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Marital Status and Informal Self-employment in Mexico

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Abstract

This thesis examines the effect of marital status on working in the informal self-employed sector or informal microenterprises in Mexico. This thesis argues that the effect of being married is stronger on women due to the disproportional burden of household responsibilities that married women carry. The results from a Probit model shows that there is a positive and significant effect of marriage on entry to self-employment, and that there is a significant 5.2% difference between the marginal effect of being married for women and men on being a self-employed worker. Thus, it depicts evidence that marriage has a stronger effect on women than on men when choosing to work as a self-employed worker. This thesis adds to the literature on how household dynamics affect labor market inclusiveness in Latin America. Most importantly, it will shed light on a region in which, recent policy programs have taken this imbalance as the base of its success, and consequently maintaining these traditional gender and household roles that are still hindering equitable participation on women in the labor market.

1 Introduction

There is no overstatement when saying that the current COVID-19 pandemic we are living in, has taken a toll on the global economy. It is particularly true for Latin American countries where the common issues were amplified by this crisis. Some of the factors that have made the region especially vulnerable are the large informal sector, low productivity, precarious urbanization, high levels of poverty and inequality, gender disparity, and the fragile and fragmented healthcare and social protection systems (for Latin America and the Caribbean (ECLAC), 2019).

As the economy shrinks, the informal sector is left as the only option to stay in the labor market especially for women, young, and low-skilled workers. In a region such as Latin America, this implies an added pressure on the sector, particularly owner-only microenterprises or self-employed. For instance, in Mexico, according to the Survey of the Economic Impact Generated by COVID-19 by the National Institute of Statistics and Geography (INEGI, 2020), over half a million enterprises have disappeared, and around 11 million jobs have been lost during this year. The most affected are microenterprises, with 91.3% suffering from a fall in income.

Household dynamics have also been affected by pandemic-related measures and lockdowns. As families were forced to stay at home, they had to adjust to the increase on household activities. Even though men and women have experienced an, increase in time spent in household chores, a recent UN publication (2020) found that in 38 countries women and daughters are carrying more the burden of this increase in domestic labor and caregiving activities.

This thesis will examine how household dynamics affect labor market decisions. Given that self-employment can be a desirable activity due to its flexibility, as household responsibilities increase desirability also rises. In particular, being married is an important determinant of household responsibilities for both men and women. Latin America is still a rather traditional region where women are expected to be in charge of the main household activities, while men are expected to provide most –if not the entire– family income. However, in this thesis will be argued that getting married will have stronger effects on women in their decision to become self-employed workers, since women have the need –or desire– to enter the labor market, but are simultaneously expected to assume caregiving responsibilities in their household.

The results from a Probit analysis indicate that the effect of marriage in getting into self-employment is 4.6% stronger for women than for men. Either way, for both, being married is positively related to entering self-employment, although is only significant for women.

First, the theoretical framework for the relationship between informal self-employment, marital status, and gender in Mexico and Latin America is presented in depth in Section 2. Then, Section 3

describes the data used for the empirical analysis and also shows some descriptive statistics related to the discussion in Section 2. Later in Section 4 the Probit model used to test our hypothesis is explained. Hence, Section 5 presents the results from the Probit defined in Section 4, and also other placebo regressions are shown to test our model effectiveness. Finally, Section 6 contains the conclusion and policy discussion.

2 Theoretical background

2.1 Women's labor market participation

During the 1980s economic crisis, women's participation in the labor market has increased in Latin America and continue to do so ever since. Contrary to the behavior shown by women in the early 20th century, instead of abandoning the labor market after marriage or birth, the economic crisis created the need to supplement family income (Ozorio and Graham, 1995). Furthermore, besides the circumstances created by crises, increased labor participation rates of women in Latin America are attributed to supply and demand factors combined, such as household income level, increasing levels of education, postponing of marriage, lower fertility rates, changes in gender roles, among others (Biles, 2009). Contributing to this, the growing liberalization of gender ideology has also motivated this rise in labor market participation(Duncan et al., 1993). This latter point poses a particular question regarding gender and household roles. If this liberalization is motivating women to enter the labor force, a departure from the traditional caregiving activities should also be expected.

The traditional neoclassical model – which is the foundation of the main economic policies – on household bargaining is gender-neutral. Therefore it omits the influence of behavior and attitudes within the economically active population. The traditional neoclassical household bargaining model states that allocation of time between labor work, domestic work, and leisure is the outcome of an optimization process that depends on individual preferences, the wage level, and additional household income (Brown and Roberts, 2014). Accordingly, given time constraints, this model would predict that as labor work increases, domestic work and leisure would decrease proportionally.

The human capital argument indicates that men and women will specialize either in the labor force or in-home production (Duncan et al., 1993). However, research shows that the division of domestic work between men and women has not changed in the same proportion as women increased their time allocation in labor work (Duncan et al., 1993; Eberharter, 2001; Forste and Fox, 2012; Ozorio and Graham, 1995; Rizavi and Sofer, 2010). For instance, Forste and Fox (2012) find that rising female involvement in in the labor force does lower the time dedicated to housework by wives while increasing participation of husbands, but the magnitude of the effect does not eliminate the gap.

New research on female labor market participation is, in fact, including relative income and employment concerns into women's utility functions to consider the impact of cultural and social attitudes (Eberharter, 2001). However, as is suggested by some authors (Cunningham, 2001; Forste and Fox, 2012; Ozorio and Graham, 1995) the gender divide explanation may be too simplistic, since it is the interaction between gender roles and household roles that really impact labor market decisions. These authors argue that household roles such as breadwinner or caregiver are what defines the unequal expectations on time spent on domestic and labor activities.

