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**Working Paper**

## Differences in the labor market by gender and aggregate income

Working Papers, No. 2024-05

**Provided in Cooperation with:**

Bank of Mexico, Mexico City

*Suggested Citation:* Mascarúa Lara, Miguel A. (2024) : Differences in the labor market by gender and aggregate income, Working Papers, No. 2024-05, Banco de México, Ciudad de México

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Banco de México

Working Papers

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Banco de México

June 2024

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## Differences in the labor market by gender and aggregate income\*

Miguel A. Mascarúa Lara<sup>†</sup>

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**Abstract:** What are the effects on the labor market and aggregate income of frictions that restrict women's labor decisions that impede labor participation and composition being equal between men and women? To answer this question, I develop an occupational general equilibrium model with heterogeneous agents facing gender-based restrictions in labor participation and job selection. Then, I include an endogenous distribution of the size of formal and informal establishments and workers to replicate the Mexican data. Finally, I use the ENOE to calibrate the model and estimate gender-based frictions in the labor market in states and regions of Mexico and their effect on aggregate income. According to the model, aggregate income could increase by 4.3% without women's restrictions to entrepreneurship and by 32.1% without restrictions to entry and entrepreneurship. In addition, the southern states would witness the largest increases.

**Keywords:** Misallocation, female entrepreneurship, gender frictions, informality

**JEL Classification:** J16, J70, O17, O40, O10, O50

**Resumen:** ¿Cuáles son los efectos en el mercado laboral y en el ingreso agregado de las fricciones que limitan las decisiones laborales de las mujeres y que evitan que la participación y la composición laboral sea similar entre hombres y mujeres? Para ello, se desarrolla un modelo ocupacional de equilibrio general con agentes heterogéneos que enfrentan restricciones por género en la participación y selección ocupacional. Adicionalmente, se incluye una distribución endógena del tamaño de establecimientos y de trabajadores entre formales e informales con el fin de replicar sus contrapartes observadas en México. Finalmente, se usa la ENOE para calibrar el modelo y estimar las fricciones por género en los mercados laborales de los estados y regiones, así como su efecto en el ingreso agregado. De acuerdo con el modelo, el ingreso agregado podría aumentar un 4.3% si no existieran fricciones que impidan a las mujeres emprender, y un 32.1% sin las fricciones para participar laboralmente y emprender. Además, las entidades federativas del sur observarían los mayores incrementos.

**Palabras Clave:** Mala asignación de recursos, emprendimiento femenino, fricciones por género, informalidad

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\*I thank the valuable comments of Daniel Chiquiar, Alejandrina Salcedo, Juan Carlos Chávez, Santiago Bazdresch, Isidro Soloaga, four anonymous reviewers, the editors at Banco de México and participants of the Banco de México internal seminar, the ITESM-Puebla seminar, and the Sobre México Congress of Universidad Iberoamericana. All errors are my sole responsibility.

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## 1. Introduction

Gender disparities are present in labor markets, where women face lower salaries than men, participate less in the labor force, work fewer hours, or in less attractive occupations (Blau and Kahn, 2003, 2007; Olivetti and Petrongolo, 2008; Klasen and Lamanna, 2009; Blau and Kahn, 2013; Pande et al., 2017). These disparities are especially true for developing countries; for instance, in Mexico, a year before the COVID-19 pandemic that further disrupted labor markets, especially for women (Alon et al., 2021), 77.2% of men participated in the labor force and just 44.7% of women. In addition, the differences by gender become starker at the subnational level. For example, in 2019, 46.8% of women participated in the labor force in the northern region compared to 77.1% of men. In contrast, only 40.8% of women participated in the southern region in the same year, against 77.9% of men (Figure 1).

The literature attributes the observed differences by gender in the labor market to frictions that women face that affect their participation and the occupations they can choose. Such frictions may be financial, cultural, informational, discriminatory, or preferential, as well as asymmetries in responsibilities inside the household or others (Fernández et al., 2004; De Mel et al., 2009; Fernández, 2013; Erosa et al., 2017; Cole and Mehran, 2018). As women and men are equally capable of performing most jobs, the labor composition by gender would be similar if labor-market frictions did not exist. However, as Figure 2 shows, the proportion of male employers in Mexico more than doubles the proportion of women employers, with notable differences at the regional level.

