence, the paper concludes that the abundance of industrial jobs in Mexico is not causing the low female labour participation rates of the country. Instead, the regression results and Mexico's labour statistics are suggesting that one of the reasons behind this pattern is the lack of women's engagement in agricultural activities. An exploratory data analysis is also showing that lack of labour demand is one of the drivers of low female labour participation in agricultural regions of Mexico. Therefore, all evidence points to the conclusion that one of the reasons behind low FLPRs in Mexico is the limited involvement of women in agriculture, rather than their lack of participation in the industrial sector.

This research makes several contributions to the literature studying the U-shaped female labour force function. The study introduces an innovative empirical strategy to conduct within-country studies based on microdata, offering a level of disaggregation that cannot be found in cross-country studies or within-country analysis using time series. It is also the first paper evaluating this theory by analysing the share of jobs in agriculture, industry, and services as proxies for different levels of economic development within a country. The paper challenges the stylized fact that low female labour force participation rates (FLPRs) in middle-income countries are tied to the high percentage of jobs in the industrial sector. Instead, it suggests that the lack of women's participation in agriculture could be one reason behind this pattern. Therefore, this research is the first to show how women's likelihood of working can be altered by the sectoral distribution of employment of their place of residence, which is a key theoretical underpinning of Goldin's U-shaped theory.

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 helps to explain the results for the agricultural regions of Mexico. Finally, section 7 presents the conclusion of the paper.

2 Literature Review

This section presents a summary of the literature surrounding the U-shaped feminisation hypothesis. It begins by explaining the main details of the female labour force function in economic development proposed by Claudia Goldin (1994). It summarises the literature that has found evidence to support the hypothesis and highlights arguments from recent papers that have criticised the methodology of previous studies that supported it. Finally, the section concludes by discussing open debates in this research area and how this paper fills some gaps in the literature by performing a within-country analysis.

Based on previous work by Sinha (1967) and Boserup (1970), Claudia Goldin (1994) developed the theory of how the structural transformation alongside factors such as fertility rates, educational attainment, marital status, and other sociological and cultural factors, play 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 economies.

The first part of the theory states that when countries are at the initial stage of economic development, women participate in the labour markets to a great extent. Goldin argues that at this stage, incomes are extremely low, and most jobs are in the agricultural sector. In this economic context, women have low levels of education, fertility rates tend to be high, and women are typically working on family farms, in-home workshop production, or as own-account workers. She further argues that women are more likely to work in agrarian economies producing crops such as sugarcane, rice, cotton, peanuts, poultry, dairy, livestock, and tree crops.

The second part of the theory argues that when an agrarian economy undergoes industrialisation, FLPRs tend to decline for several reasons. One of the reasons is because jobs in the growing industrial sector will tend to be occupied by men. In certain cases, this could be due to employers' preference to hire men. In other cases, it could be because men tend to have higher levels of education than women at this stage of economic development. Moreover, another reason could be because women will choose not to engage in industrial activities that require a lot of physical effort (such as construction or mining).

Goldin also explained that the decline in FLPRs at this stage can be attributed to a strong income effect and a complex demand effect. She argues that the industrialisation process tends to be accompanied by a rise in wages, which typically leads to lower FLPRs. The argument is that the husband's additional earnings enable women to leave physically demanding activities in the agricultural sector. Moreover, the agricultural sector itself is undergoing industrialisation, which involves the introduction of new technologies that tend to decrease the demand for female labour in this sector. Finally, many products previously made by women working at households, farms, and small businesses may become unprofitable as these goods are now produced through industrial processes with lower production costs and more competitive prices.

Apart from all these factors, Goldin (1994) argued that one of the main drivers for the decline of FLPRs in this context is the existence of a social stigma towards women working in blue-collar jobs, especially those that are married. According to her theory, a husband will not permit her wife work because it could be perceived as a reflection of his poor ability to be the only provider for the family.

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. Hence, the husband will not be judged as negligent by society. Additionally, she argues that at this stage of economic development women have higher levels of education, and there 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, lower fertility rates, better salaries in the growing service sector, and the lack of social stigma towards white-collar jobs generates the conditions that facilitates the rise of FLPRs.

Since the publication of this seminal research, the literature has studied the U-shaped female labour force function using four different approaches. The first strand of research has conducted cross-country analyses using cross-sectional data. More specifically, these studies have examined the correlation between FLPRs and GDP per capita. Goldin (1994) identified the U-shaped relationship using this approach. Since then, other authors have also found evidence to support the existence of a U-shaped curve in cross-country analyses using cross-sectional data (Çağatay and Özler, 1995; Clark *et al.*, 2003; Heath and Jayachandran, 2016; Psacharopoulos and Tzannatos, 1989; Verick, 2014).

Gaddis and Klasen (2013) have criticised the papers confirming the U-shaped hypothesis using simple cross-country analyses with cross-sectional data. Their argument is that using this approach leads to the *Kuznets fallacy.* They argue that to validate this theory, the U-shaped relationship must be observed in both cross-country studies using panel data and fixed-effects models, as well as in within-country studies employing time-series analysis. For them, failing to find the U-shape under these specifications would indicate that the theory has significant limitations.

The second strand of literature on this topic examines the U-shaped hypothesis across countries and over time. Most studies conducting cross-country analysis using panel data have found evidence supporting the U-shaped hypothesis (Luci, 2009; Mammen and Paxson, 2000; Olivetti, 2013; Tam, 2011). Nevertheless, Gaddis and Klasen (2013) have also challenged the findings of some of these studies. They criticised the results of Luci (2009) and Tam (2011) for not considering the potential endogeneity of GDP. Furthermore, they argued that the findings of Mammen and Paxson (2000) were based on a relatively short timeframe (15 years) and employed a static model rather than a dynamic one. Based on these critiques, Gaddis and Klasen (2013) conducted a cross-country study over time to evaluate the validity of the U-shaped hypothesis using dynamic panel data methods. Their results showed that the U-shaped pattern vanishes when using this type of model, leading them to conclude that this economic theory has little empirical support.

In the same year, Olivetti (2013) conducted a rigorous test of the U-shaped hypothesis using panel data and a fixed-effects model. Her study provides an in-depth examination of long-term trends in female labour force participation (FLFP) in the United States and compares these with other developed economies. Spanning the period from 1890 to 2005, her research confirms the existence of a U-shaped relationship between FLFP and economic development. In contrast, Gaddis and Klasen (2013) found little support for the U-shaped hypothesis using data from 1980 to 2010. Thus, differences in both the time frames and methodologies employed are likely key factors contributing to the divergence in their findings.

The third research area on this topic investigates whether countries followed a U-shaped pattern during their historical process of economic development. Goldin (1986, 1990) demonstrated that FLPRs in the United States followed a U-shaped pattern between 1890 and 1940. To do so, she conducted an economic history assessment of US census data, which revealed that FLPRs in the United States were underestimated in the late 19th century. After making this correction, she found that FLPRs were high when the United States was primarily agricultural, declined during the industrialisation process, and finally increased during the expansion of the service sector. Subsequent analyses made by Olivetti (2013) and Ngai *et al*. (2022) also demonstrated that FLPRs in the United States followed a U-shaped pattern during their structural transformation between 1880 and 2019.

Gaddis and Klasen (2013) argued that finding a U-shaped trend across countries and in the United States does not imply that the same pattern will materialise within all countries during their economic development process. In a more recent paper, Klasen (2019) highlighted an empirical evaluation of the U-shaped relationship conducted by Lahoti and Swaminathan (2016) using data from India. These authors tested the hypothesis through a state-level analysis using data from India between 1983 and 2012. More specifically, they analysed the relationship between FLPRs and net state domestic product (NSDP), as well as sector-specific growth in value-added and employment across the 28 Indian states. Nevertheless, they did not find evidence to support the U-shaped hypothesis.

Gaddis and Klasen (2013) also noted that while today's advanced economies may have experienced the U-shaped pattern during their economic development process, today's developing countries may not follow the same trajectory. This aligns with Olivetti (2013), who found that the U-shaped pattern is less pronounced when early developed OECD countries are excluded from the cross-country analysis. She suggested that a possible explanation for these results is that today's developing countries are not stigmatising industrial jobs to the same extent as today's advanced economies once did, as industrial jobs are now less physically demanding than before.

Finally, the fourth strand of literature on this topic involves within-country analyses using cross-sectional data. Roncolato (2016) conducted the only study following this approach, examining the U-shaped hypothesis within South Africa using data from 2007. She argued that the U-shaped trend may not hold in South Africa due to its high share of women working in manufacturing sectors such as textiles and clothing, and because the country experienced early deindustrialisation, which transformed various regions into service-oriented economies. Nevertheless, her results showed a U-shaped relationship between women's probability of participating in the workforce and the share of non-agricultural jobs at the municipal level.

Based on the preceding literature review, the goal of this paper is to contribute to the analysis of the U-shaped feminisation hypothesis by conducting a within-country study using cross-sectional data. The paper follows the empirical strategy of Roncolato (2016) but does not analyse the sectoral distribution of employment based on the share of agricultural and non-agricultural jobs. Instead, this paper is the first to examine the relationship between FLPRs and the percentage of jobs in agriculture, industry, and services across different regions of the same country.

This paper argues that the fourth strand of literature on this topic has been significantly overlooked. Cross-country studies often struggle with unobserved heterogeneity stemming from institutional, legal, and cultural differences between countries. Furthermore, Klasen (2019) highlighted that cross-country analyses do not allow for the disaggregation of female labour force participation rates across different economic sectors. In contrast, this within-country analysis, based on micro-data, permits a more granular examination. By focusing on regions within the same country, it is possible to conduct the analysis within a consistent framework of similar labour laws, educational systems, and cultural norms. This provides a clearer picture of the relationship between the share of jobs in agriculture, industry, and services and female labour force participation. Thus, this paper adopts this approach to address these limitations and offers a unique contribution to the literature on the U-shaped feminisation hypothesis.

3 Background

This section has three primary objectives. The first is to demonstrate that the U-shaped pattern holds in a cross-country analysis when the "sectoral distribution of employment" is used as a proxy for economic development. The second is to show that Mexico is not an outlier in relation to the U-shaped hypothesis in a cross-country comparison, but rather part of the downward portion of the curve. The third objective is to provide valuable insights into Mexico using various figures that illustrate the economic situation and labour market characteristics of the country.

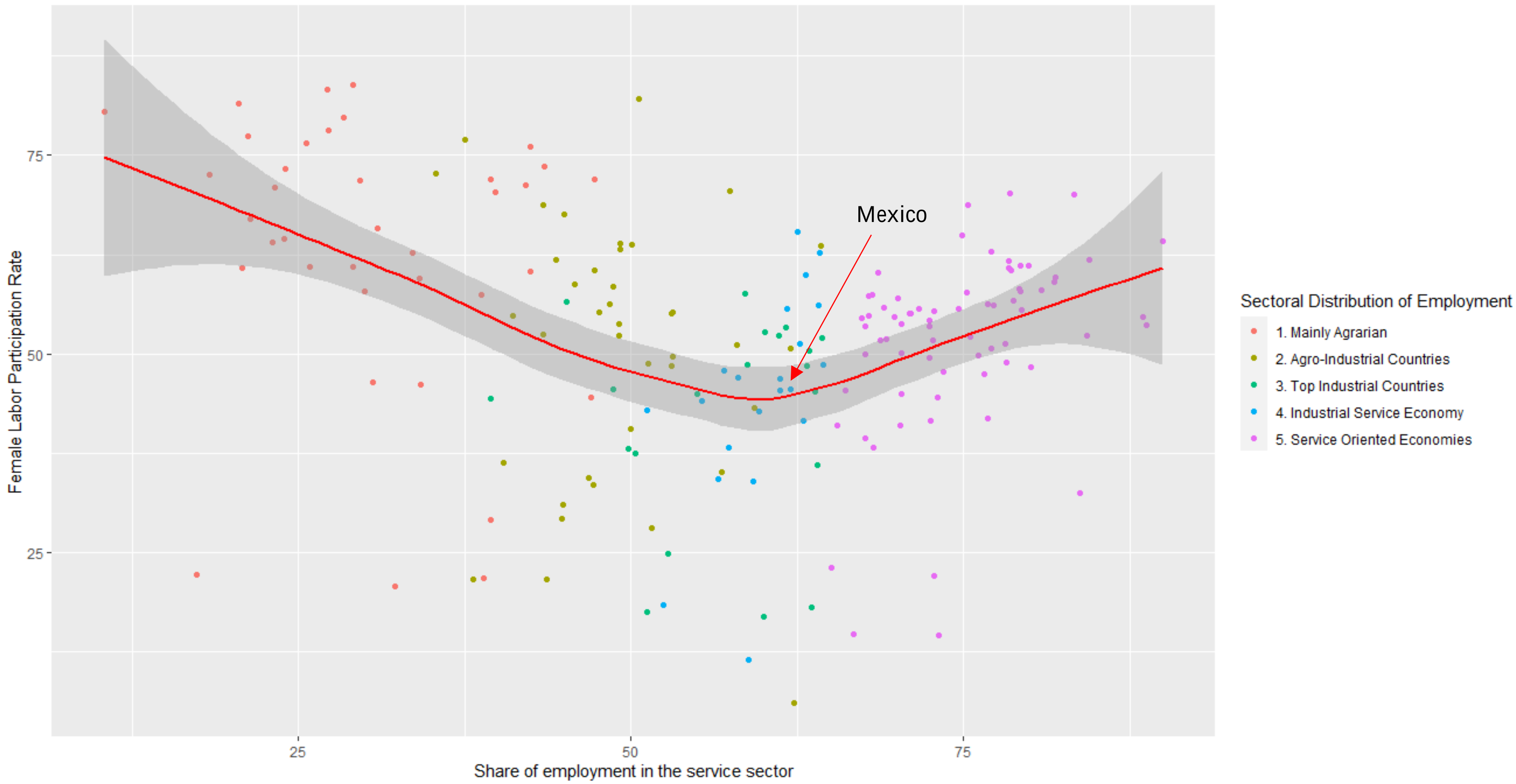
3.1 Cross-country analysis

Despite the growing number of studies analysing the U-shaped hypothesis, most of them focus on the relationship between female labour participation rates (FLPRs) and GDP per capita across countries. However, it is also possible to study this phenomenon using the sectoral distribution of employment as a proxy for economic development. Figure 1.1 illustrates the relationship between FLPRs and the share of jobs in the service sector across countries. Additionally, the figure categorises countries into five groups based on the percentage of jobs in agriculture, industry, and services. The data, sourced from the World Bank, covers 187 countries in 2019.

On the left-hand side of the figure are countries with the highest percentage of jobs in the agricultural sector. These countries are classified as mainly agrarian, where the agricultural sector accounts for 40% to 80% of total employment. In the centre of the figure are the top industrial countries, characterised by more than 30% of jobs in the industrial sector. On the right-hand side are the service-oriented countries, which have over 65% of their jobs in the service sector.

The figure also includes two additional categories based on the sectoral distribution of employment. Agro-industrial countries have 25% to 40% of their jobs in agriculture and fewer than 30% in industry. Industrial-service economies are those with more than 50% of employment in the service sector and fewer than 30% in industry. Although this classification is somewhat arbitrary, it provides a useful framework for identifying five distinct stages of economic development based on the sectoral distribution of employment across countries.

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



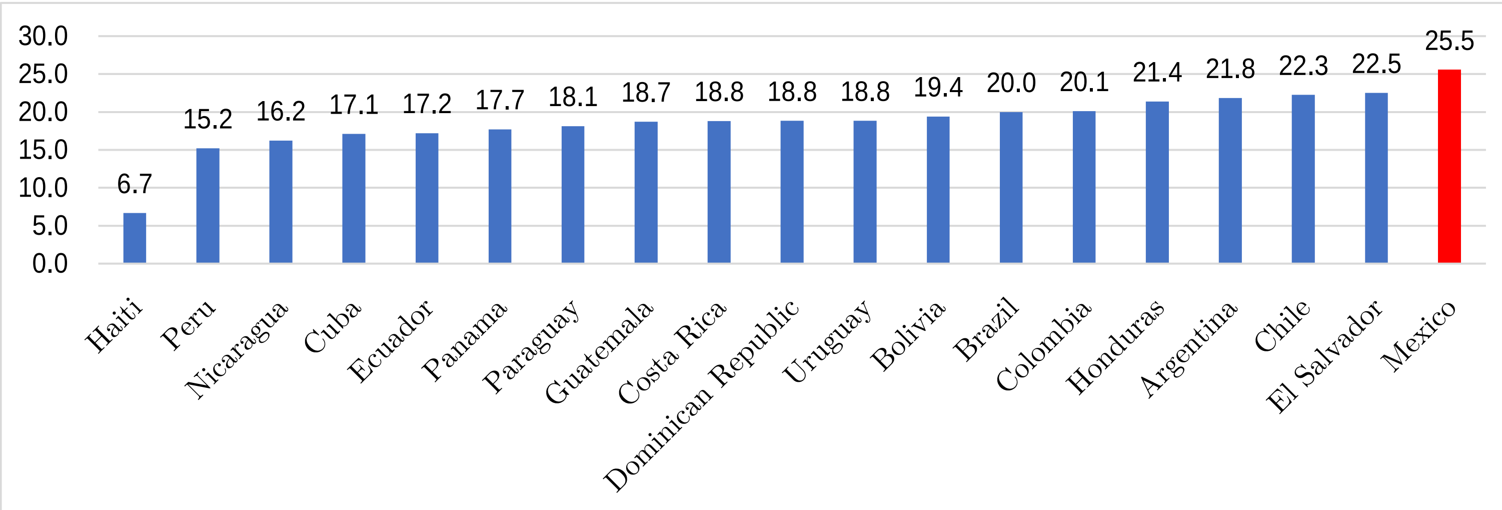
Source: World Bank, World Development Indicators. Employment in services (% of total employment), Labor force participation rate female (% of female population ages 15+) (modeled ILO estimate)

The figure demonstrates that FLPRs are higher in predominantly agricultural countries, decline in industrial countries, and rise again in service-oriented countries. The Gaussian regression curve illustrates the U-shaped pattern between the share of jobs in the service sector and FLPRs across countries. The chart also indicates that Mexico is classified as an industrial-service economy, positioning it on the downward portion of the U-shaped curve.