2.2 Marital status effect in labor supply

Marital status, as well as gender, is a factor that contributes to defining an individual's role as caregiver or breadwinner. Gender and household roles are crucial for understanding the remaining gap in economic and bargaining power between men and women, even as the latter become participants in the labor market. In traditional societies, in a married heteronormative couple, the husband is seen as the breadwinner, and the wife as the caregiver. In contrast, in the case of single mothers they have to assume both roles.

From the supply side, research has shown that marital status explains much of the transition patterns in the labor force. With data from US households,Kimmel and Kniesner (1998) find that single women are more wage elastic on the employment margin than married women, but married men are more wage elastic on the employment margin than single men. Furthermore, Cunningham (2001) identifies that married women in Mexico are the most responsive to wage shocks, single mothers less so, while women without families are the least responsive. Also, using the same data, Bosch and Maloney (2005)'s results spot that most of the difference in the transition among women can be explained by their marital status.

Women's occupational segregation results from a combination of choices and constraints which may induce women to select occupations based on the flexibility of work schedules. In self-employment, households can intensify the use of human capital to diversify sources of income (Biles, 2009). For Mexico's case, Cunningham (2001) identifies that, when entering the labor market, a married woman is likely to choose a flexible job (usually informal) over a formal sector job. On the other hand, single mothers and men are likely to go to the highest paying sector, rather than informal wage employment (Cunningham, 2001).The effect of marital status might not be limited to women. Fajnzylber et al. (2006) finds that marriage increases by 1% the probability of entry to self-employment for male-headed businesses. Even though it seems that marital status could be a good explanatory variable for entry to self-employment by itself, the difference in household roles illustrated above suggests it could be larger for women.

2.3 Self-employment in Latin America

In general, self-employment offers benefits that any other type of occupation does not. The main one being flexibility, but also the opportunity of getting faster income. In Latin America this decision does not only influences household dynamics, but it also poses economic challenges since self-employment is strongly linked with informality. This relationship poses relevant policy implications on its link with unproductivity, poverty, and inequality. Latin American countries are characterized by a strong presence of informal work with self-employment or microenterprises as the dominant form, and significant mobility between formal and informal work (Biles, 2009; Maloney, 2004; Ozorio and Graham, 1995; Porta and Shleifer, 2014).

Notwithstanding, regarding this region, not only the incentives for working in the informal sector go beyond avoiding taxes, but also the desirability of the formal sector might be overstated. For instance, in Mexico, medical benefits programs are not limited to formal workers (Levy, 2008; Maloney, 1999). Even more so, since 2012 a national social security program has reached the goal of universal health coverage.

It is therefore important to focus on informal self-employment which could have long-lasting consequences for women, households, and even the State. This, again, has a common mechanism in the Latin American region. In the so-called 'lost decade' of the 1980s, informal self-employment emerged as the most prevalent form of work in Latin America as a response to neoliberal reforms tackling the crisis (Biles, 2009). In Mexico, almost 95% of the firms in the country are microenterprises, which also account for 37% of the people employed, but only 14% of the wealth produced (Instituto Nacional de Estadística, 2007).

Biles (2009)'s research goes through the three theoretical perspectives that have tried to explain this regional phenomenon: dualist, neoliberal, and neo-Marxist. These views show that the issues around self-employment and informality in Latin America are not straightforward, and thus neither are the solutions.

Firstly, the dualist view (also referred to as the classical development economics model), which is mainly associated with Harris and Todaro's (1970) research, claims that sector segmentation happens when wage-setting drives some individuals out of the formal sector. Within this view, the informal sector is viewed as disguised unemployment in which only subsistence microenterprises emerge. Low-skilled workers, immigrants, and younger workers are left out of the formal sector and forced into self-employment and other informal activities that contribute little to nothing to the economy (Biles, 2009; Levy, 2008; Porta and Shleifer, 2014).

However, research showing that Latin American countries have experienced pro-cyclical behaviors of both the formal and informal sectors contradict this view (Bosch and Maloney, 2005; Cunningham, 2001; Fajnzylber et al., 2006; Kanbur, 2014; Maloney, 1997). Consequently, the neoliberal view emerges as a contender of the dualist model in which self-employment represents a more flexible and more profitable

opportunity to opt-out of the formal economy offering benefits not found in formal employment, including flexible hours, job training, and easy entry to the labor force, economic independence, and sometimes better wages, and avoidance of taxes (Biles, 2009; Levy, 2008; Maloney, 2004). They even argue that the flexibility offered by informality could be useful for both employees and employers in a context of market uncertainty, weak unions, and low wages that characterize the region (Maloney, 1999).

This view has led to numerous initiatives from multilateral institutions like the World Bank and the Inter-American Development Bank promoting microentrepreneurship and microfinancing, and formalization policies for the informal sector. Following this view, Levy's (2008) research suggests that, in the case of Mexico, social programs act as a drag on economic development, since they induce behavior that goes opposite to long-term productivity growth. He states that the differences between social security programs for salaried workers, and social protection programs for non-salaried workers (self-employed microentrepreneurs included) in the benefits and the financing of each one, results in a tax on salaried labor and a subsidy to non-salaried labor.

However, even though the neoliberal critique on the dualist model is well researched (Bosch and Maloney, 2005; Buso et al., 2012; Cunningham, 2001; Levy, 2008; Maloney, 1997; Maloney, 1999; Maloney, 2004), it neglects to acknowledge the gendered nature of informal work in Latin America. In this sense, neo-Marxists have shown that women in Latin America resort to informality to supplement household income within the context of neoliberal labor markets in which work is poorly remunerated and precarious rather than scarce (Biles, 2009). This third, and last theoretical model argues that informal work and self-employment are subordinate to and dependent on formal economic activities serving to reduce.