This paper quantifies the effects on aggregate income of women's entry and occupational frictions in the labor market. I use a general equilibrium occupational model based on Lucas (1978) and Guner et al. (2008), in which individuals become workers, employers, or self-employed. In addition, I incorporate gender-based distortions, as in Cuberes and Teignier (2016), and Cuberes and Teignier (2017), and an endogenous distribution of formal and informal workers and entrepreneurs, as in Leal-Ordóñez (2014). The reason to include an endogenous distribution of formal and informal entrepreneurs is to closely follow the

distribution of establishments in a developing country, such as Mexico. I calibrate the model using data from 2019 of Mexico's INEGI's National Survey of Occupation and Employment. In the model, individuals with heterogeneous entrepreneurial talent form establishments to produce, and they face idiosyncratic frictions by gender that limit their entrepreneurial choice and participation in the labor market, resulting in an endogenous labor supply. The simulations indicate that such frictions that restrict women's labor decisions have considerable effects on aggregate income. For example, eliminating occupational frictions for women at the national level would increase aggregate income (or output) by 4.3%. At the regional level, income would increase by 4.7% in the northern region, 4.3% in the north-central, 4.6% in the central, and 3.9% in the southern region. Among states, San Luis Potosí is expected to see the lowest increase in income at 2.9%. In comparison, Puebla is expected to see the highest increase with a 5.7% increase, attributed to its high estimated frictions to entrepreneurship. In addition, by eliminating occupational and entry frictions, aggregate income would increase by 32.1% in the long run (30.3% in the northern region, 31.2% in the north-central, 31.2% in the central, and 36.3% in the southern). At the state level, Chiapas would experience the highest increase, with 49.5%, due to its high participation frictions. In contrast, Colima would experience the smallest yet still significant increase, at 22.3%.

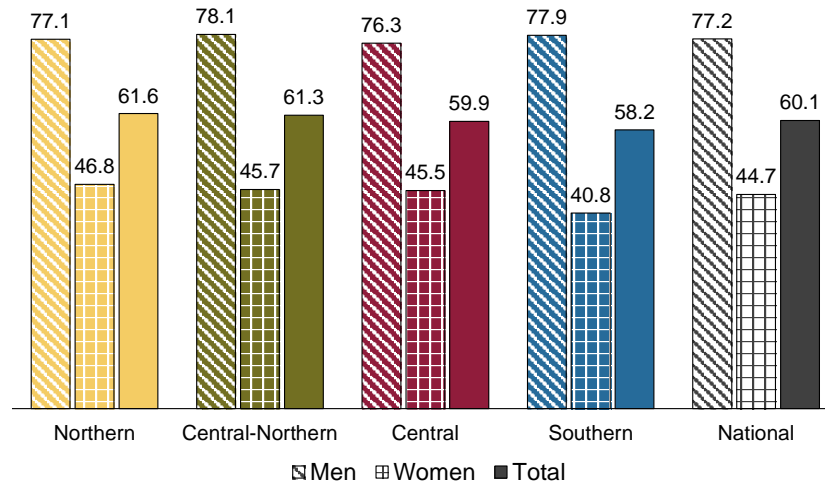
The model generates an endogenous distribution of establishments that operate in the formal and informal market and an endogenous distribution of informal workers, as in Leal-Ordóñez (2014). Informal establishments avoid their tax obligations. To do it, they rent a low level of capital since the government can only detect and enforce taxation to establishments that rent capital above some predefined level. The government taxation technology and the possibility of establishments to avoid taxation result in an endogenous distribution of formal and informal establishments that better matches the distribution of Mexican establishments.

I find that simultaneously eliminating labor informality and gender frictions in the labor market would increase aggregate income by 41.9%. This effect is larger than the sum of eradicating labor informality and gender frictions at the individual level. The results suggest that joint policies targeting informality and promoting equality in the labor market bring more benefits than the same policies implemented individually.

The mechanisms in the model that drive gender distortions to affect the aggregates are the following. First, women's occupational frictions decrease the share of female employers and increase the share of male employers with lower entrepreneurial talent. This effect decreases the average talent of employers and, consequently, aggregate productivity and the equilibrium wage decrease as well. The decrease in the wage rate pushes some workers to become self-employed to increase their earnings. The self-employed have access to a less-efficient technology than the employers, so aggregate productivity further decreases. Second, occupational frictions restrict the aggregate labor supply as fewer women can work, decreasing aggregate production.