To further explore the relationship between FLPRs and the percentage of jobs in each economic sector, three additional scatterplots are presented in Figure 1.14, , which can be found in the appendix. The first scatterplot indicates that FLPRs are higher in countries where the percentage of jobs in the agricultural sector constitutes a large share of total employment. The second illustrates that FLPRs decrease as the percentage of jobs in the industrial sector increases. Finally, the third scatterplot shows that FLPRs are higher in countries where the service sector accounts for a greater share of total employment. Therefore, these three figures are consistent with the U-shaped pattern between FLPRs and the share of jobs in each economic sector.

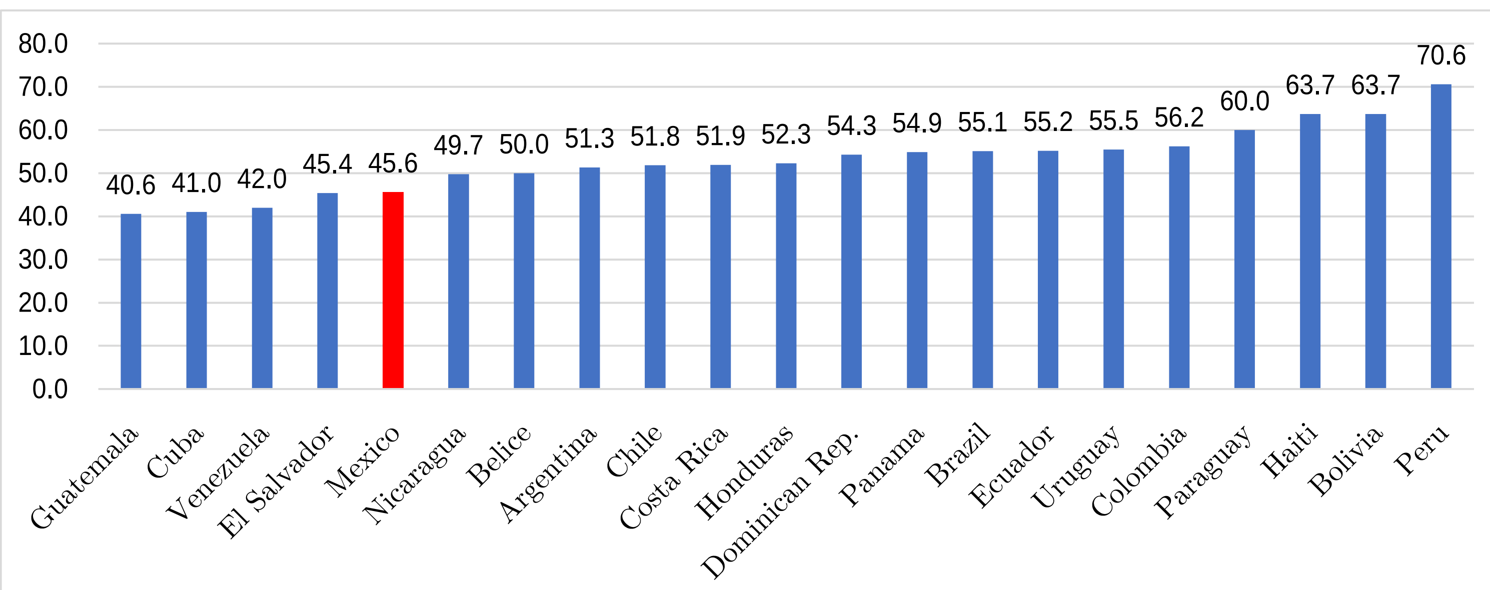
In addition to the previous evidence, this section presents several key facts about Mexico compared with other Latin American countries. Figure 1.2 shows the percentage of industrial jobs as a share of total employment in 2019. The chart illustrates that Mexico stands out among Latin American countries for having the highest percentage of industrial jobs. Furthermore, Figure 1.3 shows the female labour participation rate among Latin American countries. In this case, Mexico reports 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 provides evidence supporting the U-shaped hypothesis, showing that agricultural and service-oriented countries have higher FLPRs than industrial countries. It also reveals that Mexico occupies the downward portion of the U-curve. The analysis also showed that Mexico has the highest share of industrial jobs among Latin American countries while also exhibiting one of the lowest FLPRs in the region. Based on this evidence, some researchers might infer that Mexico's low FLPRs are linked to the high percentage of industrial jobs in the country, as they are predominantly held by men. Nevertheless, the subsequent within-country analysis of Mexico suggests that this assumption does not hold true.

3.2 Within-country analysis

As previously mentioned, Mexico has one of the lowest FLPRs in Latin America. Unfortunately, the limited involvement of women in the labour market often results in poorer economic performance. Cuberes and Teignier (2018) estimated that the gender gap in labour force participation in Mexico leads to an economic loss equivalent to 22% of its final GDP output. In contrast, a substantial body of literature highlights that a sustained increase in female labour participation has been a key factor driving the rapid economic growth observed in several Asian countries (Bloom and Williamson, 1998; Bloom *et al.*, 2009; Bloom and Finlay, 2009). Given the critical role of female labour participation in promoting both economic growth and development, it is essential to explore the underlying causes of low labour market engagement among women in Mexico.

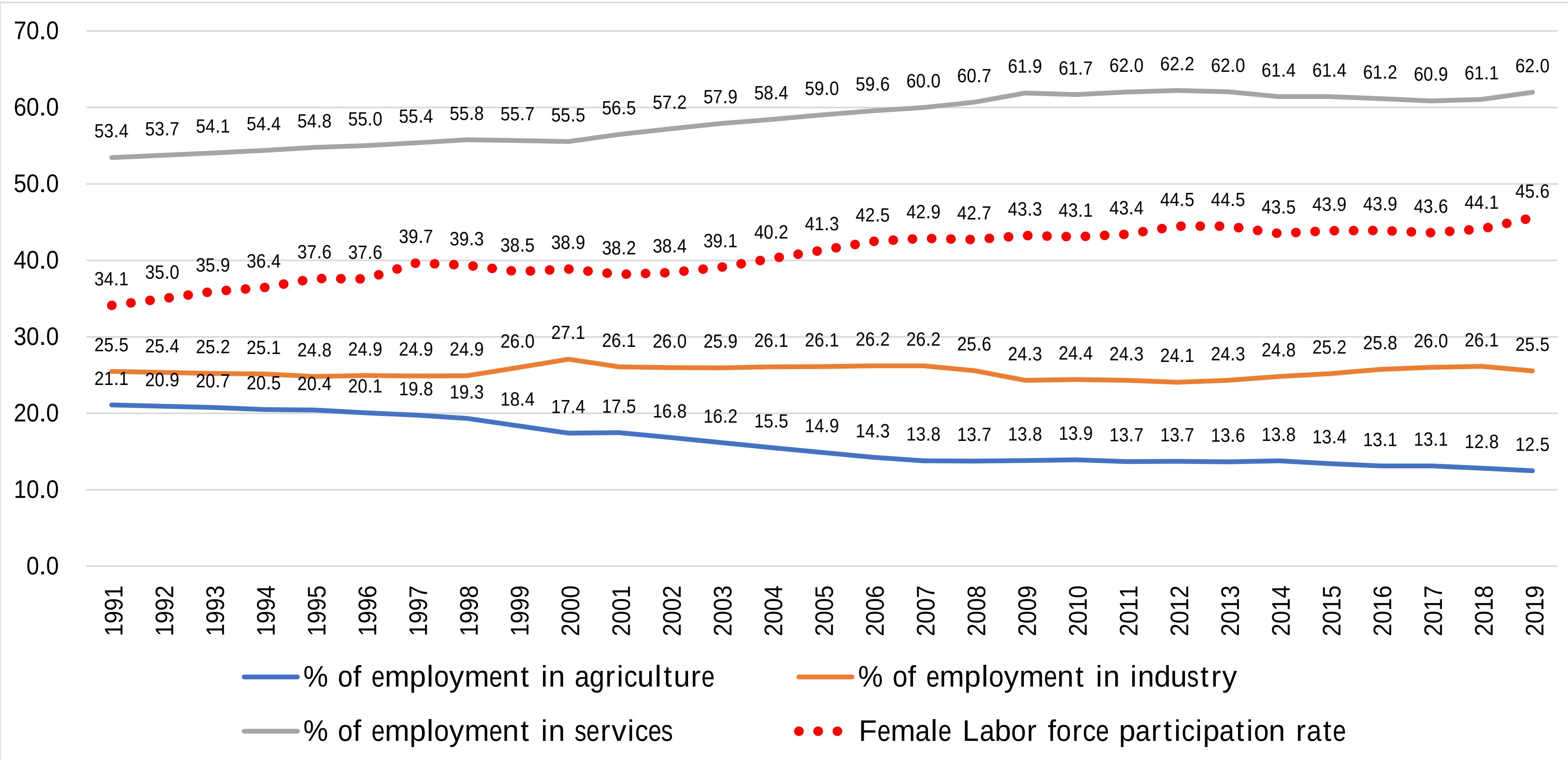
Kaplan and Piras (2019) conducted an analysis of gender gaps in Mexico's labour markets and found that the country has the second-largest gender gap in labour force participation in Latin America. They highlighted that Mexico ranks sixth in male labour participation rates within the region, while its FLPR is the fourth lowest. One of the factors they identified as contributing to the low FLPRs is the high percentage of young women who are neither studying, working, nor seeking employment. This figure is the fourth highest in the region, surpassed only by Guatemala, Honduras, and El Salvador, whereas the percentage of young men in the same situation is the lowest in Latin America.

Kaplan and Piras (2019) also noted that while the labour force participation of single or divorced women in Mexico is comparable to that in other Latin American countries, the participation rate of married women is the lowest in the region. Additionally, their analysis revealed that Mexican women with higher levels of education have lower labour participation rates compared to their counterparts in other countries. For instance, the participation rate for women with at least 14 years of schooling is the second lowest in the region, surpassed only by Bolivia. Moreover, they highlighted that Mexican women dedicate the highest number of hours to unpaid work in Latin America.

While these factors are commonly recognised as determinants of female labour participation, there is still limited evidence on how the sectoral distribution of employment at the local level influences women's ability to participate in the labour market. This study aims to address this gap in the literature by examining how the distribution of jobs across agriculture, industry, and services relates to the likelihood of women participating in the labour force. Therefore, this sub-section presents various figures that highlight key labour statistics from Mexico.

It is important to illustrate that Mexico has made progress in its economic development over the past few decades. This is depicted in Figure 1.4, which shows the country's labour shifts from 1991 to 2019, alongside FLPRs during the same period. The figure shows that the industrial sector has consistently accounted for roughly 25% of total employment over the past 30 years. Simultaneously, there has been a 10-percentage point decline in agricultural employment and a corresponding 10-percentage point increase in the service sector. Finally, the figure highlights a notable increase in female labour participation rates, which have risen by more than 10 percentage points during this timeframe.

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



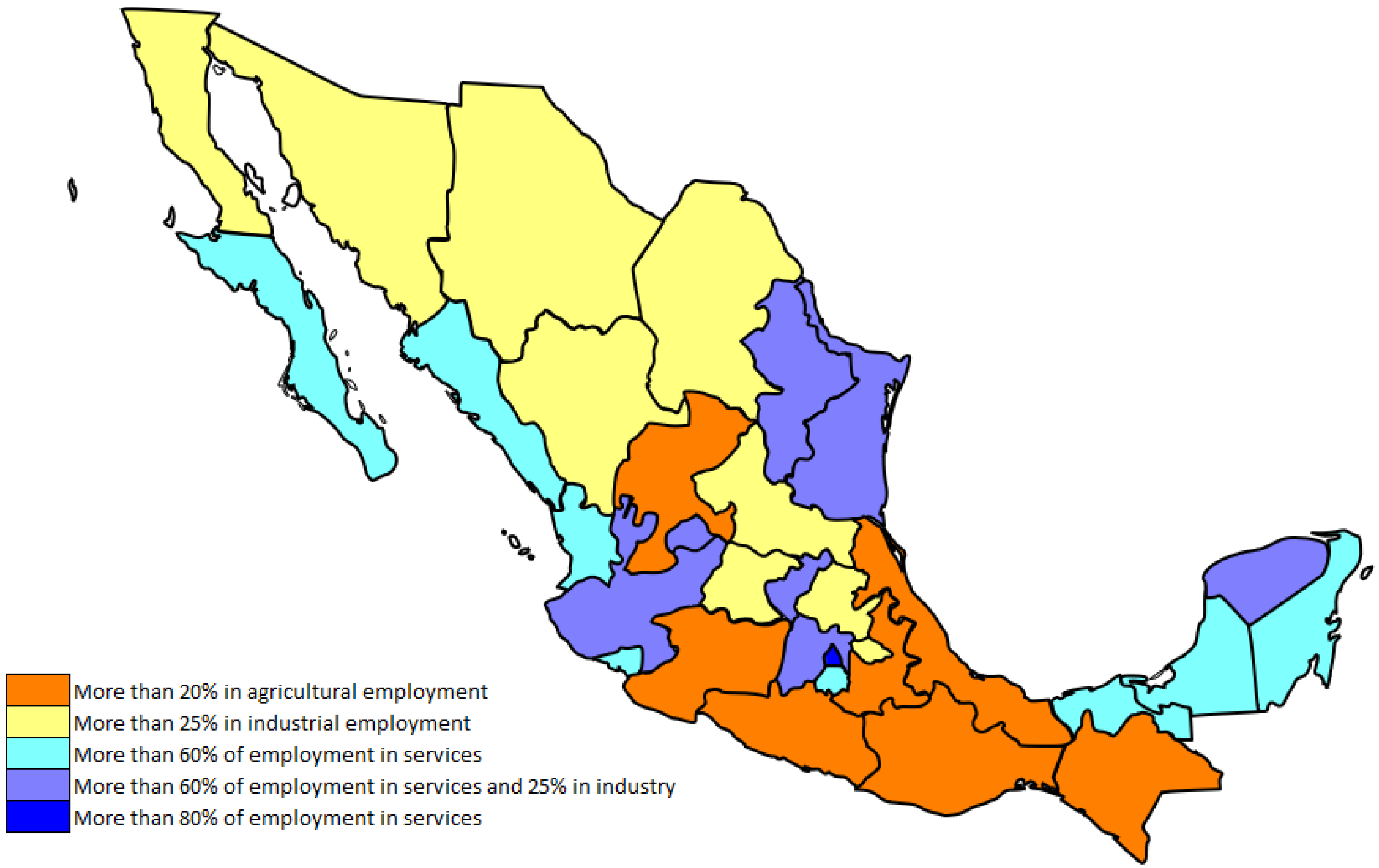
Source: World Bank, World Development Indicators.

It is also essential to provide an overview of the sectoral distribution of employment across Mexican states. Figure 1.5 presents a map with five categories, highlighting the most prominent economic sectors in each state. The orange-shaded states, mostly located in southern Mexico, are those with the highest share of agricultural jobs. In these states, a greater proportion of people are employed in agriculture than in industry. The sectoral distribution of employment in these Mexican states is comparable to that of countries such as Guatemala, Mongolia, Ecuador, and Nigeria, where at least 20% of the total workforce is engaged in agriculture.

The yellow-shaded states in Figure 1.5 have between 25% and 40% of their jobs in industrial activities, similar to Central European countries such as Serbia, Romania, Poland, and Slovenia. These states are predominantly located in northern Mexico due to the presence of numerous maquiladoras dedicated to manufacturing. The light-blue states have a service-oriented economy with a relatively low percentage of jobs in the industrial sector. Their sectoral employment distribution is comparable to that of countries like Colombia and Paraguay, where services predominate, and the share of jobs in agriculture and industry is roughly balanced.

The purple-shaded states are those with a service-oriented economy and a high share of jobs in the industrial sector. These states have over 60% of employment in services and 25% in industrial activities, a distribution similar to that of countries such as Austria, Germany, and Russia. Finally, Mexico City stands out as the only state coloured dark blue, indicating that it is the sole region where more than 80% of jobs are in the service sector. This distribution is similar to that of economies like Singapore, Macao, and Hong Kong.

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



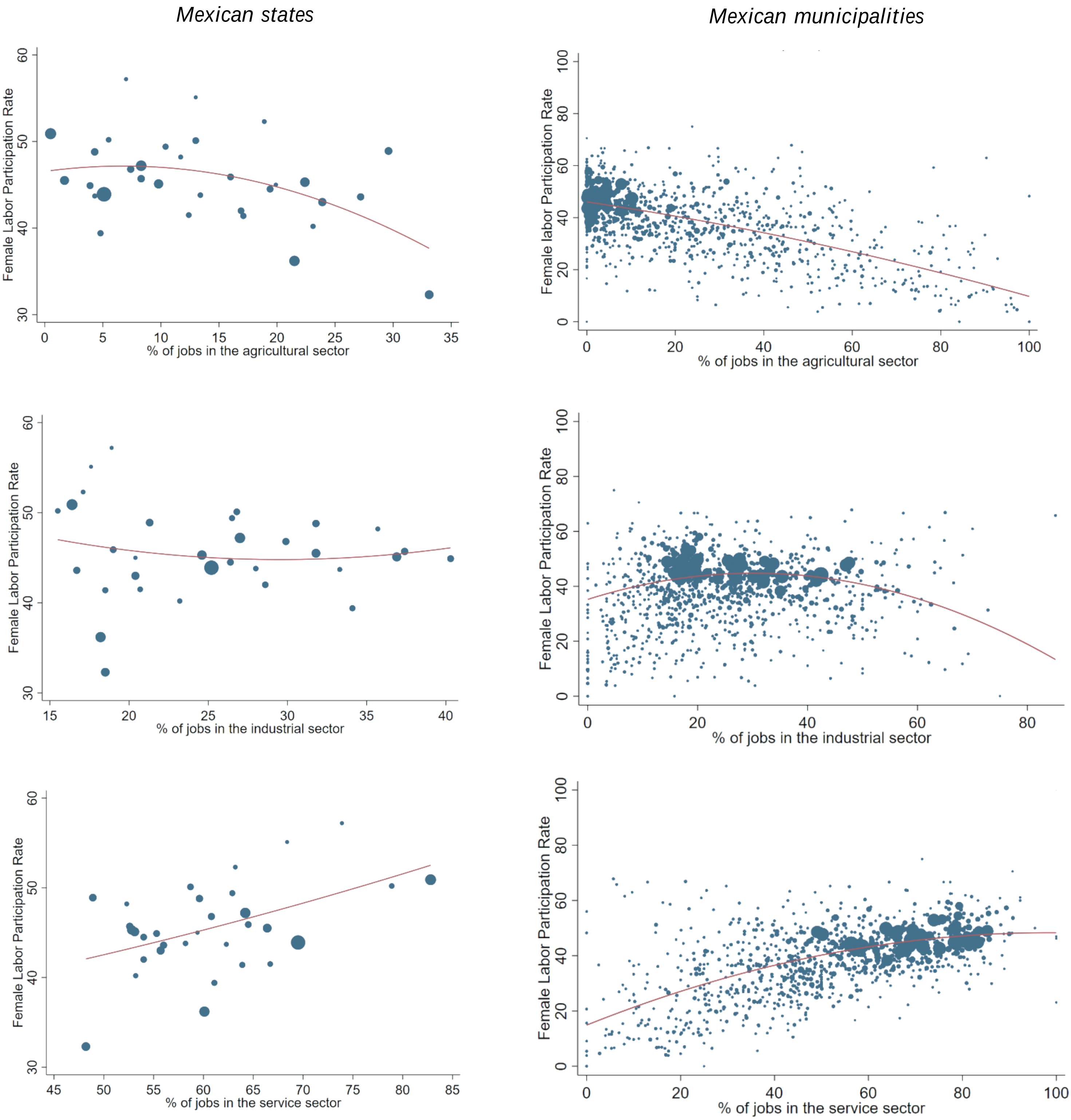
Source: Made by the author with data from ENOE.