Neo-Marxist further criticize that the neoliberal view assumes that self-employment is a universal and voluntary choice. On the contrary, Neo-Marxists claim that, women are forced to get into informality to supplement household income out of necessity.

No matter what perspective of informality and self-employment one decides to follow, the fact is that poverty is deeply associated with informality. Particularly, self-employed women are caught in a vicious cycle of poverty where they face indebtedness, assetlessness, and low-income levels (Kanbur, 2014). In this context, the State plays a crucial role to not only tackle informality as a source of unproductivity but also targeting this particular burden that women carry and which holds them in an unfavorable cycle.

Despite this, as was mentioned, the State has been adopting neoliberal policies that not only omit the gendered dynamics of labor supply and household decisions but rather perpetuate this gender role (Franzoni and Voorend, 2009). Although the new policies implemented since the 1980s recognized the civil and political rights of women, distributive inequalities were accentuated through a paternalist expansion of the State's role. By assigning women as the beneficiaries of programs like conditional cash transfers (CCT)

or microcredits, women can gain economic autonomy, but can also have their roles as caregivers reinforced by the State.

2.4 Informality, productivity, and regulation

Based on the literature presented above it can be said that entering self-employment is not only appealing for women for fulfilling their domestic and labor responsibilities, but it is also enforced by the current public policy tackling poverty and inequality.

Hence, the complexity regarding the relationship between self-employment and marital status in Latin America makes the topic crucial for dealing with women entering the labor supply. If women get to enter the labor supply with the burden of their household responsibilities, then there is little to no possibility of enhancing their quality of life. This is not only important at the individual level, but it can also have serious consequences at the State level.

As self-employment is closely linked with informality, it is also related to unproductivity. The region's labor market is characterized by high levels of informality, as well as low productivity in the salaried sector, which sets a lower entrepreneurial threshold for entering self-employment (Fajnzylber et al., 2006). The difference in labor costs across firms in different sectors causes distortions in the marginal revenue, misallocating resources and lowering aggregate labor productivity (Buso et al., 2012; Levy, 2008). These high levels of labor market distortions, and also poor regulations correlate with underdevelopment and large informal sector size (Fajnzylber et al., 2006; Maloney, 1999).

A sensible, yet naive alternative for tackling informality is increasing regulation. This is not only unsustainable due to the high cost of monitoring, but it would also be ineffective.Buso et al. (2012), Kanbur (2014), and Levy (2008) have touched on the issue that, specifically in Mexico's case, increasing regulation would not eradicate informality. Most of these microenterprises are not evading regulation, they are not even subjects of it.

Given these dynamics between gender, marital status, self-employment, informality, and productivity the State should assume an important role in tackling this cycle to ensure an inclusive, yet fair economy. As women in Mexico and Latin America keep entering the labor supply, they should not drag "traditional" expectations along. An inclusive labor market should ensure a change in the gender and household roles paradigm.

3 Data

The purpose of this thesis is to unravel the effect that marital status has on the likelihood of entering informal self-employment by gender. From the theoretical framework presented above it would be expected that as women get married, their need to balance household roles and the pressing financial need faced will have a stronger effect, therefore having a larger probability of participating in the labor market as self-employed workers.

To tackle this hypothesis we use a survey from Mexico containing information on labor supply status, marital status, and other demographic characteristics per household and individual. The National Occupation and Employment Survey (ENOE), which is coordinated by the National Institute of Statistical and Geographical Information (INEGI), follows the same household in a rotating panel framework for 15 months every 3 months since 2005. This extensive database contains socioeconomic information as well as other variables regarding labor market dynamics. From the ENOE we can get basic demographic information like gender, age, education level, underage members of the household, marital status, household income, among others. Moreover, it contains labor supply indicators such as employment, occupation, sector, economic activity, and more. Therefore, for the purpose of this thesis, the ENOE is enough to test the hypothesis.

3.1 Descriptive statistics

In this section, we show some basic demographics obtained from the ENOE which will set a general idea for the empirical analysis presented later in Section 4. After cleaning the dataset we get 1,435,978 observations that have been compiled from the first quarter of 2011 to the first quarter of 2020.

Table 1 depicts some summary statistics of the variables of interest. Our independent variable (self-employment) is binary, and it shows that self-employed workers represent 11.8% of the surveyed population [1]. To get this dummy, the self-employment category from the type of occupation variable is taken to generate it. As it is shown in the table, other possible categories are salaried, economically inactive, employers, and non-paid workers.

One of the explanatory variables is marital status. Even though the particular status we are interested in is whether the individual is married, the survey contains other possible status such as single, free union, divorced, widow, and separated. Therefore, for the empirical analysis, an additional dummy is created to identify married from non-married.

[1] Women and men older than 15 years old

Variable	Type	Min	Max	Median	Mean
Occupation	Categorical	-	-	-	Salaried: 40.2% Self-employed: 11.8% Economically inactive: 42.5% Others: 5.5%
Self-employment	Dummy	0	1	-	SE: 11.8% Not SE: 88.22%
Gender	Dummy	0	1	-	Female: 52.7% Male: 47.3%
Marital status	Categorical	-	-	-	Married: 43.2% Single: 32.8% Free union: 13.6% Others: 10.4%
Age	Continuous	15	98	38	39.8
Years of education	Continuous	0	24	9	9.4%
Income (log)	Continuous	0	13.5	8.37	8.3%

Table 1: Summary statistics of main variables

Figure 1 shows the age distribution of women and men. It also distinguishes between the individuals working in self-employment or otherwise. The graph at the bottom shows the age distributions for individuals that are self-employed, whereas the one at the top shows the age distribution for the ones who are not self-employed. This figure shows that age is distributed differently between the ones in self-employment and the rest, for both men and women. Most self-employed workers are between 30 and 50 years of age. Instead, most of the non-self-employed are between 15 and 25 years old.