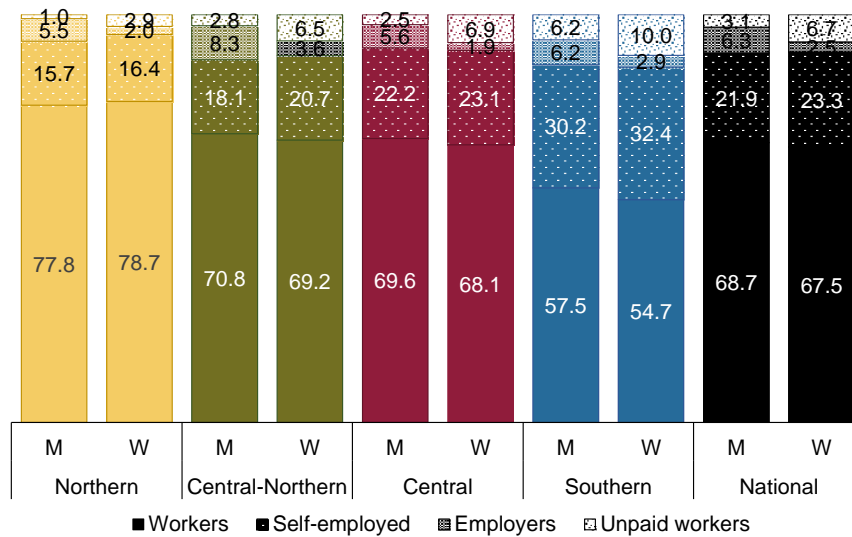
This study contributes to the misallocation literature that quantifies the aggregate effects of idiosyncratic distortions. The literature has found that such distortions result in an inefficient allocation of resources and talent that can account for the vast differences in productivity and income across countries (Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009; Bartelsman et al., 2013; Hsieh et al., 2019). Specifically, this study rationalizes a share of those idiosyncratic distortions as gender-based frictions, similar to Cuberes and Teignier (2016), Chiplunkar and Goldberg (2021), and Ranasinghe (2020). This study is similar to Cuberes and Teignier (2018) and Chiplunkar and Goldberg (2021). However, my study generates an endogenous distribution of establishments that operate in the formal and informal markets and quantifies the effects at the subnational level, unlike Cuberes and Teignier (2018). Such distribution of establishments aims to quantify the aggregate effects of the misallocation of talent and resources in developing countries more appropriately. In addition, unlike Chiplunkar and Goldberg (2021), I incorporate capital decisions to quantify the misallocation effects in the investment channel. While our modeling methodologies differ, like Chiplunkar and Goldberg (2021) and Cuberes and Teignier (2018), I, too, show that eliminating frictions results in substantial changes in the aggregate economy. Chiplunkar and Goldberg (2021) find that eradicating all job-related frictions in India could increase real income by 43% (comparable to Chiapas in this study). Similarly, Cuberes and Teignier (2018), across multiple and mainly developed countries, find that eliminating all frictions women face in the labor market could lead to long-term income boosts ranging from 7.5% to 33.3% (the upper range is comparable to Morelos in this study).

Figure 1: Labor force participation by gender and region in 2019



Note. The Figure displays the labor force participation by gender and the regions defined by Banco de México. In Mexico, only 44.7% of women participate in the labor market, compared to 77.2% of men. The participation rate differs by region. Although the northern region has participation levels similar to the national, the southern region has the lowest participation of women, with 40.8%.  
Source: National Survey of Occupation and Employment of 2019.

Figure 2: Occupation composition by gender and region in 2019



Note. The Figure displays the occupational distribution (workers, self-employed, employers, and unpaid workers) by gender (M - men and W - women). The northern region has a larger share of the population in the labor force who are workers than the southern region. In addition, the share of women who are employers is lower than that of men in all regions.  
Source: National Survey of Occupation and Employment for the fourth quarter of 2019.