It is also pertinent to illustrate the relationship between the percentage of jobs in each economic sector and FLPRs within Mexico. Figure 1.6 presents six scatterplots that depict the correlation between these variables across two distinct subnational territorial divisions of Mexico. The left side of the figure displays the relationship between FLPRs and the percentage of jobs in agriculture, industry, and services across the 32 Mexican states. The right side of the figure shows the corresponding relationships at the municipal level. The data for this analysis were sourced from the ENOE survey, specifically from the first quarter of 2019.

The scatterplots indicate that FLPRs are lower in states and municipalities with a higher share of agricultural employment. They also demonstrate that FLPRs tend to increase in regions of Mexico with a greater proportion of service jobs. Conversely, the relationship between industrial employment and FLPRs is less clear. At the state level, there appears to be no discernible relationship, while at the municipal level, an inverted U-shape emerges. However, neither of these analyses supports the assumed negative relationship between lower FLPRs and a higher percentage of industrial jobs.

To conclude this within-country analysis, two additional figures are presented to highlight notable aspects of women's participation in Mexico's labour markets. Figure 1.7 depicts the percentage of men and women employed in agriculture, industry, and services as a share of their respective total labour forces. The figure reveals that only about 3% of the female workforce is employed in agriculture, approximately 17% are engaged in industrial jobs, and nearly 80% are working in the service sector.

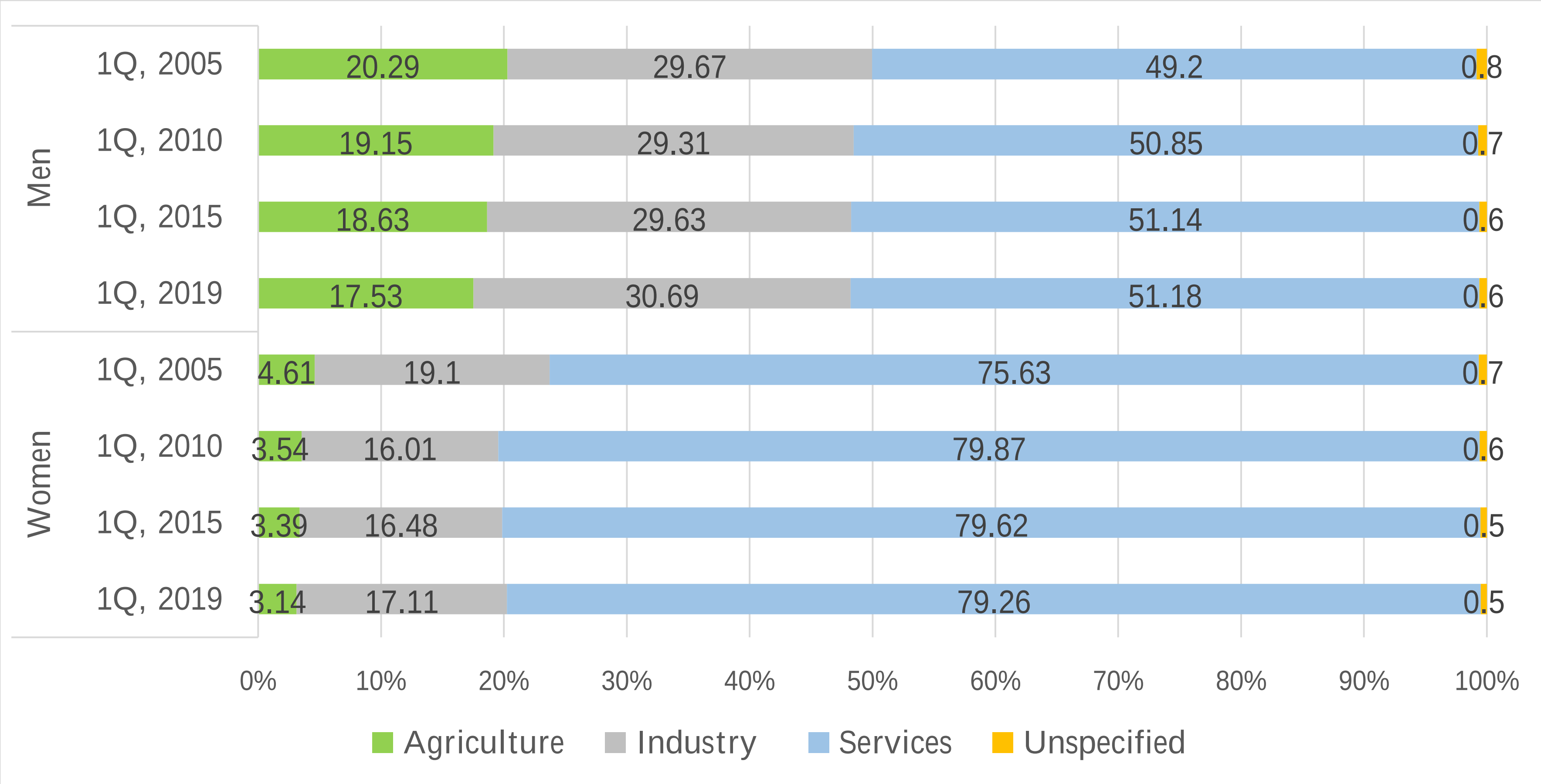
Figure 1.6 - FLPR and % of jobs in each economic sector
(Mexican states and Mexican municipalities, first quarter of 2019)



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

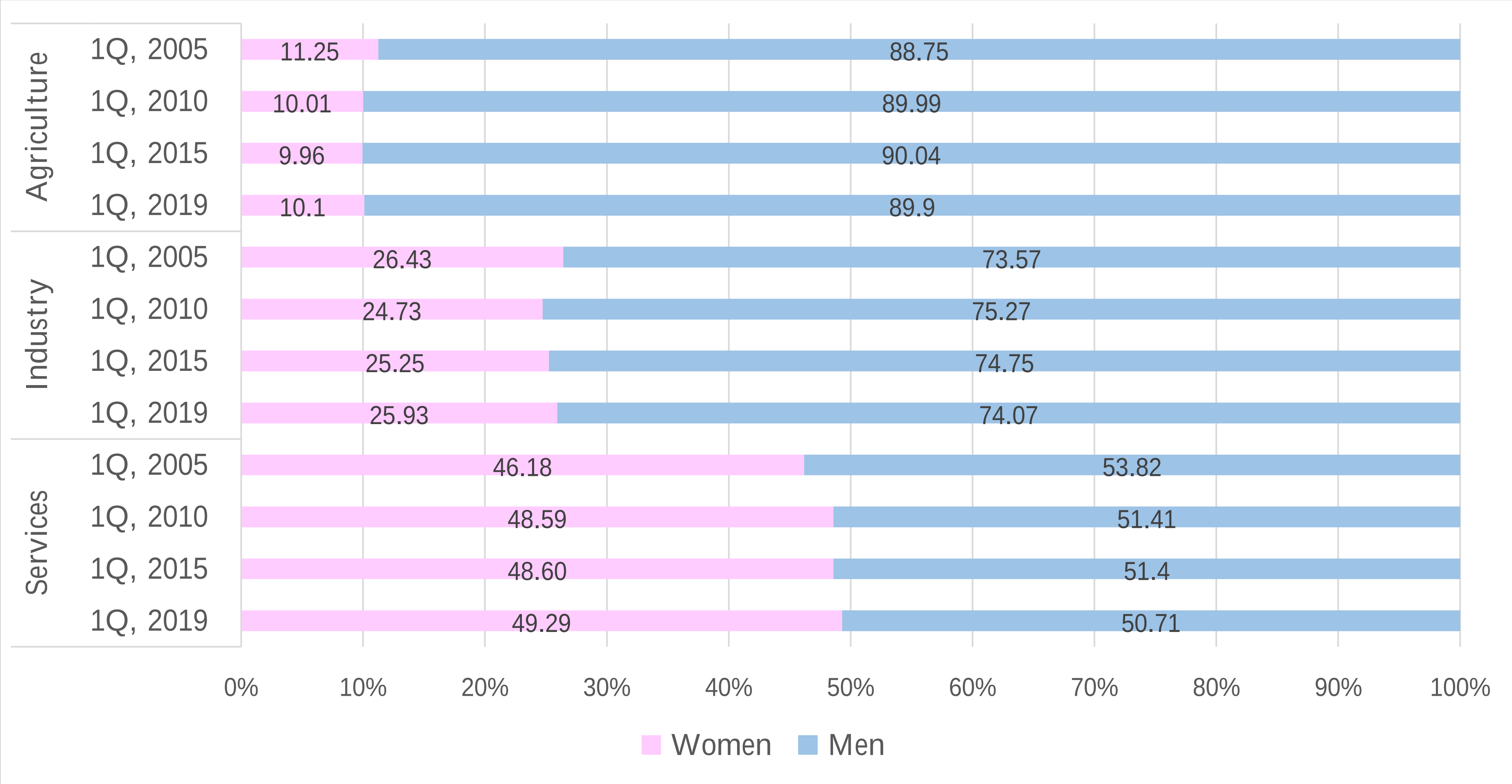
Note: The size of the dots varies depending on the total number of surveys carried out in each municipality.

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.

Finally, Figure 1.8 shows the gender composition of Mexico's workforce, segmented by economic sector. The figure illustrates that the service workforce is relatively balanced between men and women. In contrast, the industrial sector is predominantly male, since men represents three-quarters of the workforce in that sector. Meanwhile, the agricultural sector is overwhelmingly male dominated, with approximately 90% of the workforce being men and only 10% women.

To summarise, these sub-sections demonstrate that Mexico is situated in the downward portion of the U-shaped pattern observed across countries. They have also highlighted the sectoral distribution of employment across Mexican states. Moreover, the within-country analysis revealed a negative relationship between a higher percentage of agricultural jobs and lower FLPRs. Additionally, the data show that in Mexico, 90% of the agricultural workforce are men, while only 4% of working women are engaged in agricultural jobs. Therefore, this section provides initial evidence suggesting that low FLPRs in Mexico may not be related to the high percentage of industrial jobs across different regions of the country.

4 Methodology

This section outlines the methodology employed in the econometric analysis of this research. It begins with an overview of the databases used, followed by a detailed explanation of the approach for estimating the sectoral distribution of employment at the municipal level. The examination of female labour participation is then discussed, with a focus on using microdata instead of aggregated data. A comprehensive presentation of the econometric model is also provided, along with a thorough explanation of the different variables considered. The section concludes by presenting the descriptive statistics.

4.1 Dataset

Most studies analysing the U-shaped feminisation hypothesis rely on aggregated data. In contrast, this study utilises micro-level data from the extended version of the ENOE survey, conducted by Mexico's national statistical office (INEGI). The ENOE, which has served as the primary source for Mexico's labour market statistics since its inception in 2005, collects employment data on a quarterly basis. Each dataset encompasses a sufficiently large sample size to represent both rural and urban areas across Mexico's 32 states. Moreover, the surveys provide detailed information on respondents' labour status alongside socio-demographic variables, such as education level and marital status, among others.

It is important to note that during the first quarter of each year, INEGI conducts an amplified survey, whereas in the second, third, and fourth quarters, it administers a basic survey. Consequently, this study utilised four cross-sectional datasets derived from the ENOE surveys conducted in the first quarters of 2005, 2010, 2015, and 2019. The surveys from the first quarter were specifically chosen because they offer the most comprehensive information, as surveys from the other quarters exclude certain questions that are only included in the amplified survey.

The survey from the first quarter of 2019 was utilised because no survey was conducted in the first quarter of 2020 due to the COVID-19 pandemic. Aside from this exception, the analysis adheres to a five-year interval between the selected surveys. This timeframe is particularly valuable as it facilitates the observation of potential changes in the sectoral distribution of employment across Mexican municipalities. Consequently, the dataset captures not only the share of jobs in agriculture, industry, and services at the local level but also tracks the evolution of these variables over time.

4.2 Empirical strategy

It is important to begin this section by emphasising that this research does not follow a conventional empirical evaluation of the U-shaped feminisation hypothesis. Specifically, this study does not undertake an economic history analysis to determine whether female labour participation rates (FLPRs) were high when Mexico was predominantly agricultural, whether they declined during the industrial boom, or whether they increased with the expansion of the service sector. Had such an approach been employed, this research would have closely resembled previous studies on the subject. Instead, this paper explores a distinct aspect of the U-shaped feminisation theory by adopting a different methodological approach to make an original contribution to the literature. Therefore, the following section outlines the empirical strategy used to assess the specific hypothesis that, in middle-income countries like Mexico, FLPRs decline due to the high percentage of industrial jobs in the country.

4.2.1 Estimation of female labour participation using microdata

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 determines the proportion of the working-age population that is either employed or actively seeking employment, referred to as the 'economically active population'. Mexico's National Statistical Office (INEGI) classifies individuals as economically active based on ILO conventions. Consequently, this study utilised the variable "economically active" to analyse female labour participation at the individual level. This binary variable takes the value of 1 if the individual is economically active and 0 otherwise. Individuals attending an educational institution, engaged in household duties, infirm, disabled, or retired are not considered part of the economically active population. Adopting this approach is particularly useful for studying the likelihood of being economically active at the individual level.

4.2.2 Estimation of sectoral distribution of employment using microdata

Gaddis and Klasen (2013) criticised studies using GDP per capita to test the U-shaped feminisation hypothesis and instead they proposed 'sector-specific growth' as an alternative variable. However, they acknowledged that this variable might raise concerns, as it could be considered a noisy measure of structural transformation and might bias the coefficients towards zero. Given the lack of consensus on this topic, this study proposes an alternative variable to assess the relationship between FLPRs and different stages of economic development. Specifically, the analysis utilizes the share of employment in agriculture, industry, and services at the municipal level as a proxy for local economic development.

Goldin (1994) hypothesised that the sectoral composition of jobs in local labour markets can influence FLPRs. Building on this premise, the present analysis employs the share of jobs in these three economic sectors to test the U-shaped feminization hypothesis within Mexico. I argue that these variables are a suitable alternative as they capture not only the sectoral composition of employment in local labour markets but also serve as a proxy for different stages of economic development. This approach is theoretically grounded in Perkins *et al.* (2013), who posited that at the lowest levels of income per capita, agriculture dominates both in terms of GDP share and total employment. Conversely, as industry and services expand, the share of agriculture in GDP and total employment diminishes.

Before explaining the empirical strategy to estimate sectoral distribution of employment at the municipal level, it is important to mention two relevant aspects of the ENOE survey and how they were managed. First, the ENOE is designed to be representative at the national and state levels but not at the municipal level. Second, the ENOE employs a complex sampling design in which respondents have unequal probabilities of being selected. To address these two features of the ENOE survey, the following methodological adjustments were implemented.

Since the ENOE survey is not representative at the municipal level, larger municipalities are more likely to yield precise estimations of the sectoral distribution of employment due to their larger sample sizes. In contrast, smaller municipalities may exhibit greater measurement errors, as they have fewer respondents. Therefore, to estimate the sectoral distribution of employment at the municipal level, I used the sampling weights calculated by INEGI to obtain more accurate estimations for the main parameters of interest.

To understand the purpose of sampling weights, it is important to highlight that respondents in the ENOE survey do not have equal probabilities of being interviewed. In other words, the survey does not rely on simple random sampling. This is a common feature of surveys designed to capture more precise information from smaller subgroups within the country. To account for this, INEGI assigns a sampling weight to each respondent, which represents the inverse probability of that individual being selected in the sample. Hence, the sampling weight indicates the number of people in the total population that each respondent in the sample represents.

To illustrate how sampling weights function in the ENOE survey, Table 1.1 presents a comparison of the number of respondents interviewed in rural and urban areas of Mexico and the actual population living in those areas. The table shows that INEGI consistently interviewed more people in urban areas than in rural areas. This strategy is based on the greater heterogeneity of the urban population, which requires a higher number of surveys to capture the diverse characteristics of urban residents accurately. In contrast, the population in rural areas tends to be more homogeneous, enabling fewer surveys to adequately represent the sociodemographic traits of these respondents. Nevertheless, the table reveals that, after applying the sampling weights, a larger proportion of Mexico's population resides in rural areas. This underscores the importance of using the sampling weights to adjust for differences in the probabilities of being sampled.

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

ENOE Surveys				
Year / quarter	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%
Estimations of rural and urban population after using sampling weights				
Year / quarter	2005, 1Q	2010, 1Q	2015, 1Q	2019, 1Q
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%

Based on the previous explanation, my empirical strategy relies on estimating the sectoral distribution of employment at the municipal level using sampling weights. To obtain these estimations, I included all individuals who reported having a job within each Mexican municipality, regardless of their sex. The share of jobs in agriculture, industry, and services is then calculated using the weighted sum of individuals employed in each sector as a percentage of the total number of employed respondents in that municipality. Finally, each respondent living in a specific municipality, during a specific year and quarter, receives the corresponding values reflecting the sectoral distribution of employment in their place of residence.