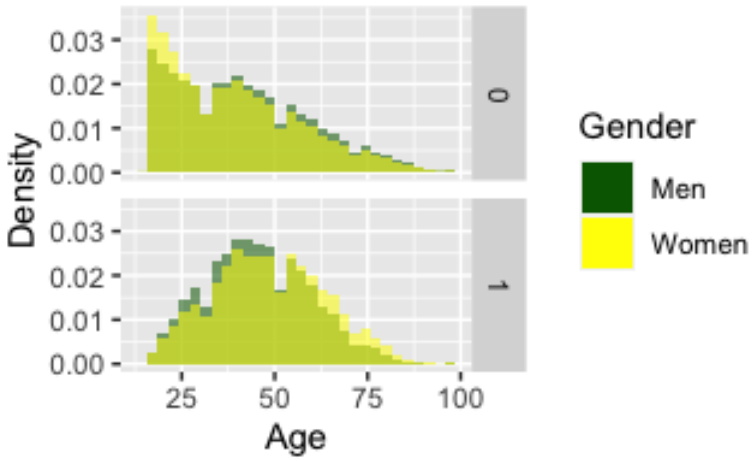

Figure 1: Age distribution by gender and self-employment status

When it comes to education levels, 2 illustrates the distribution of years of education received by gender. Also, it separates the distributions between self-employed and non-self-employed. In this case, the difference is not as clear.

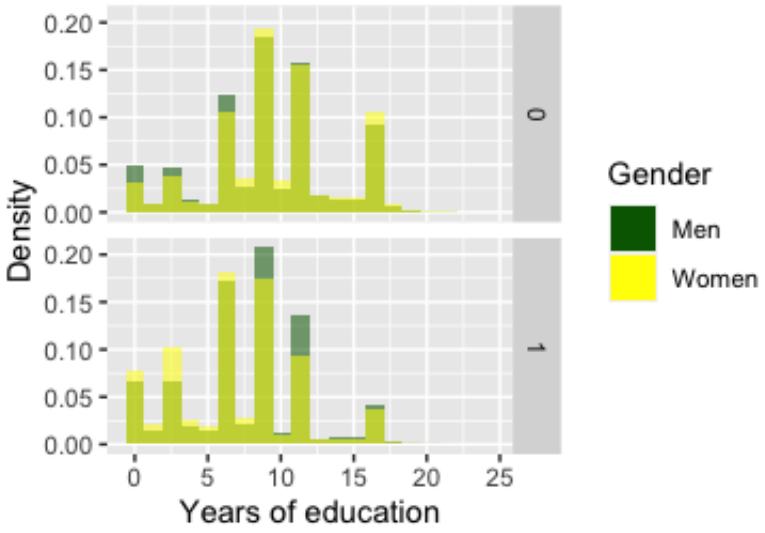

Figure 2: Years of education by gender and self-employment status

Table 2 displays the proportion of women that are mothers, and also indicates the proportion of the ones who are married. Almost all married women have children (95%), although 32% have children and are unmarried.

	Not married	Married	Total
No kids	24.1%	1.9%	26%
Kids	31.5%	42.5 %	74%
	55.6%	44.4 %	100%

Table 2: Women's marital status and children

3.1.1 Labor market participation

Table 3 shows labor supply participation by gender, and confirms that still many women are not fully integrated in the economically active population [2] in contrast with men. This table shows that only 45% of the women are part of the labor force, while 77% of men are economically active.

	Women	Men
Economically active	45.3%	76.9%
Economically inactive	54.7%	23.1%
Total	100%	100%

Table 3: Economically active and inactive population by gender

Furthermore, we can see where these individuals allocate in the different types of occupations in Table 4. Most women work as salaried workers with 68%, while 32% work as self-employed or other. Table 4 also shows that, for the economically active population, there is not an evident difference between gender and the type of work they carry out.

	Women	Men
Salaried	70.3%	69.3%
Self-employed	20.2%	21%
Others	9.5%	9.7%
Total	100%	100%

Table 4: Occupation by gender (economically active)

Most of the economically active population can be accounted for by distinguishing between salaried workers and self-employed workers. In terms of gender, 20% of women are self-employed, and 70% are salaried

[2]The INEGI defines the economically active population as people aged 15 years and over who engaged in some type of economic activity (employed population), or who actively sought to do so (open unemployed population), in the two months prior to the conduction week.

workers, while 21% of men are self-employed and 69% are salaried workers, which shows that occupation selection does not vary much between genders.

3.1.2 Informality and self-employment

As was mentioned in the theoretical framework, self-employment in Latin America is linked with the informal sector. To assess this in Mexico's case, Table 5 contains the proportion of women and men working as self-employed workers and as salaried workers, while also identifying how they are distributed between the informal and the formal sector.

	Women		Men	
	Self-employed	Salaried	Self-employed	Salaried
Formal	13.9%	58.8%	15.9%	56.9%
Informal	86.1%	41.2%	84.1%	43.1%
Total	100%	100%	100%	100%

Table 5: Informality and occupation status by gender

Clearly, self-employment is closely linked with informality. This can be said for the population in general since the distributions shown in table 5 are very similar for both women and men. Hence, the empirical analysis presented later in this thesis will exclusively focus on informal self-employment to test the hypothesis.

3.1.3 Marital status and children

To first have an idea of how can marriage affect women's participation in the labor market and occupation allocation, this section displays some contingent tables. Above, Table 3 showed that on average 45% of the women are economically active. However, the proportions drastically change when differentiating by marital status and having children. Table 6 display how these proportions differ.