## 2. A model of gender frictions with informality

The model is a general equilibrium extension of Lucas (1978)'s *span of control* that includes one additional occupation (self-employment as in Gollin 2008), an endogenous distribution of informal and formal workers (as in Antón and Leal 2015), and gender-based distortions. In the model, a continuum of agents of mass one differ in their entrepreneurial abilities (or talent) as in Guner et al. (2008), and gender as in Cuberes and Teignier (2016), and form a representative household that decides every period on consumption and investment. At period zero, men and women draw their entrepreneurial talent  $z$ , which is innate and does not evolve through time. Entrepreneurial talent is distributed according to the PDF  $f(z)$  and CDF  $F(z)$ . To be specific, the distribution of talent is a truncated Pareto of the form

$$F(z) = \frac{1 - \left(\frac{z_{\min}}{z}\right)^{shape}}{1 - \left(\frac{z_{\min}}{z_{\max}}\right)^{shape}}, \quad (1)$$

where  $shape > 0$  determines the form of the Truncated Pareto distribution and  $z \in [z_{\min}, z_{\max}]$ , with  $0 < z_{\min} < z_{\max}$ . In addition, the household is endowed with  $K_0$  units of capital at time zero.

Household members with sufficiently large entrepreneurial talent become employers and form establishments, rent capital, and hire workers to produce the single homogeneous good of the economy. In addition, members with lower entrepreneurial talent but sufficiently large to produce become self-employed and only rent capital. Finally, household members with sufficiently low entrepreneurial talent become workers and supply their time to the employers.

The government serves only two purposes in this framework. First, it taxes the employers' output and returns all tax revenue to the household as a lump-sum transfer. Taxing output is a model simplification equivalent to simultaneously taxing labor, capital, and profits. The government can only partially enforce the establishments to comply with their tax obligations because it cannot detect small establishments that operate in the informal sector. In particular, the government cannot detect and tax self-employed individuals and employers who rent low capital levels. The partial enforcement of the tax obligations results in an endogenous



distribution of establishments that operate formally and informally and an endogenous distribution of informal workers, as in Leal-Ordóñez (2014).

Finally, women face exogenous restrictions that limit their labor market participation and occupational choices as entrepreneurs. This mechanism results in an endogenous distribution of occupations by gender.

### 2.1. Technology to enforce taxation

As mentioned above, the government has limited technology to enforce output taxation. In particular, the government cannot detect and tax self-employed persons or employers who rent capital below  $k_{caught}$ . In mathematical terms, the probability  $p_e[k(z)]$  of detecting an employer  $z$  is

$$p_e[k(z)] = \begin{cases} 0, & k(z) \leq k_{caught} \\ 1, & k(z) > k_{caught} \end{cases} \quad (2)$$

and the probability of detecting a self-employed worker is always zero.

If the government detects an employer that evades taxes, it takes the total of the employer's profits as a punishment. Punishments last only one period, and after that, the entrepreneur has a fresh start.

### 2.2. Earnings and choices for the alternative occupations

Individuals can have four possible occupations: formal employer, informal employer, self-employed, and worker.

#### 2.2.1. Formal employer

An individual with entrepreneurial ability  $z$  who chooses to become an employer rents  $k_F(z)$  units of capital and hires  $n_F(z)$  workers to form an establishment and operate a technology that produces  $y_F(z)$  units of output. Every period, the establishment (or the employer) pays a fraction  $\tau$  of output as taxes. She or he has access to the technology  $y_e(z, k_F, n_F) = z[k_F^\alpha n_F^{1-\alpha}]^\eta$  as in Lucas (1978) and Buera et al. (2011), where  $\eta \in (0,1)$  is the *span-of-control* parameter. Because  $\eta$  is less than one, the technology exhibits decreasing returns to scale, ensuring a distribution of establishments with heterogeneous productivities (as opposed to the most productive establishment producing everything). The formal employer maximizes profits according to:

$$\pi_F(z) = \max_{k_F, n_F} (1 - \tau) z [k_F^\alpha n_F^{1-\alpha}]^\eta - w n_F - r k_F, \quad (3)$$

where  $w$  is the wage rate and  $r$  is the rental rate of capital.<sup>1</sup>

### 2.2.2. Informal employer

An individual with entrepreneurial talent  $z$  who chooses to become an informal employer to avoid taxation has access to the same technology as the formal employers. However, the establishment he or she operates maximizes profits by considering the probability of detection stated in equation (2). Hence, the maximization problem is:

$$\pi_I(z) = \max_{k_I, n_I} [1 - p(k_I)] [z(k_I^\alpha n_I^{1-\alpha})^\eta - w n_I - r k_I]. \quad (4)$$

A rational informal employer will not rent capital levels above  $k_{caught}$ ; otherwise, every period, he or she will be caught and earn zero profits (as the government will forfeit them). However, he or she can still produce by renting any capital below  $k_{caught}$ . This way, the informal employer can reap the tax avoidance benefits without getting caught. Consequently, the maximization process can be alternatively stated as:

$$\pi_I(z) = \max_{k_I, n_I} z [k_I^\alpha n_I^{1-\alpha}]^\eta - w n_I - r k_I, \quad s. t. \ k_I \leq k_{caught}. \quad (5)$$