Since the ENOE survey is not representative at the municipal level, the empirical strategy also relies on conducting the regression analysis at the individual level rather than the municipal level. This ensures that respondents from municipalities with small sample sizes have a proportionally smaller influence on the regression results. Consequently, municipalities with fewer respondents are down-weighted in the analysis, thereby reducing potential bias in the coefficients due to measurement error.

Performing the analysis at the individual level, rather than the municipal level, helps to partially address this limitation of the ENOE survey. By following this approach, if a respondent lives in a small municipality where few individuals have a job, the estimations of the sectoral distribution of employment at the municipal level may be less reliable. However, these municipalities will have a correspondingly smaller weight in the sample. For instance, a municipality with 5,000 employed respondents is 100 times more relevant in the sample than a municipality with only 50 employed respondents, because the regression analysis is conducted at the individual level, not the municipal level. Hence, municipalities with just 10 working respondents are more likely to have inaccurate estimations of the sectoral distribution of employment, but these estimations will have a smaller influence on the regression results because only the individuals living in that small municipality will be assigned that estimation. To conclude, Table 1.2 shows that the ENOE survey typically covers more than 1,000 municipalities and collects more than 2,600 interviews per municipality, on average.

Table 1.2 - Statistics of the ENOE survey at the municipal level

Total number of surveys made at the municipal level

Year	Municipalities	Obs.	Mean	Std. Dev.	Min	Max
2005	1,071	150,393	2,699	2,466	9	8,249
2010	1,070	152,094	2,673	2,475	7	8,359
2015	1,008	152,944	2,590	2,418	9	8,302
2019	989	157,723	2,646	2,355	2	7,922

4.2.3 Control variables

This sub-section includes a detailed explanation of the control variables incorporated into 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 1.19, found in the appendix, presents various charts depicting the relationship between female labour participation and specific control variables examined in this section.

The initial control variables at the individual level are age and 'age squared,' given that the relationship between labour status and age is often non-linear. Additionally, I account for educational attainment, which is a categorical variable indicating the highest level of education achieved by each respondent. Research in this area highlights that the relationship between a woman's educational level and her labour market participation varies across different countries, making it incorrect to assume a universally positive and linear relationship.

Klasen *et al.* (2021) provide a comprehensive review of this research area, offering micro-level evidence on the disparities in the relationship between educational attainment and female labour participation across eight developing countries. Their analysis reveals that, in some developing nations, this relationship follows a U-shaped pattern, while in others, it adheres to a more typical linear relationship. Figure 1.19 shows that Mexican women with low education levels have the lowest labour force participation rates, while highly educated women have the highest. Therefore, educational attainment is included in the model as a control variable that appears to have a positive and linear relationship with female labour participation.

Another control variable included in the model is marital status, since Goldin (1994) noted that married women are less likely to work in blue-collar occupations. Surprisingly, Figure 1.19 shows that in Mexico, married women exhibit higher labour force participation rates compared with single women. Nevertheless, it is worth noting that the dataset includes all women above 15 years of age, meaning a substantial portion of the single women in the sample are teenagers who are likely still enrolled in high school or university.

The econometric model also includes a control variable that identifies whether the respondent lives in a household belonging to a low, medium-low, medium-high, or high socioeconomic stratum. According to INEGI (2020), this variable is derived using multivariate statistical methods based on 34 indicators that assess both the economic status of individuals and the physical attributes and amenities of their households. Key indicators include access to medical services, educational attainment, literacy levels, household flooring type (e.g., cement, wood, or mosaic), household overcrowding, access to essential utilities such as electricity, water, and drainage, and ownership of goods like televisions, cars, mobile phones, refrigerators, and washing machines. Based on this information, the 'socioeconomic stratum' variable serves as a proxy for the financial situation of household members.

This control variable is included as studies indicate that it could influence a woman's decision to engage in economic activities. For instance, Verick (2014) argued that poor women in low-income countries are more likely to participate in the labour market, often in subsistence activities or informal employment. In contrast, Lampietti and Stalker (2000) found that in six out of nine Latin American countries analysed, poor women exhibited lower female labour force participation rates (FLPRs) compared to their non-poor counterparts. In the case of Mexico, Figure 1.19 indicates that women from low socioeconomic strata have the lowest FLPRs.

A similar pattern is observed with the control variable that captures the number of children each woman in the sample has given birth to. Figure 1.19 shows that women without children have FLPRs comparable to those of married women. This observation may appear counter-intuitive, as women without children are typically more likely to participate in the workforce due to the lack of caregiving duties. Nevertheless, the sample includes all women aged 15 and above, as this is the appropriate method for estimating labour force participation rates according to ILO standards. This results in many underage women without children not being economically active.

According to estimates obtained by López-Acevedo *et al.* (2021), residing in a Mexican urban household is associated with an 11.1 percentage point increase in a woman's likelihood of being employed in both 2007 and 2017. Therefore, a control variable was included that takes the value of 1 if the household is in an urban area and 0 if it is in a rural area.. Falk and Leoni (2010) also found that population density is positively associated with FLPRs, suggesting that densely populated areas offer a wider and more diverse array of employment opportunities for women. Consequently, a variable controlling for population density was incorporated. This categorical variable is assigned a value of 1 if the household is in an area with more than 100,000 inhabitants, 2 if it has between 15,000 and 99,000 inhabitants, 3 if it has between 2,500 and 14,999 inhabitants, and 4 if it has fewer than 2,500 inhabitants.

The regression analysis also incorporates additional control variables to capture household characteristics. The model includes variables that account for the age, gender, and educational attainment of the household head. Additionally, the analysis considers control variables that capture the total number of household members and the number of children under the age of 5 within the household.

Finally, the econometric model incorporates control variables that represent the characteristics of the municipality. Including these controls in the regression analysis is crucial because the primary variables of interest in this study are the share of jobs in agriculture, industry, and services at the municipal level. Thus, the analysis needs to account for the specific characteristics of the municipality where the respondents reside. This approach facilitates a more accurate assessment of whether there is a statistically significant relationship between a woman's likelihood of participating in the workforce and the sectoral employment distribution in her municipality. The control variables at the municipal level are:

- Average age of women in the municipality.
- Share of women in the municipality with elementary schooling or less.
- Share of women in the municipality with secondary schooling.
- Share of women in the municipality with high-school education.
- Share of single women in the municipality.
- Share of married women in the municipality.
- Share of women in the municipality that are in a free union relationship.
- Share of people in the municipality from a low socioeconomic stratum.
- Share of people in the municipality of medium-low socioeconomic stratum.
- Average number of sons or daughters among women between 20-35 years old, (used as a proxy of the fertility rate in the municipality).

In addition to the control variables at the municipal level, this study also includes a variable that captures the percentage of people in the municipality who have migrated from their city or locality to retain or obtain their current job. This control is relevant because within-country migration is generally easier than cross-country migration. Considering the U-shaped hypothesis, which examines female labour participation across countries, it is essential to include this variable in the regression analysis to account for the relative ease of migration between regions within the same country, as opposed to migration from one country to another.

4.2.4 Descriptive statistics

To conclude this section, Table 1.3 shows the descriptive statistics of all the variables that were considered in the regression models.

Table 1.3 – Descriptive statistics

	Women						Men					
	Obs.	%	Mean	Std. Dev.	Min	Max	Obs.	%	Mean	Std. Dev.	Min	Max
Dependent variable												
Economically active	613,154	-	0.444	0.497	0	1	550,681	-	0.777	0.417	0	1
Main independent variables												
% 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
Individual characteristics												
Age	613,154	-	39.660	17.609	15	98	550,681		38.668	17.478	15	98
Marital status												
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	-	-	-	-
Level of education												
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	-	-	-	-
Household characteristics												
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	613,154	-	0.423	0.714	0	8	550,681	-	0.386	0.688	0	8
Located in urban/rural area	613,154	-	0.621	0.485	0	1	550,681	-	0.613	0.487	0	1
Population size of household location												
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	-	-	-	-
Socioeconomic strata												
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	-	-	-	-

	Women						Men					
	Obs.	%	Mean	Std. Dev.	Min	Max	Obs.	%	Mean	Std. Dev.	Min	Max
Household head characteristics												
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
Household head education												
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	-	-	-	-
Municipal characteristics												
% 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	-	-	-	-	-	-
Year/quarter												
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
Mexican states												
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 Potosi	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	-	-	-	-

4.3 Econometric model

The empirical analysis is based on a set of probit regressions designed to capture the relationship between female labour participation and the sectoral distribution of employment at the municipal level. The econometric model used to derive the main results of this study is represented by the following equation:

$$P(Y_{i,m,t} = 1) = \mathrm{F}\,(\beta_0 + \beta_1 Share_{s,m,t} + \beta_2 Share^2_{s,m,t} + \sum_j^4 \beta_x I^{(j)}_{i,m,t} + \sum_j^8 \beta_x H^{(j)}_{i,m,t} + \sum_j^{11} \beta_x M^{(j)}_{m,t} + \mu_{e,t} + \varepsilon_i)$$

Where 'Y' is a binary variable that takes the value of 1 if the respondent is part of the economically active population, and 0 otherwise. Hence, the dependent variable of this model is used to estimate the probability that the individual *(i)* living in a given municipality *(m)* is part of the workforce in time *(t)*. 'F' is the standard normal cumulative distribution function and β_0 is the intercept.

'*Share*' is the main independent variable of the model, capturing the percentage of sectoral jobs *(s)* either in agriculture, industry, or services as a share of total employment in municipality *(m)* in time *(t)*. Furthermore, $Share^2$ represents the squared term for the percentages of jobs within these sectors. This is useful to capture any potential non-linear relationship between female labour participation and the share of jobs in any of the three economic sectors. As the model reflects, these three variables capturing the sectoral distribution of employment at the municipal level were not included in the model simultaneously to avoid multicollinearity. Finally, β_1 and β_2 are the coefficients of interest in this study. They will capture if there is a positive or negative relationship between the share of jobs in agriculture, industry or services at the municipal level and the likelihood that a woman is part of the workforce.

'I' represents a vector of four control variables that account for the individual characteristics of each respondent in the sample. This vector includes '*age*' and '*age squared*' as the relationship between female labour participation and age is often non-linear. The model also includes controls for marital status and educational attainment, which captures the highest level of education achieved by the respondents.

'H' represents a vector of eight control variables capturing different household characteristics, including: 1) socioeconomic stratum of the household, 2) number of children under five years old in the household, 3) total number of household members, 4) sex of the household head, 5) age of the household head, and 6) educational attainment of the household head. Furthermore, the econometric model includes two variables that describe the characteristics of the household's location: 1) population size of the locality, and 2) whether the household is in a rural or urban area.

'M' represents a vector of eleven control variables, listed in the table of descriptive statistics, that account for different characteristics of the municipality where each respondent lives. These control variables were estimated using the sampling weights provided by INEGI, and their purpose is to ensure that the relationship between the dependent variable (female labour participation) and the key independent variables (share of jobs in agriculture, industry, or services) is not spurious.

Lastly, $i \in \{1, \ldots, N\}$ denotes the index for each individual in the sample, $m \in \{1, \ldots, M\}$ denotes the index for municipalities, $t \in$ {2005 1Q, 2010 1Q, 2015 1Q, 2019 1Q} represents the specific years and quarters considered in this study, $s \in$ {agriculture, industry, services} denotes the index for the share of jobs in each economic sector, and $e \in \{1, \ldots, 32\}$ refers to the index for the 32 states in Mexico. Finally, μ represents the fixed effects incorporated into the model to control for unobserved heterogeneity over time and across Mexican states. The first quarter of 2005 and Mexico City serve as the base categories for the fixed effects.

5 Results

The findings from the regression analyses are compelling. As outlined earlier, the study utilises a repeated cross-sectional dataset from Mexico, spanning the first quarters of 2005, 2010, 2015, and 2019. The results were obtained using probit regressions to determine whether the share of jobs in agriculture, industry, or services at the municipal level is positively or negatively associated with women's likelihood of being economically active.

In all instances, the regressions are restricted to women aged 15 and above, as this is the legal working age in Mexico and the minimum age used by INEGI and the ILO for estimating FLPRs. The regressions were executed using probability weights and included fixed effects to account for unobserved heterogeneity across Mexican states over time. Additionally, standard errors are clustered at the municipal level, as both the sectoral distribution of employment and the local control variables were estimated based on the territorial divisions of Mexican municipalities.

The results are presented in various formats. Table 1.4 shows the results obtained from all the probit regressions. Table 1.5, included in the appendix, displays the average marginal probabilities of being economically active based on sex and the share of jobs in agriculture, industry, and services at the municipal level. Finally, Figure 1.9 illustrates the regression outcomes reported in the previous tables to facilitate the interpretation of the results.

The results reject the hypothesis that a higher share of industrial jobs is associated with lower female labour participation. Instead, the findings show that women's probability of being economically active declines if they live in municipalities with a higher share of agricultural jobs. Meanwhile, the regression results indicate a strong positive relationship between female labour participation and a higher share of jobs in the service sector, which is consistent with the U-shaped feminisation hypothesis.

Although it is not possible to make causal claims from these results, it is worth noting 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 and the characteristics of their place of residence. It is also important to emphasise that the regression analysis includes both paid and unpaid jobs on farms and in businesses. In Mexico, an individual is considered part of the economically active population if they are family workers without a salary or if they are producing food solely for self-consumption. Therefore, there is no evidence to suggest that the low female labour participation in agricultural activities is due to unpaid agricultural labour being excluded from the labour force estimations.

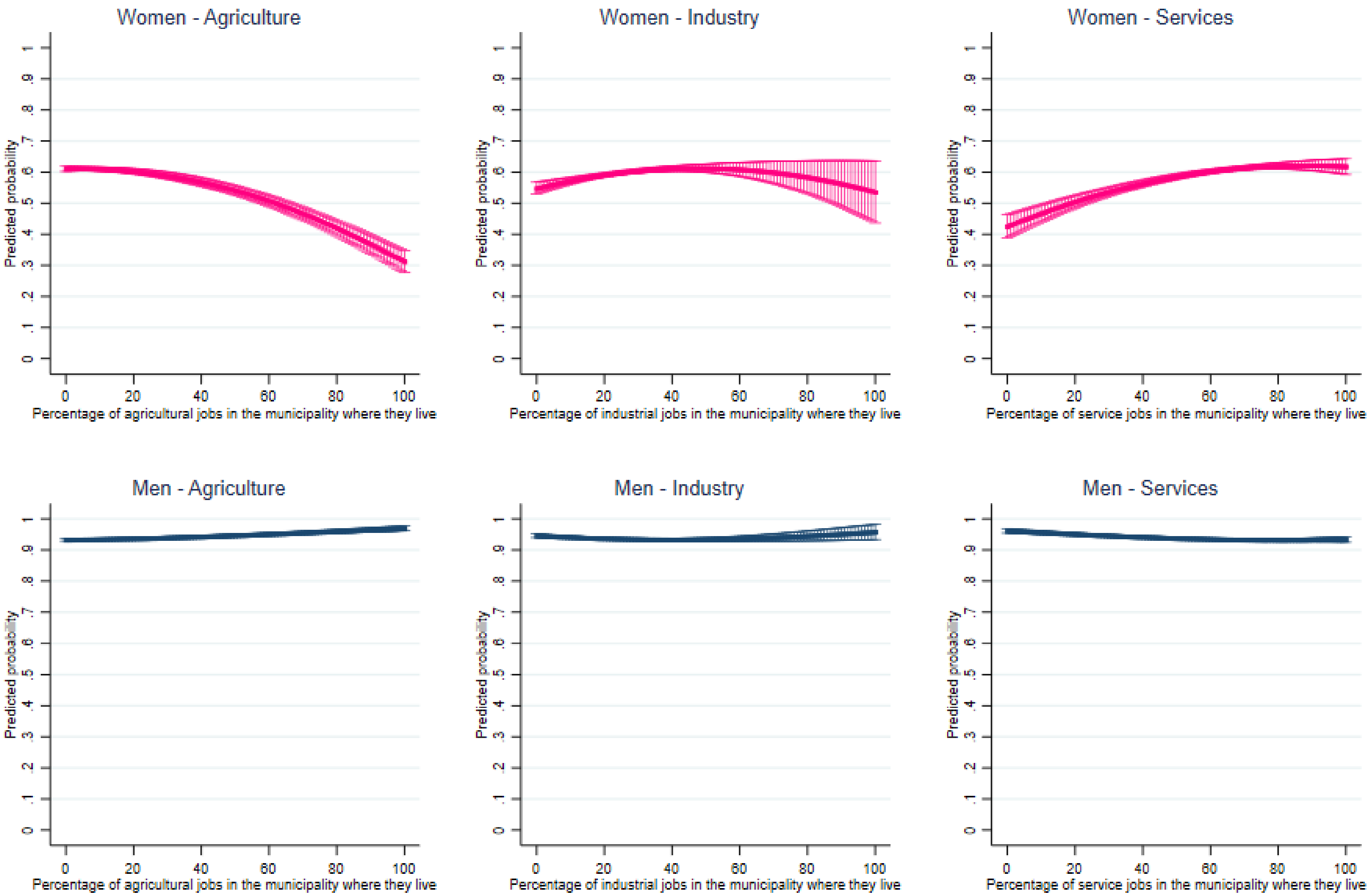
Based on these results, one plausible explanation for the low levels of female labour participation in Mexico is that women living in agricultural communities are particularly less likely to work. Additionally, the discovery of a positive relationship between female labour participation and a higher proportion of industrial jobs marks a notable contribution to the existing literature. Prior research has often accepted this hypothesis as a stylised fact, despite this being the first study to empirically assess it. Therefore, this paper shows that the sectoral distribution of employment in local labour markets is indeed an explanatory variable for female labour participation. Nevertheless, the dynamics of female labour participation in Mexico do not entirely align with the predictions of the U-shaped feminisation hypothesis.