Interestingly, the most similar distributions are between married women with kids and single women without kids. Moreover, the proportions that stand out are the ones from single women with kids. This group shows a radical change in their participation distribution with 72% of the women being economically active. This confirms results from Cunningham (2001) who finds that the behavior of single women with kids is more similar to men than to the other types of women. This finding will be considered in the empirical analysis since it is closely related to the choice of women's occupation allocation.

As will be explained more extensively in the sections below, having young children has a large impact

	Married		Single	
	With kids	Without kids	With kids	Without kids
Active	40.9%	52.1%	71.7%	46.6%
Inactive	59.1%	47.9%	28.3%	53.4%
	100%	100%	100%	100%

Table 6: Labor participation by marital status and children

on women's expected household responsibilities. Therefore, it would be expected to find a larger difference in labor participation when years below five years of age are present in the household. Nevertheless, when making the same distinction as Table 6 in Table 7, the proportions stay rather similar, and the differences seem to depend more on marital status than on having young children.

	Married		Single	
	With kids	Without kids	With kids	Without kids
Active	41%	41.6%	56.4%	51.4%
Inactive	59%	58.4%	43.6%	48.6%
	100%	100%	100%	100%

Table 7: Labor participation by marital status and children under 5 (women)

The table above can be replicated for men. [3] Thus, Table 8 displays a very different set of distributions compared to women. For instance, being married also poses a difference between men's labor market participation, especially for those with the presence of young kids in the household where 92% of men are economically active.

	Married		Single	
	With kids	Without kids	With kids	Without kids
Active	91.7%	80%	69.5%	64.4%
Inactive	8.3%	20%	30.5%	35.6%
	100%	100%	100%	100%

Table 8: Labor participation by marital status and children under 5 (men)

Moreover, for the economically active population, Table 9 depicts in which type of jobs women

[3]There is a slight difference in how the variables for children in Table 6 and Table 7 were calculated. In the former we constructed a dummy from the question from the survey that asks women for number of alive children they had had, while in the latter we took the presence of children from 5 years old and below that were living in the same household. Therefore, the first table cannot be replicated for men.

allocate themselves. In this case, although there is a clear choice majority of women in salaried jobs regardless of marital status or having children, a shift can be seen in married women with children.

	Married		Single	
	With kids	Without kids	With kids	Without kids
Self-employed	27.4%	15.8%	15.7%	8.1%
Salaried	57.7%	72.3%	76.1%	74.4%
Others	14.9%	11.9%	8.2%	17.5%
	100%	100%	100%	100%

Table 9: Women's occupation with and without children by marital status

Again in Table 10 we make the distinction for households with the presence of children of 5 years old or under, and we find that the difference mentioned for Table 9 is smaller.

	Married		Single	
	With kids	Without kids	With kids	Without kids
Self-employed	25.3%	27.2%	10%	11.1%
Salaried	63.1%	59.6%	82.4%	80.2%
Others	11.6%	13.2%	7.6%	8.7%
	100%	100%	100%	100%

Table 10: Women's occupation with and without children under 5 by marital status

4 Methodology

As mentioned in the literature review, several research papers have already tackled the dynamics between gender, marital status, and entry into self-employment or informality in Mexico. For instance, Bosch and Maloney (2005) and Cunningham (2001) analyzed transitions between formal and informal sectors in Mexico by gender and marital status. However, since their goal is mainly to assess business cycle dynamics, both analyses focus on transitions during the economic crisis to disprove the dualist model, therefore concentrate on the transitions from unemployment and out of the labor force to formal and informal sectors. Moreover, Fajnzylber et al. (2006) study the determinants of entry and survival of informal self-employment in Mexico but covering only male-headed microenterprises and self-employed.

Furthermore, both studies are outdated since they used data from 1987 to 2001 at the latest. The

three research papers use the National Urban Employment Survey (ENEU), which is an older version of the currently gathered, the National Occupation and Employment Survey (ENOE). The latter is the substitution of the former and collects data in a more precise and continuous way, and it is constructed in a way that fits the international requirements of the Organization for Economic Cooperation and Development (OECD) and the International Labor Organization (ILO) (Instituto Nacional de Estadística, 2007).

Moreover, this thesis will contribute to this research not only by using more recent data but also by implementing a Probit model with an interaction term that can estimate not only the effect of marital status on the entry to self-employment but can prove if the effect is stronger for women than for men.

4.1 Probit Analysis

A standard Probit model is one of the binary response models that, contrary to linear probability models, fit the estimation between zero and one. In contrast with other binary models like Logit, Probit favors the normality assumptions, therefore it is more commonly used in economic research. To measure the his can be expressed in the next equation:

$$Y_{it} = \gamma_0 X_{it} + \gamma_1 Married_{it} + \gamma_2 Female_{it} + \gamma_{12}(Married_{it} * Female_{it}) + \alpha_i + \theta_i + \rho_t + u_{it} \quad (1)$$

Where X is a vector of control variables, including a constant term, Y represents our dependent variable self-employed for individual i , $Married_{it}$ is a dummy that represents whether individual i is married, and $Female_{it}$ is a dummy that identifies the individual's gender. Also some fixed effects terms are included (α_i, θ_i,ρ_t) to eliminate time-constant effect at the city level and at household level, and time fixed effects respectively.