### 2.2.3. Self-employed

If an individual with talent  $z$  chooses to become self-employed, he or she produces  $y_S(z)$  units of output and rents  $k_S(z)$  units of capital. The self-employed operate the technology  $y_S = \kappa z k_S^{\alpha\eta}$ , where the parameter  $\kappa$  determines the productivity of the self-employed production function. One interpretation of the parameter is that the self-employed allot part of their time on managerial tasks; henceforth,  $\kappa$  is the remaining time allocated to produce raised to the power of  $(1 - \alpha)\eta$ . The maximization process is:

$$\pi_S(z) = \max_{k_S} \kappa z k_S^{\alpha\eta} - r k_S. \quad (6)$$

### 2.2.4. Worker

Workers supply all their endowed time inelastically, which is standardized to one. They receive the wage rate  $w$  for their working time, so their earnings are just  $w$ . Workers cannot

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<sup>1</sup> The price of the consumption good is  $p$  and is set to one.

choose to work for formal or informal establishments since they are randomly chosen. If such a choice existed inside the model, workers would be indifferent since the wage rate is the same in both sectors.

### 2.3. Household's decisions

The household has preferences over a sequence of consumption of the homogeneous good given by:

$$\sum_{t=0}^{\infty} \beta^t u(C_t), \quad (7)$$

where  $C_t$  represents consumption in period  $t$ . The household accumulates capital by investing  $I_t$ , and the capital accumulation motion is:

$$K_{t+1} = I_t + (1 - \delta)K_t, \quad (8)$$

where  $\delta$  denotes the depreciation rate.

### 2.4. Optimal choices

Since talent is static, the employers and the self-employed solve a static problem every period. Therefore, the optimal choices of formal employers are:

$$n_F = [(1 - \tau)z\eta]^{\frac{1}{1-\alpha\eta-\eta}} \left(\frac{\alpha}{r}\right)^{\frac{\alpha\eta}{1-\alpha\eta-\eta}} \left(\frac{1-\alpha}{w}\right)^{\frac{1-\alpha\eta}{1-\alpha\eta-\eta}} \quad (9)$$

and

$$k_F = [(1 - \tau)z\eta]^{\frac{1}{1-\alpha\eta-\eta}} \left(\frac{\alpha}{r}\right)^{\frac{1-\eta}{1-\alpha\eta-\eta}} \left(\frac{1-\alpha}{w}\right)^{\frac{\eta}{1-\alpha\eta-\eta}} \quad (10)$$

There are two types of informal employers: those unconstrained in capital, who rent a capital level below  $k_{caught}$ , and those constrained, who rent a capital level of  $k_{caught}$  to avoid detection. The optimal choices of the unconstrained informal employers are:

$$n_{I,u} = (z\eta)^{\frac{1}{1-\alpha\eta-\eta}} \left(\frac{\alpha}{r}\right)^{\frac{\alpha\eta}{1-\alpha\eta-\eta}} \left(\frac{1-\alpha}{w}\right)^{\frac{1-\alpha\eta}{1-\alpha\eta-\eta}} \quad (11)$$

and

$$k_{I,u} = (z\eta)^{\frac{1}{1-\alpha\eta-\eta}} \left(\frac{\alpha}{r}\right)^{\frac{1-\eta}{1-\alpha\eta-\eta}} \left(\frac{1-\alpha}{w}\right)^{\frac{\eta}{1-\alpha\eta-\eta}}. \quad (12)$$

And the optimal choices of the constrained informal employers are:

$$n_{I,c} = \left[ \frac{(1 - \alpha)\eta z k_{caught}^{\alpha\eta}}{w} \right]^{\frac{1}{1 - \alpha\eta - \eta}} \quad (13)$$

and

$$k_{I,c} = k_{caught}. \quad (14)$$

The optimal choice of a self-employed with entrepreneurial talent  $z$  is:

$$k_S(z) = \left( \frac{\kappa z \alpha \eta}{r} \right)^{1/(1 - \alpha\eta)}. \quad (15)$$

Finally, since a worker does not value leisure, her or his optimal choice is to supply all her or his time endowment, that is, one.