Table 1.4 - Probability that men and women are economically active depending on the sectoral distribution of employment at the municipal level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
VARIABLES	Women	Women	Women	Men	Women	Women	Women	Men	Women	Women	Women	Men	Robustness
Share of agricultural jobs	-0.0090***	-0.00593***	0.00065	0.00079									
	(0.0001)	(0.00045)	(0.00089)	(0.00094)									
Share of agricultural jobs ^{2}			-0.00008***	0.00003**									
			(0.00001)	(0.00001)									
Share of industrial jobs					0.0034***	0.00257***	0.00687***	-0.00520***					
					(0.0003)	(0.00056)	(0.00157)	(0.00171)					
Share of industrial jobs ^{2}							-0.00007***	0.00006**					
							(0.00002)	(0.00003)					
Share of service jobs									0.0089***	0.00490***	0.01129***	-0.00675***	
									(0.0001)	(0.00053)	(0.00164)	(0.00149)	
Share of service jobs ^{2}											-0.00006***	0.00004***	
											(0.00001)	(0.00001)	
Share of non-agricultural jobs													0.01902***
													(0.00170)
Share of non-agricultural jobs ^{2}													-0.00011***
													(0.00001)
Control variables													
Individual characteristics	X	✓	✓	✓	X	✓	✓	✓	X	✓	✓	✓	✓
Household characteristics	X	✓	✓	✓	X	✓	✓	✓	X	✓	✓	✓	✓
Municipal characteristics	X	✓	✓	X	X	✓	✓	X	X	✓	✓	X	✓
Fixed effects: Year/quarter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fixed effects: Mexican states	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clustered standard errors	X	✓	✓	✓	X	✓	✓	✓	X	✓	✓	✓	✓
Constant	-0.0859***	-3.18415***	-3.12731***	-1.16940***	-0.1650***	-2.92330***	-2.96848***	-1.04266***	-0.8089***	-3.29559***	-3.40730***	-0.89741***	-4.86430***
	(0.0113)	(0.17039)	(0.16905)	(0.06549)	(0.0123)	(0.17564)	(0.17628)	(0.06696)	(0.0161)	(0.18293)	(0.18489)	(0.07056)	(0.20945)
Observations	613,153	609,070	609,070	548,764	613,153	609,070	609,070	548,764	613,153	609,070	609,070	548,764	538,413

Notes:
Base category for state fixed effects: Mexico City
Base category for time fixed effects: 2019, first quarter
Clustered standard errors at the municipal level
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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

I decided to follow the empirical strategy of Roncolato (2016) to test whether my previous results hold under her specifications. To the best of my knowledge, this is the only study that has analysed the U-shaped feminisation hypothesis within a country using microdata. As previously explained, she found that in South Africa, there is a U-shaped relationship between the share of non-agricultural employment at the municipal level and women's probability of participating in the labour force.

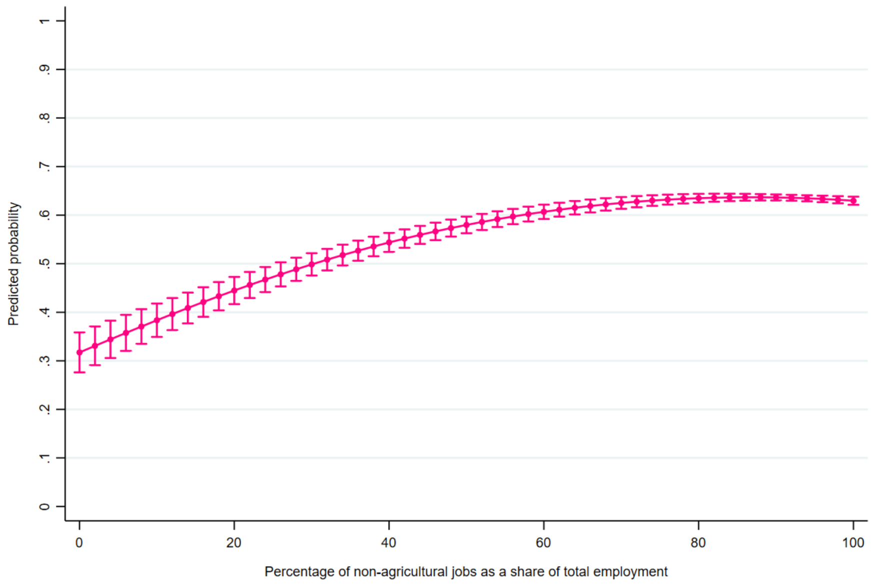
Although the empirical strategy of Roncolato (2016) is similar to mine, specific aspects vary between both studies. One crucial difference is that she considers structural change to occur after a decline in the share of employment in the agricultural sector. Consequently, she uses the "share of non-agricultural jobs" as the main independent variable in her econometric model. Conversely, my previous analysis considered three variables that capture the share of jobs in agriculture, industry, and services. By doing so, I was able to test the hypothesis that women living in regions with a higher share of industrial jobs are less likely to be economically active.

Another difference is that she was unable to control for internal migration in her analysis since South Africa's dataset does not include information on this subject. As she explained, it is much easier for workers within a country to move across municipal borders compared to moving across international borders. Fortunately, the ENOE household surveys include a question asking respondents if they moved from their hometown to retain or obtain their current job. Another difference is that she used a cross-sectional dataset from 2007, while my analysis uses a repeated cross-sectional dataset covering four different surveys conducted between 2005 and 2019.

Finally, another minor difference is that I decided to follow the ILO's standards for calculating labour force participation rates. For instance, in her analysis, she restricted the sample to women aged 15 to 65 years, while I considered all women aged 15 and above. Moreover, her analysis excluded students, sick, and disabled individuals from her sample, whereas I maintained them as part of the non-economically active population, as this is the international standard for calculating FLPRs.

I decided to perform an additional regression based on the specifications of Roncolato (2016). The results of this regression analysis can be found in the last column of Table 1.4. Furthermore, the computation of average marginal probabilities derived from this probit regression can be found in Table 1.5, included in the appendix. Finally, Figure 1.10 illustrates the regression outcomes to facilitate its interpretation. The chart shows the change in the predicted probability of a woman being economically active for each one-unit increase in the share of non-agricultural jobs in her municipality. These estimations were obtained by holding the control variables at their means. The results confirm that, even after applying Roncolato's methodology, there is no U-shaped pattern within Mexico. Instead, the analysis reveals a clear upward trend, as women's likelihood of being part of the workforce decreases in agricultural regions but gradually increases in regions with a higher share of non-agricultural jobs.

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



6 Discussion

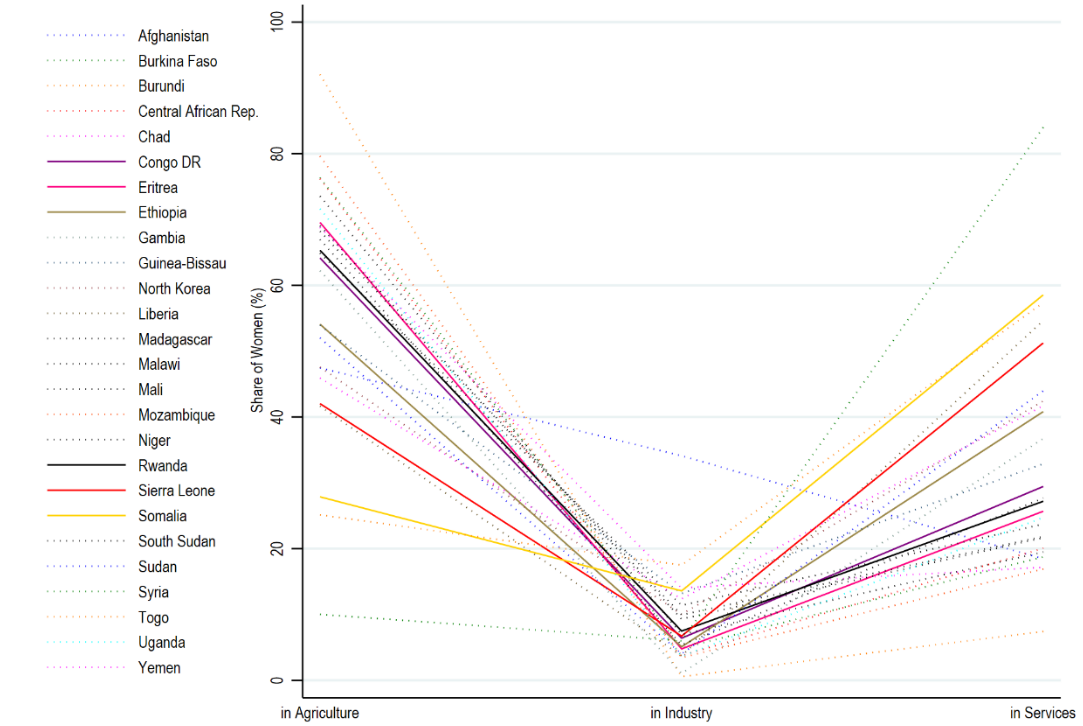
The previous section highlighted that the U-shaped relationship holds within South Africa. In contrast, my results show an upward trend within Mexico. These two countries are highly unequal, categorised as upper-middle-income economies, and have a similar sectoral distribution of employment. According to World Bank data, in 2022 South Africa had 19% of jobs in agriculture, 18% in industry, and 63% in services. Meanwhile, Mexico had 13% of jobs in agriculture, 25% in industry, and 62% in services. Thus, the objective of this section is to discuss why countries with these similarities exhibit different patterns.

To conduct this analysis, I use data from the World Bank to examine how female labour is distributed across agriculture, industry, and services in countries with similar levels of economic development. The first chart in Figure 1.11 illustrates that in low-income countries, a high percentage of women are employed in agriculture and services, with fewer in the industrial sector. Conversely, the second chart in Figure 1.11 shows that in high-income countries, there are few women involved in agriculture, a slightly larger share working in industry, and most employed in services. Unsurprisingly, this pattern is highly correlated with the sectoral distribution of employment typically observed in countries at these stages of economic development.

In contrast, upper-middle-income countries have a similar sectoral distribution of employment but follow two distinct trends. The first chart in Figure 1.12 shows that in South Africa and some other upper-middle-income countries, the sectoral distribution of female labour follows a U-shaped pattern, resembling the trend seen in low-income countries. Meanwhile, in other upper-middle-income countries like Mexico, there is an upward trend, indicating a higher share of women working in industry compared to agriculture, which mirrors the pattern observed in high-income countries.

Figure 1.11 – Sectoral distribution of the female workforce in low-income and high-income countries

U-shaped sectoral distribution of the female workforce in low-income countries



Upward sectoral distribution of the female workforce in high-income countries

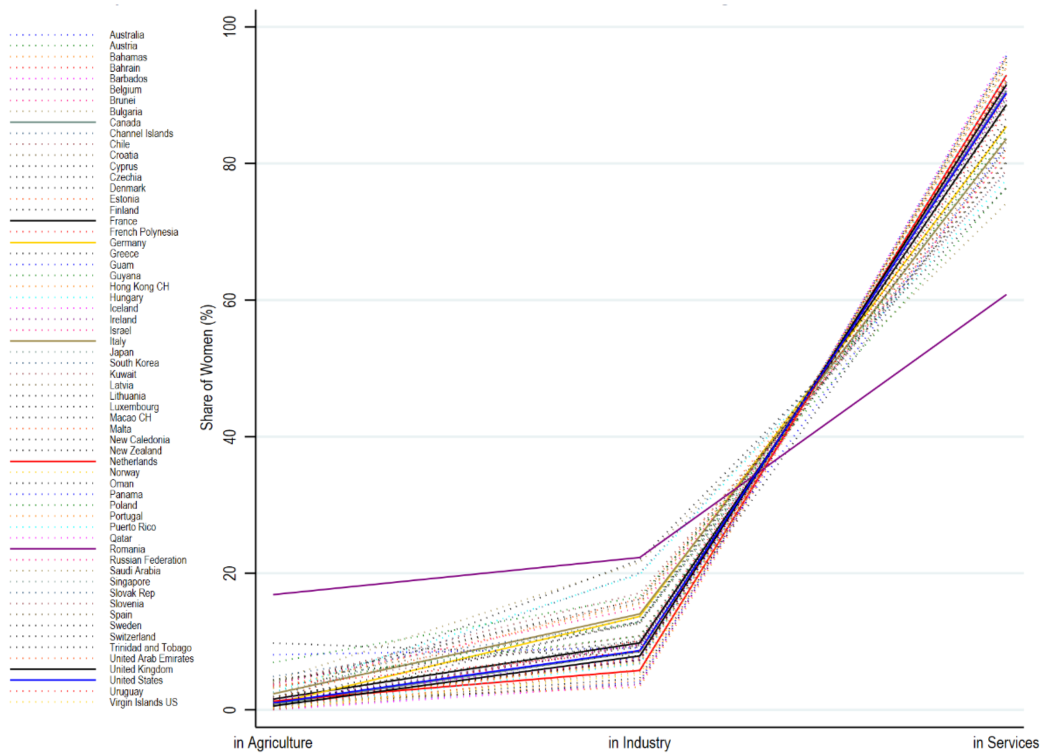
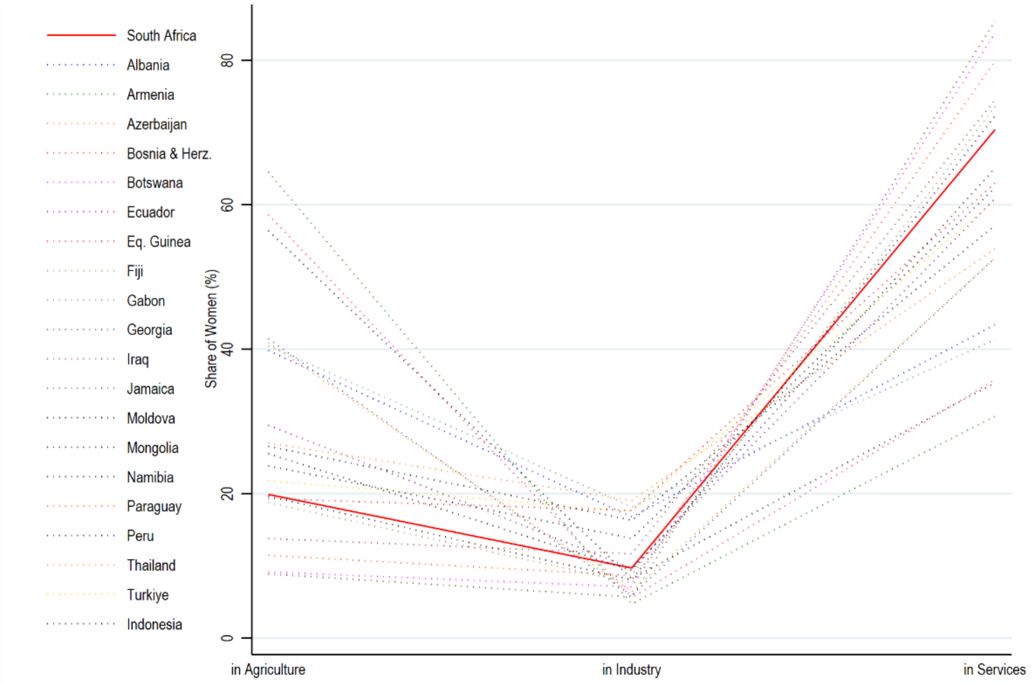
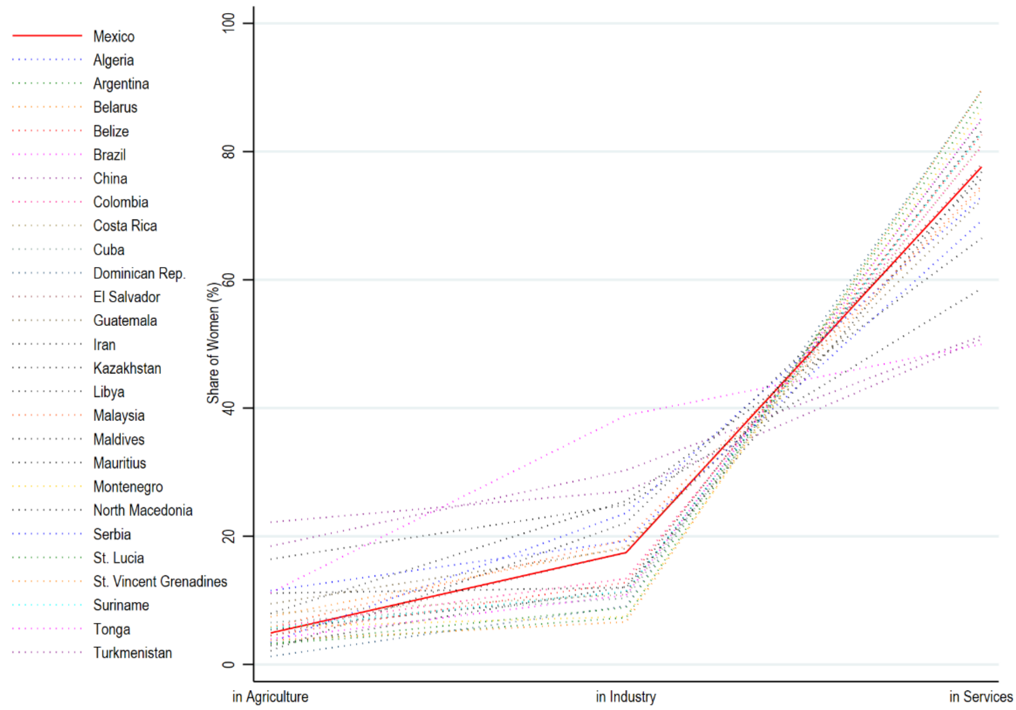


Figure 1.12 – Sectoral distribution of the female workforce in upper-middle-income countries

U-shaped sectoral distribution of female workforce in upper-middle-income countries



Upward sectoral distribution of female workforce in upper-middle-income countries



The previous figure reaffirms that the involvement of women in agricultural jobs is particularly low in Mexico. As previously mentioned, World Bank data indicates that in 2022, around 13% of jobs in Mexico were in the agricultural sector, yet only 4% of working women in Mexico were engaged in agricultural activities. In contrast, during 2022, South Africa reported that 19% of total jobs were in agriculture, while 20% of working women participated in this sector.

A plausible explanation for the low labour participation of Mexican women in the agricultural sector can be found in the U-shaped feminisation hypothesis. Goldin (1994) placed considerable emphasis on the argument that low female labour participation in middle-income countries is due to the expansion of the industrial sector and a strong social stigma against wives working in blue-collar jobs. However, she briefly noted that as part of structural change, the introduction of agricultural machinery can also displace female workers engaged in labour-intensive agricultural tasks, creating a complex demand effect. This hypothesis aligns with findings of Afridi *et al*. (2020), who reported that technological changes in agriculture led to a significant decline in demand for women's labour on farms in India. Further evidence of Deshpande and Singh (2021) also indicates that the lower demand for female workers has contributed to the unusual decline in FLPRs in India.