Equation (1) depicts the case where the relationship between Y and treatment $Married_{it}$ is linear. However, an important disadvantage of using a linear model is that when handling with a binary dependent variable, the fitted probabilities can be less than zero or greater than one and the partial effect of any explanatory variable is constant (Wooldridge, 2012). Therefore, by using a binary response model such as a Probit these limitations can be overcame. Equation (1) can be modified for such model as follows:

$$\Pr[Y = 1|Married, Female, X] = F(\gamma_0 X_{it} + \gamma_1 Married_{it} + \gamma_2 Female_{it} + \gamma_{12}(Married_{it} * Female_{it}) + \alpha_i + \theta_i + \rho_t) \quad (2)$$

In the case of a Probit model, function F is a standard normal cumulative distribution function.

This will ensure that the outcome is strictly between zero and one for all values of the explanatory and control variables.

Hence we can express the potential outcome as conditional probabilities, where the coefficient of interest is γ_{12}. This coefficient will measure the changes in the marginal effect of marital status induced by gender, and representing the cross-partial difference or interaction effect. This can also be expressed for every combination of time and treatment occurrence:

$$\begin{aligned}
&\Pr[Y = 1|Female = 1, Married = 1, X] = F(\gamma_0 X + \gamma_1 + \gamma_2 + \gamma_{12}) \\
&\Pr[Y = 1|Female = 1, Married = 0, X] = F(\gamma_0 X + \gamma_1) \\
&\Pr[Y = 1|Female = 0, Married = 1, X] = F(\gamma_0 X + \gamma_2) \\
&\Pr[Y = 1|Female = 0, Married = 0, X] = F(\gamma_0 X)
\end{aligned} \tag{3}$$

Puhani (2008) states that the cross-difference or derivative (γ_{12} in this case) is not relevant for estimating the treatment effect in the Probit model with an interaction term or in any other non-linear model. Since our hypothesis states that the marginal effect of being married differs between men and women, we are interested in the cross-partial difference, which is the change in the marginal effect of one variable induced by changes in another variable's value (Karaca-Mandic et al., 2011). This can be expressed as follows:

Where $v = \gamma_0 X_{it} + \gamma_1 Married_{it} + \gamma_2 Female_{it} + \gamma_{12}(Married_{it} * Female_{it})$,

$$\frac{\partial[Y = 1|Female = 1, Married = 1, X]}{\partial Married} = \frac{dF}{dv}\frac{\partial v}{\partial Married} = \frac{dF}{dv}(\gamma_1 + \gamma_{12} Female) \tag{4}$$

Therefore, for the empirical analysis a cross-sectional Probit regression will be applied to measure the difference in marginal effect of being married on entering self-employment between women and men. A positive marginal effect of being married on being self-employed would be expected, along with a positive difference between the marginal effects of married women over married men.

4.1.1 Control variables

The vector of control variables X contains age, years of education, family income, and if the individual has children of age five or younger.

For instance, age is included since it can be related to the dependent and the explanatory variable. As was mentioned in the literature review, younger workers can be attracted to self employment when the

entry restrictions of the formal sector is too high or because it poses an opportunity for skill-building (Bosch and Maloney, 2005). Fajnzylber et al. (2006) identify a rising likelihood of entering self-employment from ages 15 to 50.

Similarly, education can also be related with entry to self employment when higher skill jobs in the formal sector require higher educated individuals (Maloney, 1999; Porta and Shleifer, 2014). Education has been found negatively related to entry to self-employment (Fajnzylber et al., 2006), but there is no consent on whether it has a positive effect on staying and surviving as a self-employed worker (Bosch and Maloney, 2005; Fajnzylber et al., 2006).

Income levels can also be related with entering self-employment since this sector offers quicker sources of money. The lower the lever of liquidity, the more prone to enter self-employment. Moreover, Eberharter (2001) makes the case that low income levels can also explain attachment to the traditional household and gender roles. He argues that individuals under the poverty income line would be less influenced by expected traditional roles and more influenced by financial needs.

Finally, children could play an important role in women's decision of entering self-employment. Cunningham (2001) finds that having children could discourage women in entering the labor force. Particularly children between 0 and 5 have stronger childcare demands that could lower women's time allocation in labor when in a caregiving household role (Rizavi and Sofer, 2010).

5 Results

This section shows the results of the Probit analysis to find whether marital status has a stronger effect in women for their decision of entering informal self-employment.

Table 11: Entry to self-employment results - Married

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
$Married$	0.298***	0.0827***	0.0793***	0.0732***	0.0724***	0.0801***
	(0.00985)	(0.0115)	(0.0132)	(0.0132)	(0.0132)	(0.0132)
$Female$	0.206***	-0.0112	-0.0110	-0.00962	-0.00834	-0.0120
	(0.0102)	(0.0111)	(0.0111)	(0.0110)	(0.0111)	(0.0110)
$Married * Female$	0.0885***	0.216***	0.216***	0.220***	0.220***	0.216***
	(0.0142)	(0.0153)	(0.0153)	(0.0153)	(0.0153)	(0.0153)
$Kids < 5$		0.0638***	0.0593***	0.0588***	0.0581***	0.0599***
		(0.00789)	(0.0113)	(0.0113)	(0.0113)	(0.0113)
$Kids < 5 * Married$			0.00873	0.00814	0.00845	0.00849
			(0.0156)	(0.0155)	(0.0155)	(0.0155)
Age		0.128***	0.128***	0.129***	0.129***	0.128***
		(0.00156)	(0.00156)	(0.00156)	(0.00156)	(0.00156)
$Years\ of$		-0.00939***	-0.00940***	-0.00948***	-0.00916***	-0.00969***
$education$		(0.00102)	(0.00102)	(0.00101)	(0.00102)	(0.00101)
$Income(log)$		-0.468***	-0.468***	-0.461***	-0.459***	-0.470***
		(0.00569)	(0.00570)	(0.00554)	(0.00561)	(0.00562)
Constant	-1.335***	1.974***	1.975***	2.147***	2.113***	2.000***
	(0.0207)	(0.0465)	(0.0466)	(0.0421)	(0.0453)	(0.0436)
Observations	177,350	177,350	177,350	177,350	177,350	177,350
City FE	YES	YES	YES	NO	YES	NO
Household FE	YES	YES	YES	NO	YES	NO
Year FE	YES	YES	YES	NO	NO	YES