Individuals have rational expectations and perfect information. They can observe each entrepreneur's talent and anticipate their actions and the prices of the economy. Then, they calculate the payoffs they will get for every available occupation. Based on that, an individual with entrepreneurial talent  $z$  will choose the occupation that provides the largest payoff (profits for entrepreneurs or the wage rate for workers). The decision rule is then:

$$\max [w, \pi_S(z), \pi_I(z), \pi_F(z)]. \quad (16)$$

If one orders all individuals according to their entrepreneurial skills and because of the concavity of the production technologies, as Leal-Ordóñez (2014) and Cuberes and Teignier (2016) show, there are thresholds in which individuals with entrepreneurial skills from  $z_{\min}$  (the lowest ability) to  $z_1$  become workers, those with entrepreneurial skills between  $z_1$  and  $z_2$  become self-employed, those with entrepreneurial skills between  $z_2$  and  $z_3$  become informal employers and, finally, those with entrepreneurial skills higher than  $z_3$  become formal employers. The mentioned threshold skills are endogenously determined by equation (16). In particular, the skill  $z_1$  is determined by the marginal individual who is indifferent to becoming a worker or self-employed; that is,  $z_1$  solves the equation  $w = \pi_S(z_1)$ . Similarly,  $z_2$  solves  $\pi_S(z_2) = \pi_I(z_2)$  and  $z_3$  solves  $\pi_I(z_3) = \pi_F(z_3)$ .

## 2.5. Labor market frictions by gender

The model assumes that men and women are identical in all dimensions, except women face exogenous restrictions in the labor market. Specifically, men and women draw their talent from the same distribution  $F(z)$ . However, only women draw two additional restrictions that limit their participation in the labor market and the entrepreneurial occupations they can choose.

The first restriction is that only a fraction  $\lambda$  of women participate in the labor market. In contrast, a fraction  $1 - \lambda$  of them is randomly excluded from participating in the market (and hence, of all occupations). One can think of the fraction  $\lambda$  as a reduced-form factor that reflects all aspects that inhibit the participation of women (and that happened outside the model), such as women's discrimination, cultural and supply-side factors, or even personal decisions (to value more a healthy balance between work or life, as an illustration).

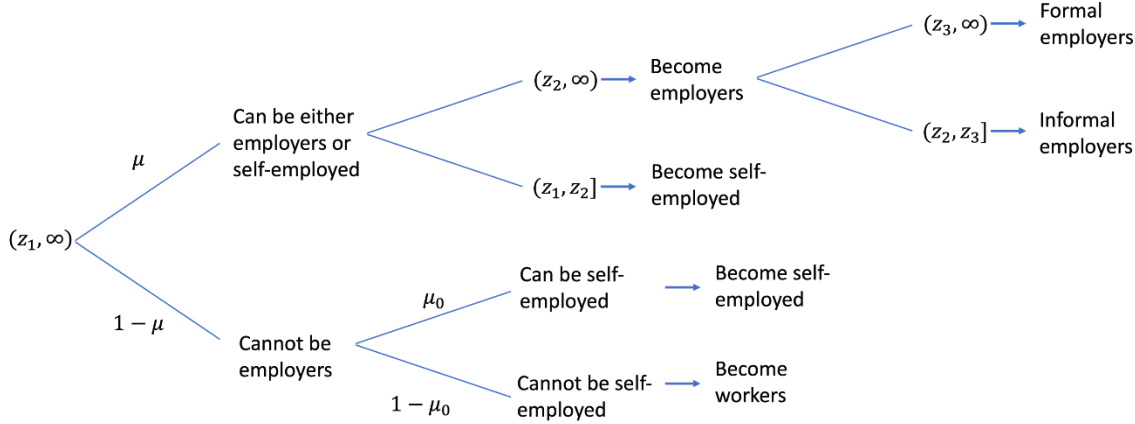
The second exogenous restriction is that only a fraction  $\mu$  of women can freely choose an entrepreneurial occupation; therefore, a fraction  $1 - \mu$  of them are excluded from becoming formal or informal employers. Finally, the third restriction is that of the fraction of excluded women, only  $\mu_0$  have the possibility of becoming own-account workers (or self-employed). The rest of them, representing the fraction  $1 - \mu_0$ , are also excluded from self-employment. As a result, a fraction of  $(1 - \mu)(1 - \mu_0)$  of women are excluded from becoming employers and self-employed, so their only occupation left is to become workers.