Based on this discussion, I decided to explore whether a lack of labour demand could be related to the low female labour participation in agricultural regions of Mexico. To investigate this, I analysed two specific questions from Mexico's ENOE survey. First, the survey includes a question asking non-economically active individuals whether they are disabled, retired, studying, or responsible for household chores. A follow-up question seeks to determine the primary reason for their economic inactivity. The response options for this question are listed in Table 1.6, included in the appendix. However, there is one particular response to the second question that could indicate whether low labour demand is a contributing factor: "I am not working because in my locality there are no jobs, or they are only available during certain seasons of the year."

Based on this survey question, I analysed the responses of working-age women who are non-economically active and are dedicated to household chores. The charts obtained from this exploratory data analysis are presented in the appendix. Figure 1.14 illustrates the primary reasons why women with these characteristics are not participating in the workforce. The chart shows that in 2019, the predominant reason among women dedicated to household chores was their need to care for elderly or disabled individuals living in the household. Interestingly, the second most important reason was the lack of job opportunities in their locality and the seasonal availability of jobs.

Figure 1.15 shows that nearly all women who were not working due to a lack of labour demand live in rural areas of Mexico. Furthermore, Figure 1.16 compiles the responses of all women who selected the labour demand option across all the ENOE surveys available from 2005 to 2019, confirming that almost all of them reside in rural areas. Figure 1.17 highlights that in localities with populations exceeding 100,000, the lack of labour demand is not a significant factor. Conversely, in small localities with fewer than 2,500 inhabitants, more than one-quarter of working-age women indicated that they are not employed due to a lack of labour demand. Lastly, Figure 1.18 shows that in localities with fewer than 2,500 inhabitants, the agricultural sector accounts for more than 40% of total employment, on average.

Based on this brief exploratory data analysis, the paper argues that low FLPRs in Mexico may be linked to the limited female labour demand in agricultural regions of the countries. Finally, it seems that the position of Mexico in the downward portion of the U-shaped pattern across countries is not because the lack of FLP in the industrial sector, but rather because women are not involved in agricultural activities.

7 Conclusion

One of the main explanations for the downward portion of the U-shaped feminisation hypothesis is that middle-income countries experience an expansion of the industrial sector. Consequently, FLPRs tend to decline in this economic context due to a social stigma against women working in blue-collar jobs. Pampel and Tanaka (1986) posited that women are often excluded from early industrial jobs because of physical limitations, gender discrimination, and the domestic demands associated with higher fertility rates. In line with this argument, Goldin (1994) argued that in developing countries, there is typically a social stigma that excludes women from participating in industrial jobs, particularly married women. Thus, the literature on this subject has widely accepted as a stylised fact that, as part of the structural transformation process, low levels of female labour participation in middle-income countries are attributed to the lack of women's engagement in industrial jobs.

Due to the limited number of studies that have empirically evaluated this specific hypothesis, this paper fills a gap in the literature by assessing whether there is a negative relationship between female labour participation and a higher share of industrial jobs in women's place of residence. To achieve this, the paper employs a novel empirical strategy using microdata to analyse the within-country relationship between FLPRs and different levels of economic development across regions of the same country. The analysis relies on Mexico's household surveys, which offer a level of disaggregation that is not available in cross-country studies. Thus, one of the main contributions of this paper is that the results provide insights at the individual level.

The results do not support the hypothesis. The analysis revealed that one potential reason behind the low FLPRs in Mexico is the limited involvement of women in the agricultural sector. Background data showed that in 2019, only 4% of the female workforce in Mexico was employed in agriculture. Additionally, the scatterplots at both the state and municipal levels indicated that female labour participation is lower in agricultural regions of the country. Finally, the probit regressions confirmed that women's likelihood of participating in the labour market decreases if they live in municipalities with a high share of agricultural jobs.

Furthermore, the results reject the hypothesis of a negative relationship between female labour participation and a higher share of industrial jobs in their place of residence. Instead, the probit regressions confirmed a positive relationship between female labour participation and a higher percentage of jobs in the industrial sector. Background data illustrate that in 2019, approximately 17% of economically active women were employed in the industrial sector. Additionally, the scatterplots at the state and municipal levels confirm that there is no evidence to support the alleged negative relationship between FLPRs and a higher share of industrial jobs.

In contrast, some results align with the U-shaped feminisation hypothesis. This research found that Mexican women living in municipalities with a high share of service jobs have the highest likelihood of participating in the labour force across the country. Background data also show that in 2019, around 80% of the female workforce in Mexico was employed in the service sector. Therefore, as most of the literature on this topic indicates, this paper confirms that women tend to have high labour participation rates if they live in places with a service-oriented economy.

Comparative results between men and women also reveal interesting patterns. In the case of men, their likelihood of working does not vary significantly depending on the sectoral distribution of employment in their place of residence. Their probability of participating in the labour force consistently exceeds 90%, regardless of whether they live in agricultural, industrial, or service-oriented regions of the country. In contrast, the likelihood of women's participation changes substantially depending on the share of jobs in agriculture, industry, and services in their place of residence. Their probability of participating in the workforce typically hovers around 30% if they live in municipalities where agriculture predominates, but can increase to 60% if they reside in regions with a service-oriented economy. Thus, one of the main contributions of this paper to the literature is its demonstration that the sectoral distribution of employment significantly influences women's likelihood of participating in the workforce, while it does not play a decisive role for men.

This research leaves open the debate on why female labour participation in agricultural activities is particularly low in Mexico. A brief cross-country analysis revealed that other upper-middle-income countries exhibit similar patterns. In Colombia, Brazil, China, and Malaysia, more women are employed in industrial activities than in agriculture. Consequently, these countries display an upward trend in the sectoral distribution of the female workforce, similar to the pattern observed in high-income countries. Conversely, other upper-middle-income countries like South Africa, Peru, Thailand, and Indonesia employ more women in agriculture than in industry. In these cases, the countries exhibit a U-shaped sectoral distribution of the female workforce, resembling the pattern found in low-income countries.

A within-country analysis of data from Mexico also revealed that one reason for the low participation of women in agriculture is the lack of labour demand for female workers in agricultural regions. This evidence leads to the hypothesis that, in some upper-middle-income countries like Mexico, the agricultural sector has become capital-intensive, thereby reducing the demand for female labour. In contrast, other upper-middle-income countries may still maintain labour-intensive agricultural activities that continue to require female workers. Another factor influencing these patterns could be that in some emerging economies, such as Mexico, nearly all crops are harvested by men, while in others, the agricultural sector produces crops that are typically harvested by women. Therefore, these divergent trends among countries with similar levels of economic development remain an open question that warrants further investigation.

There are other aspects that could be explored in future research. For instance, the female labour force function indicates that FLPRs increase during the expansion of the service sector. The reasoning is that women are more likely to work in clerical roles in the white-collar sector than in blue-collar jobs, which carry a higher social stigma. However, this theory does not account for the fact that most service jobs in early developed countries were formal, whereas in many upper-middle-income countries, a significant portion of jobs in the service sector are part of the informal economy. Even in Mexico City, the most developed city in the country, there are numerous informal jobs in the service sector. Thus, it would be worthwhile to examine whether there are substantial differences in women's labour participation in formal versus informal jobs in the service sector.

It is also important to emphasise that this analysis cannot be considered a standard evaluation of the U-shaped hypothesis, as the paper does not undertake a historical examination of FLPRs in Mexico. The study relies on microdata from Mexico's household surveys, available from the first quarter of 2005 onwards. World Bank data indicates that the sectoral distribution of employment in Mexico at that time was 15% in agriculture, 26% in industry, and 59% in services. Thus, assessing the U-shaped hypothesis in Mexico from a historical standpoint would require data from the period when agriculture was the primary source of employment.

If a historical analysis of FLPRs had been chosen, this research would have been just another study examining the theory using aggregate data, without the capacity to corroborate or refute the underlying factors driving these trends. It may be true that when Mexico was primarily an agricultural country, FLPRs were particularly high, then experienced a decline during the expansion of the industrial sector, and are now rising due to the sustained growth of service activities. However, even if this pattern were confirmed, it would still be uncertain which sector-specific factors led to the decline in female labour participation rates. For this reason, the study chose to take certain theoretical underpinnings of this macroeconomic theory and assess its micro-foundations using highly disaggregated data obtained from household surveys.

I would like to conclude by emphasising the value of this research paper in the current body of literature on this subject. First, this research followed a micro-econometric approach to provide valuable empirical evidence at the individual level. This empirical strategy was instrumental in confirming that the sectoral distribution of employment is a factor that influences the likelihood of women participating in the labour force. Furthermore, the analysis refutes the hypothesis of a negative relationship between female labour participation and a higher share of industrial jobs in local labour markets. Instead, it demonstrates that women's participation is particularly low in agricultural activities, and one potential driver is the lack of female labour demand in agricultural regions of the country.

These results represent a meaningful contribution to the literature, given the lack of within-country studies evaluating specific hypotheses of the female labour force function. Moreover, the empirical strategy based on microdata offers a level of disaggregation that cannot be achieved in cross-country analyses using macro-level data. Hence, this paper highlights the current relationship between female labour participation and different levels of economic development across regions within the same country. Employing this approach was instrumental in uncovering valuable insights that contradict some of the premises of the U-shaped feminisation hypothesis. It is hoped that the findings of this research will inspire future studies to develop a deeper understanding of the factors that can increase female participation in the labour market.

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9 Appendix

Figure 1.13 – FLPRs and % of jobs in agriculture, industry, and services across countries (2019)

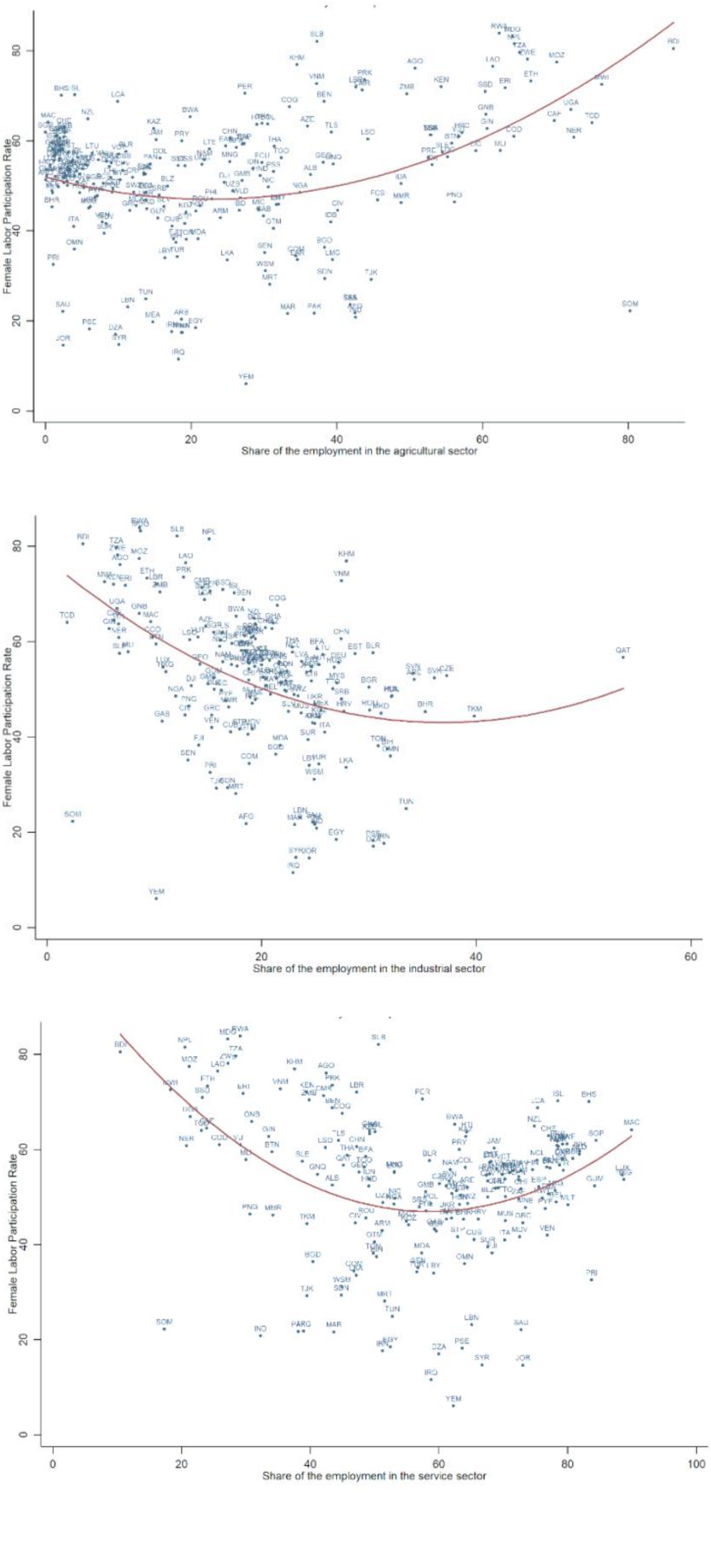


Table 1.5 - Average marginal probabilities of being economically active depending on sex and the share of jobs in agriculture, industry, and services at the municipal level

	Women			Men			Robustness check
% of jobs in	Agriculture	Industry	Services	Agriculture	Industry	Services	Non-agricultural
0	0.6105***	0.5484***	0.4256***	0.9336***	0.9467***	0.9622***	0.3173***
	(0.0041)	(0.0100)	(0.0191)	(0.0020)	(0.0032)	(0.0035)	(0.0210)
2	0.6108***	0.5537***	0.4344***	0.9339***	0.9456***	0.9611***	0.3308***
	(0.0038)	(0.0089)	(0.0181)	(0.0019)	(0.0029)	(0.0034)	(0.0203)
4	0.6110***	0.5588***	0.4430***	0.9341***	0.9445***	0.9599***	0.3442***
	(0.0036)	(0.0079)	(0.0170)	(0.0019)	(0.0027)	(0.0032)	(0.0196)
6	0.6108***	0.5637***	0.4514***	0.9344***	0.9435***	0.9588***	0.3575***
	(0.0034)	(0.0070)	(0.0160)	(0.0019)	(0.0025)	(0.0031)	(0.0189)
8	0.6104***	0.5683***	0.4596***	0.9347***	0.9425***	0.9577***	0.3706***
	(0.0034)	(0.0062)	(0.0151)	(0.0019)	(0.0023)	(0.0030)	(0.0182)
10	0.6098***	0.5727***	0.4677***	0.9350***	0.9416***	0.9566***	0.3836***
	(0.0034)	(0.0055)	(0.0141)	(0.0019)	(0.0022)	(0.0029)	(0.0175)
12	0.6089***	0.5768***	0.4755***	0.9354***	0.9407***	0.9556***	0.3963***
	(0.0036)	(0.0048)	(0.0132)	(0.0019)	(0.0020)	(0.0028)	(0.0168)
14	0.6077***	0.5807***	0.4832***	0.9358***	0.9398***	0.9545***	0.4088***
	(0.0037)	(0.0043)	(0.0124)	(0.0020)	(0.0019)	(0.0027)	(0.0162)
16	0.6063***	0.5844***	0.4907***	0.9362***	0.9390***	0.9534***	0.4211***
	(0.0040)	(0.0039)	(0.0116)	(0.0020)	(0.0019)	(0.0026)	(0.0155)
18	0.6046***	0.5879***	0.4979***	0.9367***	0.9383***	0.9524***	0.4331***
	(0.0042)	(0.0037)	(0.0109)	(0.0020)	(0.0019)	(0.0026)	(0.0149)
20	0.6027***	0.5911***	0.5050***	0.9371***	0.9376***	0.9513***	0.4448***
	(0.0044)	(0.0035)	(0.0102)	(0.0021)	(0.0018)	(0.0025)	(0.0143)
22	0.6005***	0.5941***	0.5118***	0.9376***	0.9370***	0.9503***	0.4562***
	(0.0047)	(0.0034)	(0.0095)	(0.0021)	(0.0018)	(0.0024)	(0.0137)
24	0.5980***	0.5969***	0.5185***	0.9382***	0.9364***	0.9493***	0.4673***
	(0.0050)	(0.0033)	(0.0089)	(0.0022)	(0.0019)	(0.0024)	(0.0132)
26	0.5953***	0.5994***	0.5249***	0.9387***	0.9359***	0.9483***	0.4780***
	(0.0052)	(0.0033)	(0.0083)	(0.0022)	(0.0019)	(0.0023)	(0.0127)
28	0.5923***	0.6017***	0.5312***	0.9393***	0.9355***	0.9473***	0.4885***
	(0.0055)	(0.0034)	(0.0078)	(0.0023)	(0.0019)	(0.0023)	(0.0122)
30	0.5891***	0.6038***	0.5372***	0.9399***	0.9351***	0.9464***	0.4986***
	(0.0057)	(0.0035)	(0.0074)	(0.0023)	(0.0020)	(0.0023)	(0.0117)
32	0.5855***	0.6057***	0.5430***	0.9405***	0.9348***	0.9454***	0.5083***
	(0.0060)	(0.0036)	(0.0069)	(0.0023)	(0.0020)	(0.0022)	(0.0113)
34	0.5818***	0.6073***	0.5486***	0.9412***	0.9346***	0.9445***	0.5177***
	(0.0062)	(0.0038)	(0.0065)	(0.0024)	(0.0020)	(0.0022)	(0.0109)
36	0.5777***	0.6087***	0.5540***	0.9418***	0.9344***	0.9437***	0.5268***
	(0.0064)	(0.0039)	(0.0062)	(0.0024)	(0.0021)	(0.0022)	(0.0106)
38	0.5734***	0.6099***	0.5591***	0.9425***	0.9343***	0.9428***	0.5354***
	(0.0066)	(0.0042)	(0.0059)	(0.0024)	(0.0021)	(0.0022)	(0.0103)