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 11 shows six different specifications of the model shown above. The first specification is the interaction term between gender and marital status on the probability of working as an informal self-employed worker without further control variables. Models (2) to (6) include the control variables defined in section 4.1.1. Because the theoretical framework pointed to a stronger effect of marital status when having small children, models (3) and (6) also include an interaction term between both variables. Finally, models (1) to (3) include city, household, and year fixed effects, while model (4) does not include any fixed effects,

model (5) includes all but year fixed effects, and model (6) just include year fixed effects.

The interaction term between being married and gender ($Married * Female$), which is the one of interest, is positive and significant for every specification of the Probit regression. This means that the marginal effect of being married is positive and significantly larger for women than for men.

Being women by itself is not significant on entering self-employment. Gender is only relevant when interacted with marital status. Having children of age five or less is also positive and significant for entering informal self-employment. However, the interaction term with being married has little significance.

Furthermore, table 11 also proves that the interaction term between being married and a woman is rather stable in magnitude and significance when adding the control variables. All the control variables are also stable in every specification and highly significant, except for the interaction term between being married and having young children.

With a Probit model with an interaction term lies the question of whether this term improves the goodness of fit of the model. This measure is also called the percent correctly predicted, and that can be answered by examining the asymptotic z-statistic (Karaca-Mandic et al., 2011). For non-linear models, a maximum likelihood estimation is usually used, which automatically accounts for heteroskedasticity (Wooldridge, 2012). So to test whether the interaction term ($Married * Female$) improves the goodness of fit of the model, a log likelihood command is included for every specification of the model. The log likelihood ratio chi-square of Model (3), which is the most comprehensive model, is -70,921.82 with a p-value of 0.00001 tells us that our model as a whole is statistically significant.

5.1 Result's interpretation

With a linear model it would be enough to take the coefficients as the marginal effect. However, to determine the effect of marital status and gender on entry to self-employment in a Probit is not as straightforward as it is with linear regressions. In a non-linear model such as the Probit, the effect could be different from zero even when $\gamma_{12} = 0$ (Karaca-Mandic et al., 2011). Probit models with interaction terms can be even more tricky to interpret, but as Wooldridge (2012) states, one should compute the partial derivatives and then evaluate the resulting partial effects at interesting values.

In general, as identified before, the sign of the coefficients and their significance obtained give the signs and significance of the partial effects (Wooldridge, 2012). The covariates shown in Table 11 have no explanatory power, the marginal effect has to be calculated to interpret the results from the Probit regression. Interaction terms in a non-linear model indicate changes in the marginal effect of one variable induced by changes in another variable's value. This is called a cross-partial derivative, and is what we are interested

in measuring. To calculate the partial derivatives we take the most comprehensive specification, which is Model (3).

Therefore, we need to determine the marginal effect of a change in marital status to married when gender is female on working as a self-employed worker. To get the interaction effect we compute the derivative with respect to being married for both genders separately, as established in equation (4). After applying it, we get that the marginal effect of being married in working as self-employed for men is 0.01789, and for women is of 0.07016. Therefore, the average change in the predicted conditional probability that the individual gets into self-employment when being married differs between men and women by 6.18 percentage points. As was stated before, this difference is positive, meaning that married women are 5.23% more likely than married men to enter informal self-employment.

5.2 Placebo regressions for robustness checks

To further test the model's robustness we also ran the model changing our explanatory variable *Married*. We would expect that when changing marital status, either the effects' direction change or the variable becomes irrelevant. This way, we can confirm that being married is a relevant factor for women that enter the informal self-employment sector.

First, we replicate Table 11 we test it for single individuals. Interestingly, the results shown in Table 12 depict a very different effect for this case. Particularly, is noticeable that the interaction term of single women is opposite to married women.

Table 12: Entry to self-employment results - Single

VARIABLES	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
$Single$	-0.498***	-0.241***	-0.207***	-0.205***	-0.204***	-0.208***
	(0.0119)	(0.0146)	(0.0159)	(0.0159)	(0.0159)	(0.0159)
$Female$	0.265***	0.117***	0.117***	0.121***	0.123***	0.116***
	(0.00802)	(0.00881)	(0.00881)	(0.00876)	(0.00879)	(0.00878)
$Single * Female$	-0.169***	-0.181***	-0.176***	-0.179***	-0.180***	-0.175***
	(0.0176)	(0.0189)	(0.0189)	(0.0189)	(0.0189)	(0.0189)
$Kids < 5$		0.0231***	0.0443***	0.0433***	0.0430***	0.0446***
		(0.00808)	(0.00898)	(0.00898)	(0.00898)	(0.00898)
$Kids < 5 * Female$			-0.112***	-0.113***	-0.113***	-0.112***
			(0.0207)	(0.0207)	(0.0207)	(0.0207)
Age		0.116***	0.116***	0.117***	0.117***	0.116***
		(0.00167)	(0.00167)	(0.00167)	(0.00167)	(0.00167)
$Years\ of$		-0.00629***	-0.00645***	-0.00657***	-0.00629***	-0.00670***
$education$		(0.00101)	(0.00101)	(0.00100)	(0.00101)	(0.00101)
$Income(log)$		-0.479***	-0.479***	-0.471***	-0.470***	-0.480***
		(0.00576)	(0.00576)	(0.00560)	(0.00568)	(0.00568)
Constant	-1.006***	2.241***	2.225***	2.381***	2.351***	2.247***
	(0.0202)	(0.0495)	(0.0496)	(0.0453)	(0.0484)	(0.0467)
Observations	177,350	177,350	177,350	177,350	177,350	177,350
City FE	YES	YES	YES	NO	YES	NO
Household FE	YES	YES	YES	NO	YES	NO
Year FE	YES	YES	YES	NO	NO	YES