40	0.5688***	0.6109***	0.5641***	0.9432***	0.9342***	0.9420***	0.5438***
	(0.0068)	(0.0044)	(0.0056)	(0.0024)	(0.0022)	(0.0022)	(0.0100)
42	0.5639***	0.6116***	0.5688***	0.9440***	0.9342***	0.9412***	0.5517***
	(0.0070)	(0.0048)	(0.0053)	(0.0024)	(0.0023)	(0.0022)	(0.0097)
44	0.5588***	0.6122***	0.5734***	0.9447***	0.9343***	0.9405***	0.5593***
	(0.0072)	(0.0052)	(0.0051)	(0.0024)	(0.0024)	(0.0021)	(0.0094)
46	0.5534***	0.6125***	0.5777***	0.9455***	0.9344***	0.9397***	0.5665***
	(0.0074)	(0.0056)	(0.0049)	(0.0024)	(0.0025)	(0.0021)	(0.0092)
48	0.5477***	0.6126***	0.5818***	0.9463***	0.9346***	0.9390***	0.5733***
	(0.0076)	(0.0062)	(0.0047)	(0.0025)	(0.0026)	(0.0021)	(0.0089)
50	0.5417***	0.6124***	0.5857***	0.9471***	0.9349***	0.9384***	0.5798***
	(0.0078)	(0.0068)	(0.0045)	(0.0025)	(0.0028)	(0.0021)	(0.0087)
52	0.5355***	0.6121***	0.5894***	0.9479***	0.9352***	0.9377***	0.5860***
	(0.0079)	(0.0075)	(0.0043)	(0.0025)	(0.0030)	(0.0021)	(0.0085)
54	0.5290***	0.6115***	0.5929***	0.9487***	0.9356***	0.9371***	0.5917***
	(0.0081)	(0.0083)	(0.0042)	(0.0025)	(0.0032)	(0.0021)	(0.0083)
56	0.5222***	0.6107***	0.5962***	0.9496***	0.9361***	0.9366***	0.5971***
	(0.0084)	(0.0092)	(0.0040)	(0.0025)	(0.0035)	(0.0020)	(0.0080)
58	0.5151***	0.6097***	0.5993***	0.9504***	0.9366***	0.9361***	0.6022***
	(0.0086)	(0.0102)	(0.0039)	(0.0025)	(0.0037)	(0.0020)	(0.0078)
60	0.5078***	0.6085***	0.6021***	0.9513***	0.9372***	0.9356***	0.6069***
	(0.0088)	(0.0113)	(0.0037)	(0.0025)	(0.0040)	(0.0020)	(0.0076)
62	0.5002***	0.6070***	0.6048***	0.9522***	0.9378***	0.9351***	0.6112***
	(0.0091)	(0.0124)	(0.0036)	(0.0025)	(0.0044)	(0.0019)	(0.0073)
64	0.4924***	0.6054***	0.6073***	0.9531***	0.9385***	0.9347***	0.6152***
	(0.0093)	(0.0136)	(0.0036)	(0.0025)	(0.0047)	(0.0019)	(0.0070)
66	0.4842***	0.6035***	0.6096***	0.9540***	0.9393***	0.9344***	0.6188***
	(0.0096)	(0.0150)	(0.0035)	(0.0026)	(0.0051)	(0.0019)	(0.0068)
68	0.4759***	0.6013***	0.6116***	0.9549***	0.9401***	0.9341***	0.6222***
	(0.0100)	(0.0164)	(0.0036)	(0.0026)	(0.0055)	(0.0019)	(0.0065)
70	0.4672***	0.5990***	0.6135***	0.9558***	0.9409***	0.9338***	0.6251***
	(0.0103)	(0.0179)	(0.0036)	(0.0027)	(0.0059)	(0.0019)	(0.0062)
72	0.4583***	0.5964***	0.6152***	0.9567***	0.9418***	0.9335***	0.6277***
	(0.0107)	(0.0195)	(0.0038)	(0.0027)	(0.0063)	(0.0019)	(0.0059)
74	0.4492***	0.5936***	0.6166***	0.9576***	0.9428***	0.9333***	0.6300***
	(0.0111)	(0.0211)	(0.0040)	(0.0028)	(0.0067)	(0.0020)	(0.0056)
76	0.4398***	0.5906***	0.6179***	0.9586***	0.9438***	0.9332***	0.6320***
	(0.0116)	(0.0229)	(0.0043)	(0.0028)	(0.0072)	(0.0020)	(0.0052)
78	0.4302***	0.5873***	0.6190***	0.9595***	0.9448***	0.9331***	0.6336***
	(0.0120)	(0.0248)	(0.0047)	(0.0029)	(0.0076)	(0.0021)	(0.0049)
80	0.4204***	0.5838***	0.6199***	0.9605***	0.9459***	0.9330***	0.6349***
	(0.0125)	(0.0267)	(0.0052)	(0.0030)	(0.0081)	(0.0022)	(0.0045)
82	0.4104***	0.5801***	0.6206***	0.9614***	0.9470***	0.9330***	0.6359***
	(0.0130)	(0.0287)	(0.0057)	(0.0031)	(0.0085)	(0.0023)	(0.0042)
84	0.4002***	0.5762***	0.6211***	0.9623***	0.9482***	0.9330***	0.6365***

	(0.0136)	(0.0308)	(0.0063)	(0.0032)	(0.0090)	(0.0025)	(0.0039)
86	0.3898***	0.5720***	0.6214***	0.9633***	0.9493***	0.9330***	0.6368***
	(0.0141)	(0.0331)	(0.0069)	(0.0033)	(0.0094)	(0.0027)	(0.0036)
88	0.3792***	0.5676***	0.6215***	0.9642***	0.9506***	0.9331***	0.6368***
	(0.0147)	(0.0353)	(0.0076)	(0.0034)	(0.0098)	(0.0029)	(0.0033)
90	0.3684***	0.5629***	0.6214***	0.9652***	0.9518***	0.9333***	0.6364***
	(0.0153)	(0.0377)	(0.0084)	(0.0035)	(0.0103)	(0.0031)	(0.0032)
92	0.3575***	0.5580***	0.6211***	0.9661***	0.9531***	0.9335***	0.6357***
	(0.0159)	(0.0402)	(0.0092)	(0.0036)	(0.0107)	(0.0034)	(0.0031)
94	0.3465***	0.5529***	0.6206***	0.9671***	0.9544***	0.9337***	0.6347***
	(0.0165)	(0.0427)	(0.0101)	(0.0037)	(0.0111)	(0.0036)	(0.0032)
96	0.3354***	0.5475***	0.6199***	0.9680***	0.9557***	0.9339***	0.6334***
	(0.0172)	(0.0454)	(0.0110)	(0.0038)	(0.0115)	(0.0039)	(0.0034)
98	0.3241***	0.5419***	0.6191***	0.9689***	0.9570***	0.9343***	0.6317***
	(0.0178)	(0.0481)	(0.0120)	(0.0039)	(0.0119)	(0.0042)	(0.0038)
100	0.3185***	0.5390***	0.6185***	0.9694***	0.9577***	0.9344***	0.6297***
	(0.0181)	(0.0495)	(0.0125)	(0.0039)	(0.0120)	(0.0044)	(0.0043)
Observations	609,070	609,070	609,070	1,158,454	1,158,454	1,158,454	538,433

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.

Table 1.6 – Reasons for not being economically active

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 the necessary schooling, documentation or experience to perform a job.
4. I think that because of 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 from starting 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.

Figure 1.14 - Reasons for not working among working-age women (18–65) who are engaged in domestic chores. (Mexico, 2019)

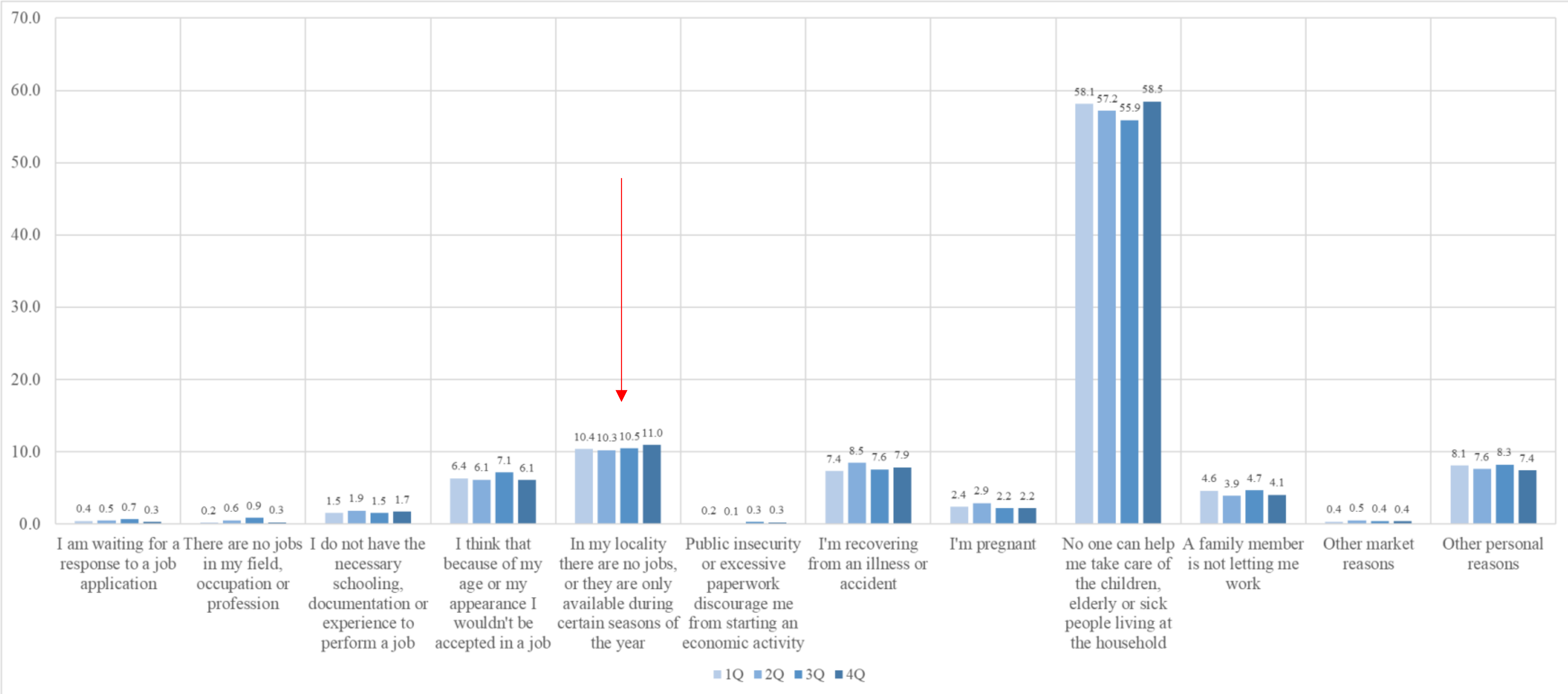


Figure 1.15 - Reasons for not working among working-age women (18–65) engaged in domestic chores, differentiating by urban and rural areas (Mexico, 1st quarter of 2019)

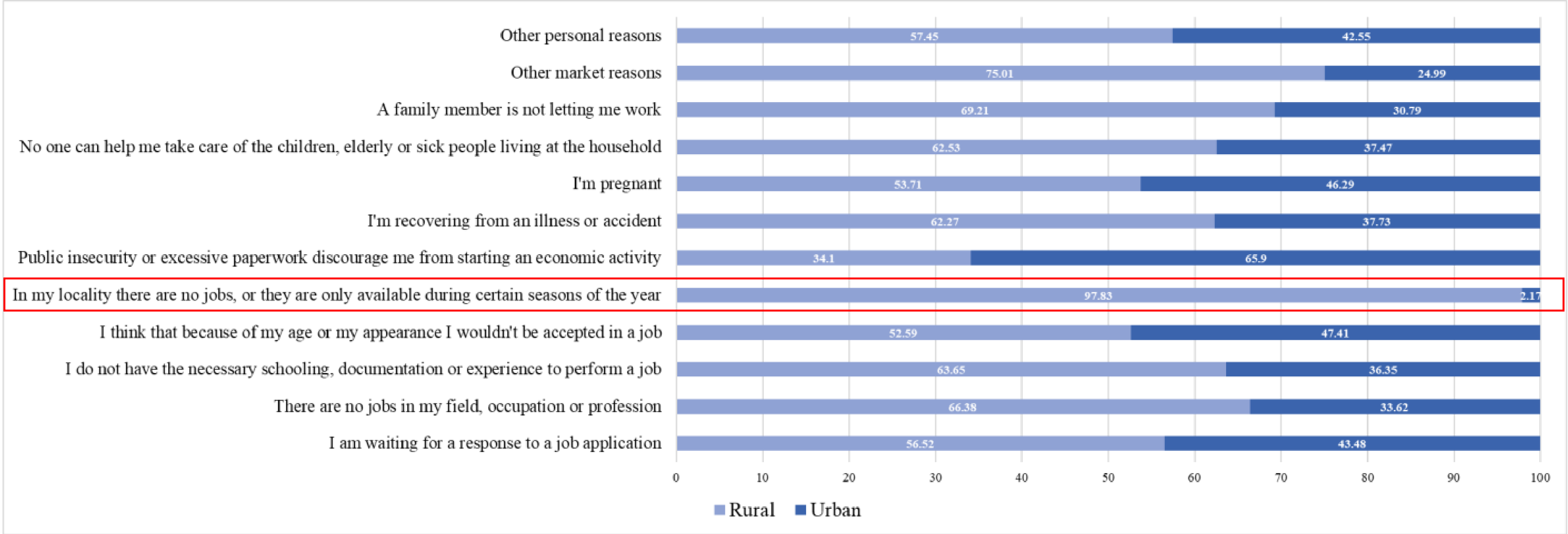


Figure 1.16 – Place of residence of women that are not working due to lack of labour demand. (Mexico, 2005 – 2019)

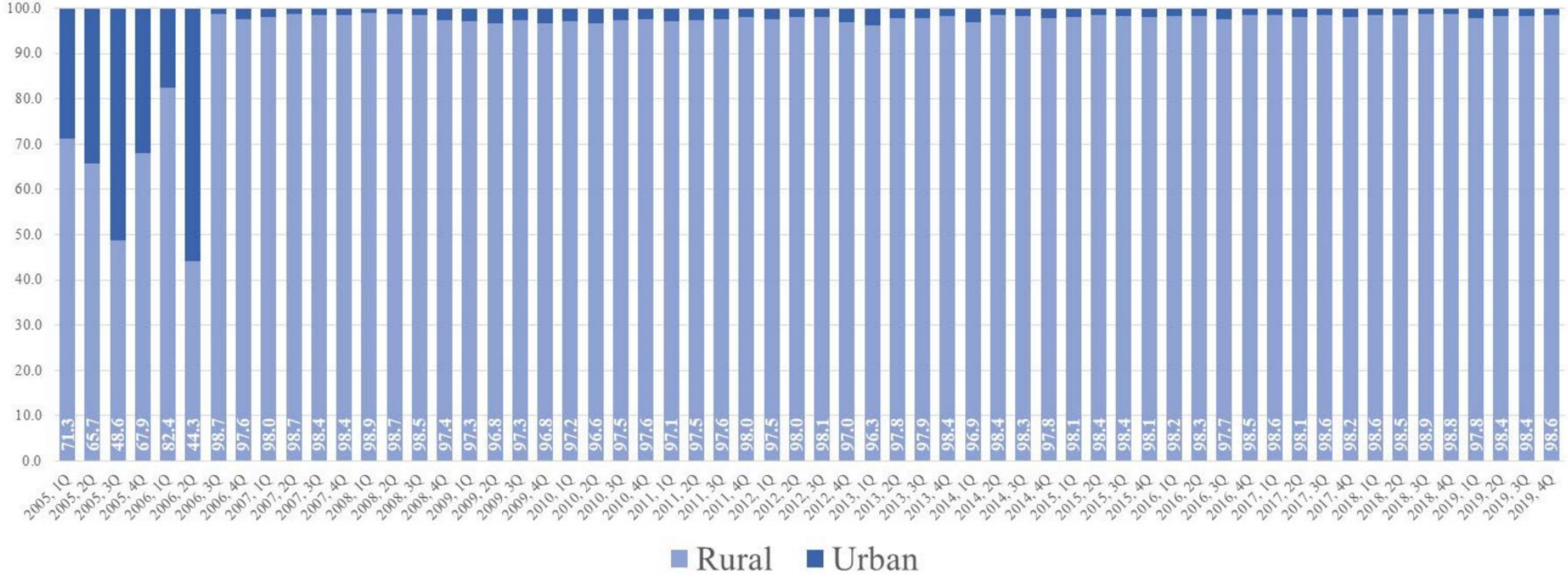


Figure 1.17 - Reasons of economic inactivity among working-age women (18-65) engaged in domestic chores, differentiating by the population size of their place of residence (Mexico, 1st quarter of 2019)

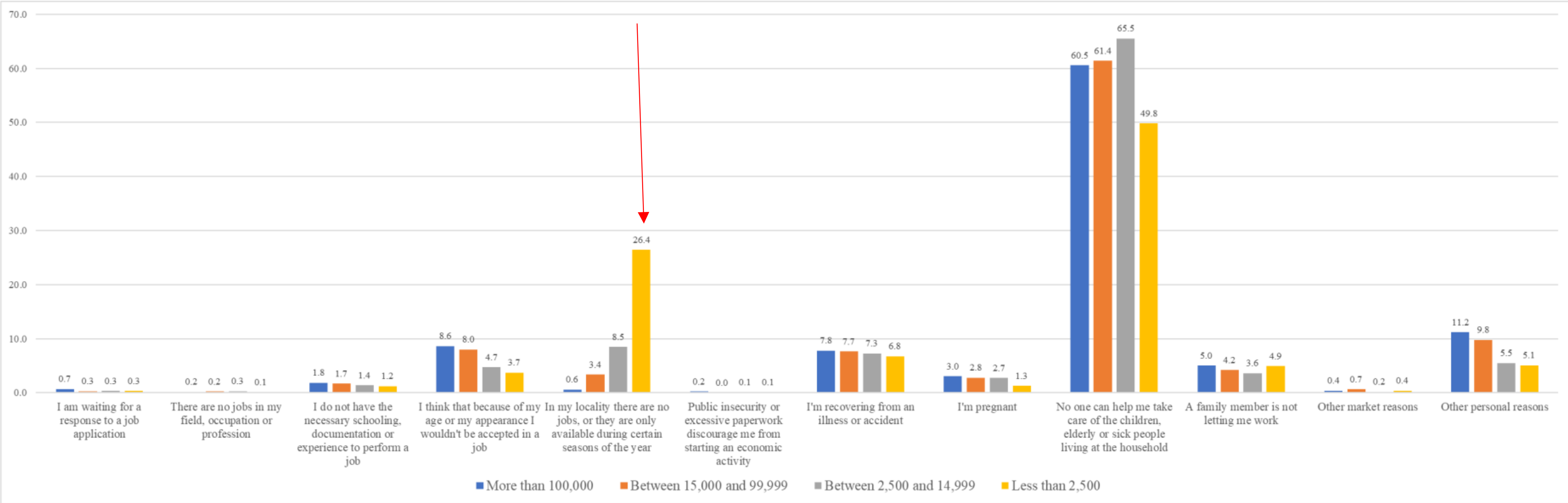


Figure 1.18 – Sectoral distribution of employment depending on the population size of the place of residence. (Mexico, 1st quarter of 2019)

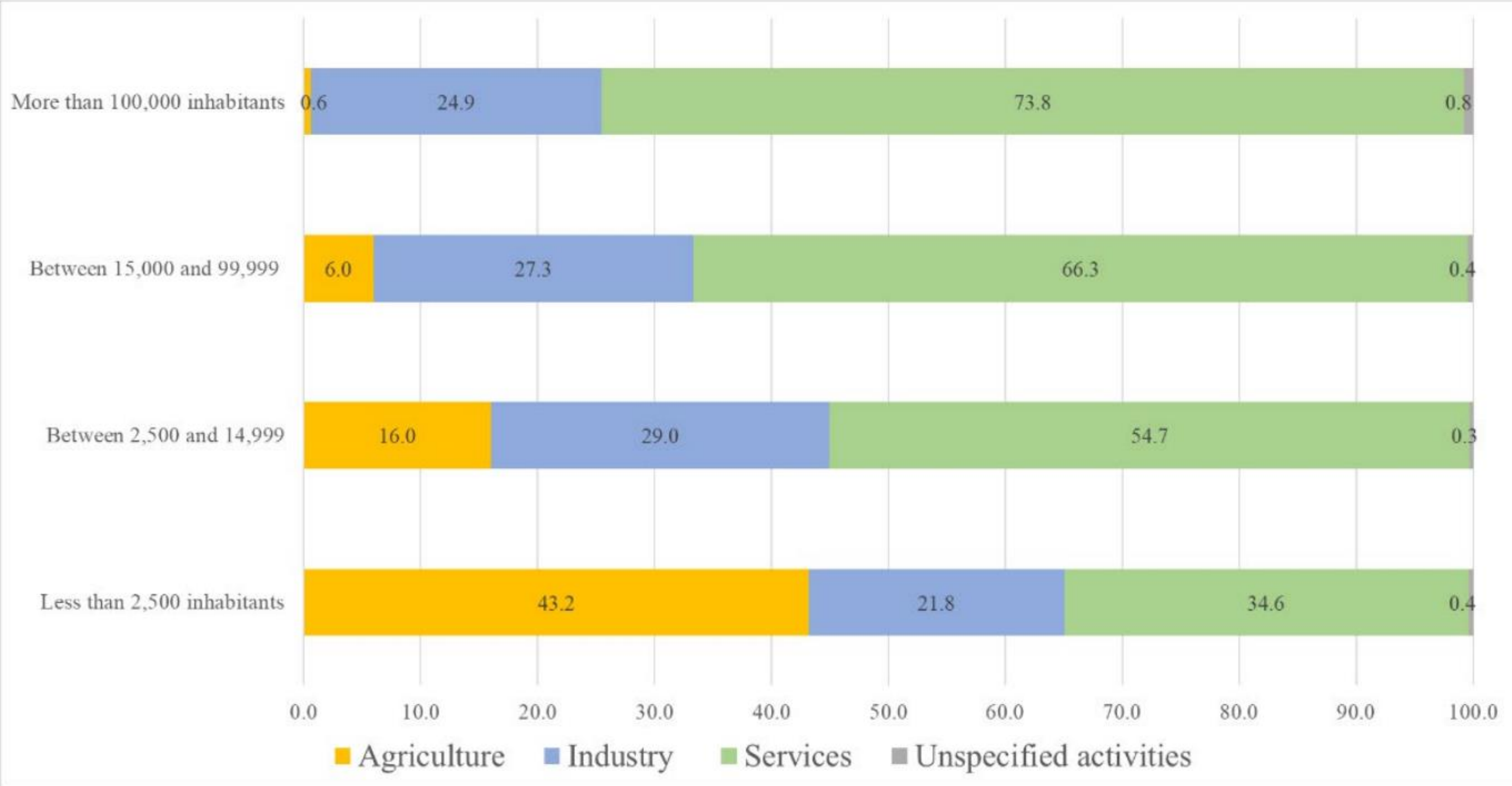
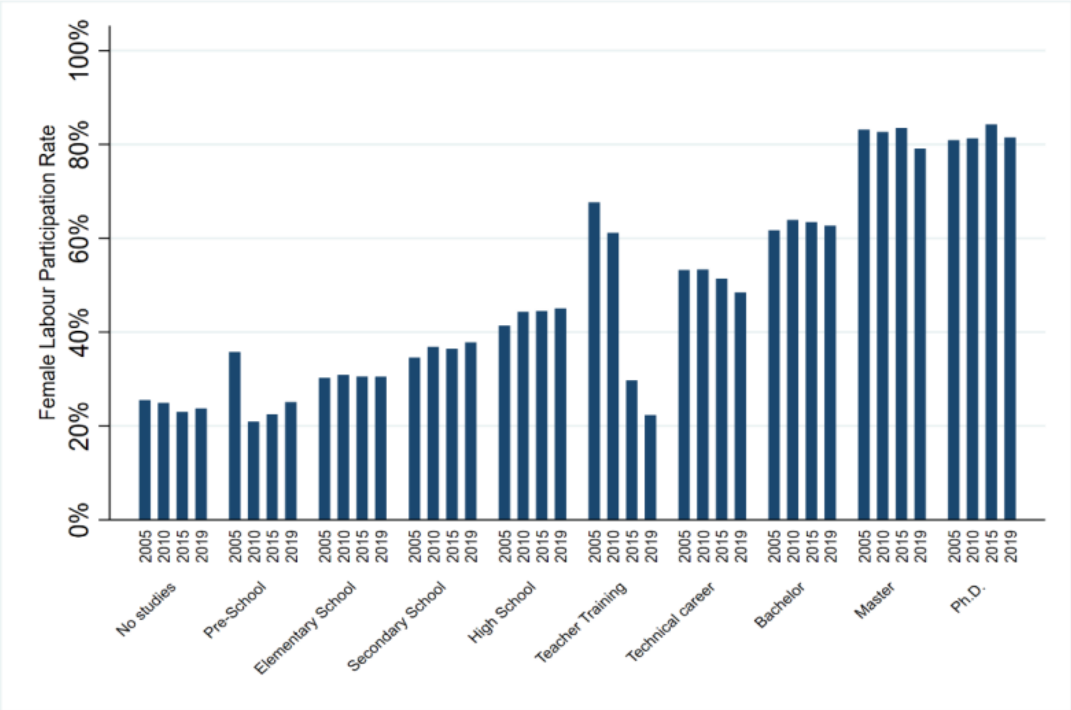
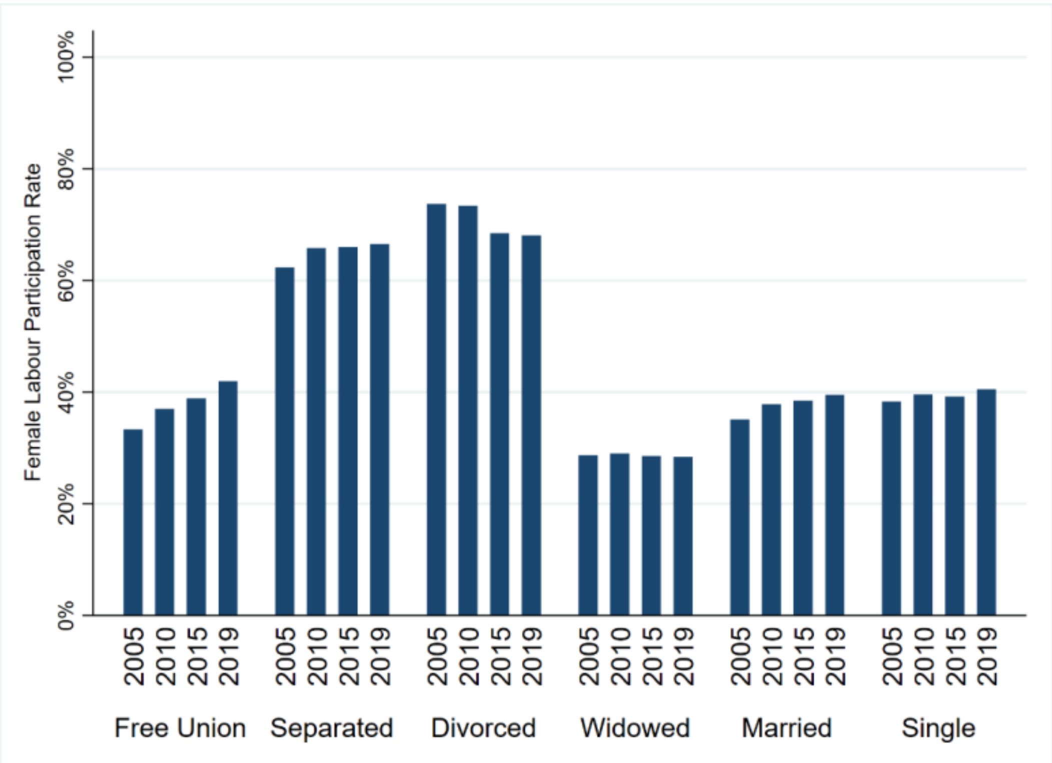


Figure 1.19 – Control variables

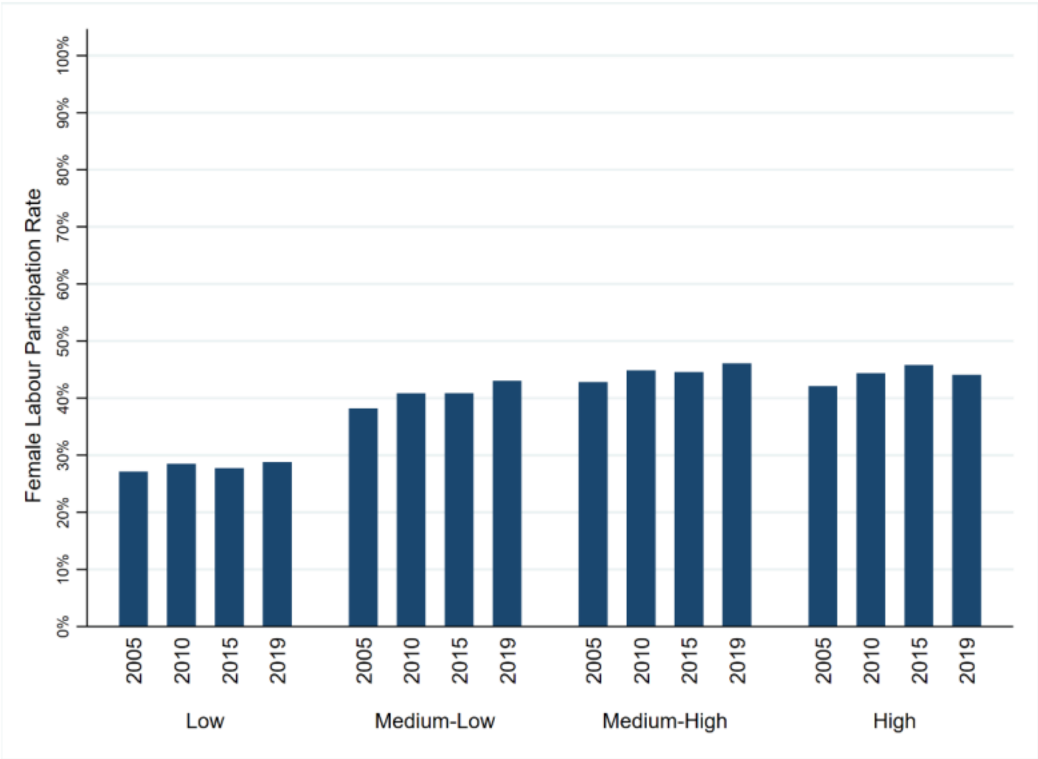
FLPRs depending on different education levels (2005 – 2019)



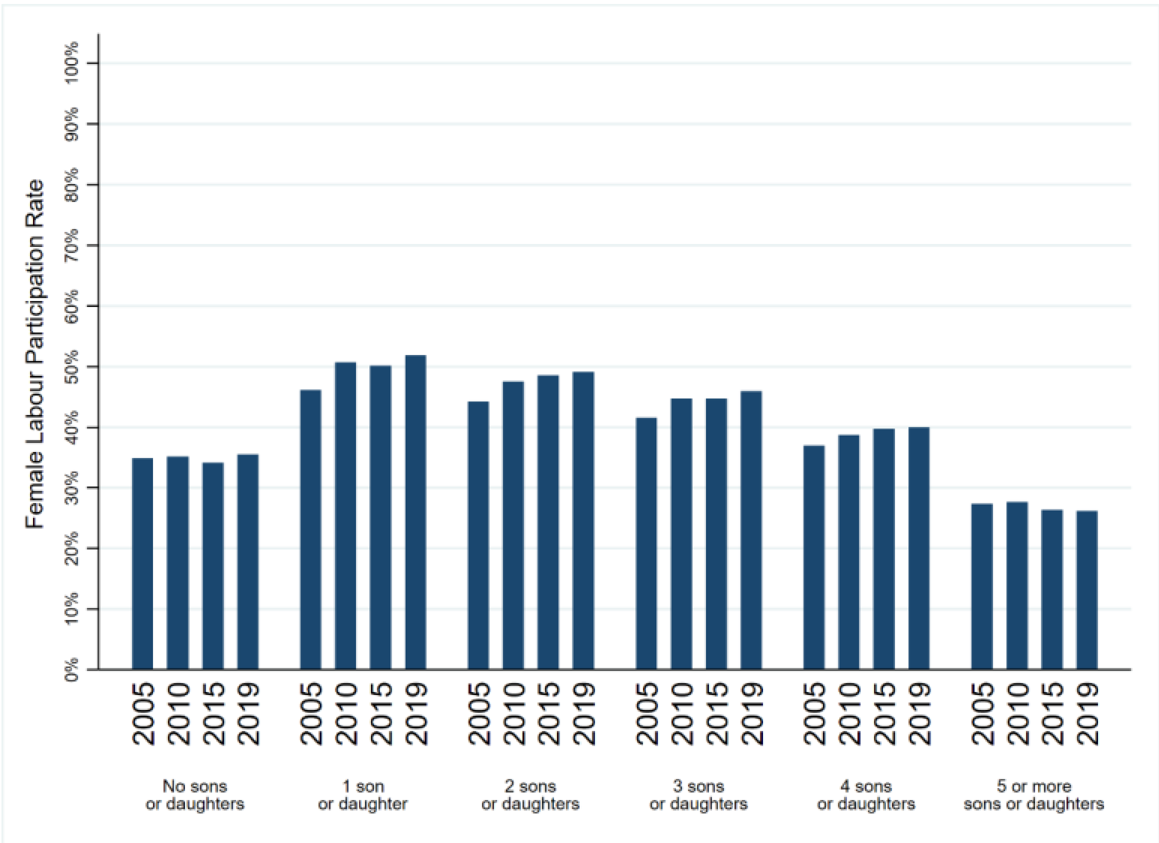
FLPRs depending on marital status (2005 – 2019)



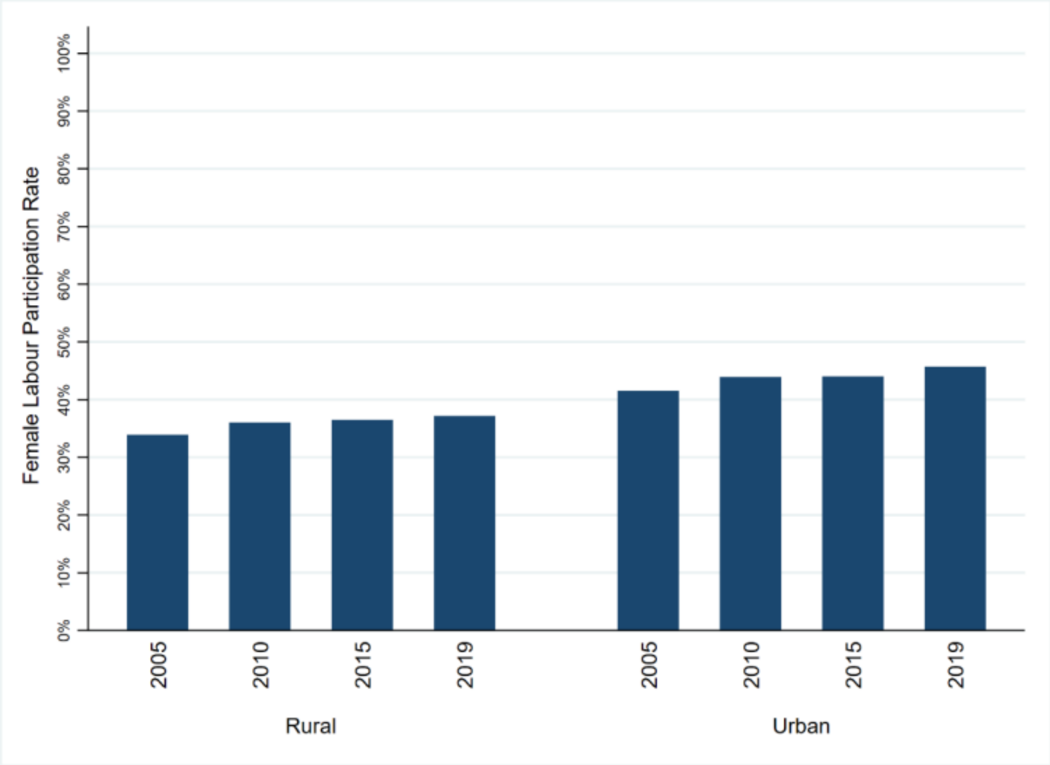
FLPRs depending on socioeconomic stratum (2005 – 2019)



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)