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results are expected because it is more likely that single women prefer higher paying jobs in the formal sector rather than the informal self-employment sector. The coefficients of the interaction term are also highly significant, but negative, meaning that being a single women decreases the probability of being self-employed. When calculating the marginal effects, we get that the marginal effect of being single in working as self-employed is -0.05128 for men, while is -0.09004 for women [4]. Therefore, single women's

[4]Both marginal effects are highly significant.

average change in the predicted conditional probability differs negatively from men by 3.88 percentage points.

It is also interesting that, in contrast with being married, being a single with young children is significant and negative for entering self-employment. This could be because single men and women are even less likely to enter self-employment due to the larger financial pressure it poses.

We can also test the same for a marital status more similar to being married "free union", which is living together without being married. Table 13 shows the results.

Table 13: Entry to self-employment results - Free union (FU)

	Model	Model	Model	Model	Model	Model
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
FU	0.0453***	0.0799***	0.0543***	0.0598***	0.0593***	0.0547***
	(0.0127)	(0.0137)	(0.0171)	(0.0171)	(0.0171)	(0.0171)
$Female$	0.232***	0.0835***	0.0839***	0.0863***	0.0880***	0.0824***
	(0.00774)	(0.00843)	(0.00843)	(0.00838)	(0.00842)	(0.00840)
$FU * Female$	0.0357*	0.0586***	0.0592***	0.0599***	0.0599***	0.0592***
	(0.0185)	(0.0197)	(0.0197)	(0.0197)	(0.0197)	(0.0197)
$Kids < 5$		0.0672***	0.0569***	0.0557***	0.0550***	0.0576***
		(0.00788)	(0.00871)	(0.00870)	(0.00870)	(0.00871)
$Kids < 5 * FU$			0.0540***	0.0539***	0.0538***	0.0540***
			(0.0199)	(0.0199)	(0.0199)	(0.0199)
Age		0.139***	0.139***	0.140***	0.140***	0.139***
		(0.00142)	(0.00142)	(0.00142)	(0.00142)	(0.00142)
$Years\ of$		-0.00559***	-0.00565***	-0.00582***	-0.00544***	-0.00600***
$education$		(0.00101)	(0.00101)	(0.00101)	(0.00101)	(0.00101)
$Income(log)$		-0.468***	-0.468***	-0.462***	-0.460***	-0.470***
		(0.00567)	(0.00567)	(0.00553)	(0.00560)	(0.00560)
Constant	-1.162***	1.925***	1.926***	2.088***	2.047***	1.961***
	(0.0198)	(0.0464)	(0.0464)	(0.0420)	(0.0451)	(0.0435)
Observations	177,350	177,350	177,350	177,350	177,350	177,350
City FE	YES	YES	YES	NO	YES	NO
Household FE	YES	YES	YES	NO	YES	NO
Year FE	YES	YES	YES	NO	NO	YES

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

These results are less expected since it could be argued that couples in a free union arrangement comply less with traditional gender and household roles. Instead, results from 13 depict a significant and positive effect of women in free union of entering self-employment.

6 Conclusions

This thesis shows that marital status has a positive effect on being an informal self-employed worker, although it is only statistically significant for women. Moreover, is also found that this effect is stronger for women as the difference between marginal effects between men and women depicted. This can be explained by the unequal distribution of household responsibilities between husbands and wives. Since the inclusion of women in the labor market in Latin America, the latter are expected not only to bring income to the household, but also to keep assuming the caretaking activities (Cunningham, 2001; Forste and Fox, 2012; Kimmel and Kniesner, 1998).

The latter is not only true for married individuals, but women in free union also are more likely to get into self-employment. This could mean that household and gender roles are independent on marital status, and are present in every household integrated by a man and a woman. Furthermore, this finding is more interesting when we run the same model for single individuals and it shows the opposite effect. In contrast, being single significantly deters individuals from being informally self-employed. It could be argued that this stays in line with the mechanism proposed for the main results. By being single, both men and women can pursue a more stable, better-payed job in the formal sector.

Therefore, if married women are choosing to work in the informal self-employed sector due to their household responsibilities, they are also incapable of investing much time for labor activities. Needless to say that this affects productivity since it prevents them from developing necessary skills for their business, and probably also from investing enough resources to allow scalability.

This dynamic poses a few policy implications, and can be problematic both at the public and private sphere. For instance, in the public domain the expansion of informal firms hinders regulation and affects productivity (Fajnzylber et.al., 2006; Levy, 2008; Buso et.al., 2012; Kanbur, 2014), while in the private sphere it perpetuates a cycle of inequality in the division of household labor (Duncan et.al., 1993; Rizavi and Sofer, 2010; Kanbur, 2014). As Franzoni and Voorend (2009) argues, the latter can be reinforced by policy programs that perpetuate women's gender roles by directly transferring household resources to women for caregiving activities.

Social policy programs in Mexico and Latin America should analyze these patriarchal structures at the design stage and during implementation to prevent that the workload inequality between women and

men keeps on being the rule in the region. Women's inclusion in the labor market should not be thought as a virtue by itself or as a sufficient development indicator. The State should be aware of the incentives created by both the labor market dynamics and its own social policy that could add or maintain gender inequality.

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