As mentioned, the implicit assumption about the frictions described above is that they arise outside the model, so they are considered exogenous in this study. Since this study aims to quantify the aggregate effects in aggregate income, taking the frictions as exogenous does not invalidate our results. However, further studies that aim to formulate specific public policies should rationalize the origin of these frictions. Including, for example, differences by gender in financial access, social norms for participating in the labor market and occupational choice, differences in information, discrimination, gendered laws, taxes, and subsidies that affect the marketization of home production, as well as asymmetries in responsibilities inside the household (Fernández et al., 2004; De Mel et al., 2009; Fernández,

2013; Erosa et al., 2017; Cole and Mehran, 2018; Jayachandran, 2021; Hyland et al., 2020; Duval-Hernandez et al., 2021).

Figure 3 presents a diagram that summarizes the occupational possibilities for women.

Figure 3: Women’s occupational choice in the model



Note. The diagram shows the occupational choices of women by considering their frictions.  $z_1$  represents the minimum entrepreneurial talent to become a self-employed or employer; hence all women with talent above  $z_1$  become entrepreneurs. However, only  $\mu$  of them can become employers. Of the rest of  $1 - \mu$  of women, only  $\mu_0$  can become self-employed.

**2.6. Mechanisms of the model**

There are two general distortions in the model: those related to tax evasion and the others related to the gender frictions in the labor market. In this subsection, I describe how such distortions affect the aggregate economy. For a more mathematical description, the reader should check Leal-Ordóñez (2014) and Cuberes and Teignier (2016).

The technology to detect informal establishments stated in equation 2 introduces three primary sources of distortions. In addition, other general equilibrium effects that result from tax avoidance distort the economy, which will be described in section 4. First, some entrepreneurs willingly decrease their scale of operation to avoid detection. Since capital and labor are complementary in the production function, the decrease in the scale of operation reduces aggregate production in equilibrium. Second, in modeling terms, avoiding taxes is like facing lower production costs; therefore, some more productive formal employers find it more profitable to operate in the informal market. Similarly, individuals with low

entrepreneurial talent who otherwise would have been workers become informal employers to take advantage of the lower production costs that result from not paying taxes. And third, the capital-labor ratios of the constrained informal entrepreneurs are distorted in equilibrium (Leal-Ordóñez, 2014).

Gender frictions introduce three other direct sources of distortions, as well as additional ones from general equilibrium effects (that similarly will be described later). First, restrictions on the participation of women ( $1 - \lambda > 0$ ) affect aggregate productivity by reducing labor supply and decreasing average entrepreneurial talent by reducing the pool of entrepreneurs. Frictions into employership ( $1 - \mu > 0$ ) generate a decline in the number of employers and, hence, a decline in the labor demand and the equilibrium wage, which affects the occupational arrangement. Finally, frictions into self-employment ( $1 - \mu_0 > 0$ ) generate a decline in the share of the self-employed and, consequently, an increase in labor supply, pushing the equilibrium wage down, which, once again, affects the occupational arrangement.

## 2.7. Equilibrium

A competitive equilibrium in the steady state is a price vector ( $p = 1, r, w$ ), a talent distribution  $F(z)$ , a set of occupations, a set of constraints on the occupational choices and participation of women ( $\mu, \mu_0, \lambda$ ), such that, given prices, the agents solve the problems in equations (3) to (6), the household solves the problem in equation (7) and chooses occupations for each household member, and the aggregate quantities are consistent.<sup>2</sup>

The supply of capital  $K$  is equal to the demand for it:

$$K = \underbrace{\frac{1}{2} \left[ \int_{z_2}^{z_{\max}} k_e(z) dF(z) + \int_{z_1}^{z_2} k_s(z) dF(z) \right]}_{\text{demand of capital (men)}} + \underbrace{\frac{\lambda}{2} \left\{ \mu \int_{z_2}^{z_{\max}} k_e(z) dF(z) + [\mu + (1 - \mu)\mu_0] \int_{z_1}^{z_2} k_s(z) dF(z) + (1 - \mu)\mu_0 \int_{z_2}^{z_{\max}} k_s(z) dF(z) \right\}}_{\text{demand of capital (women)}}. \quad (17)$$

The demand for workers is equal to the supply of them:

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<sup>2</sup> One equilibrium condition is redundant, so I normalized the price of the consumption good to the unity.

$$\begin{aligned}
& \underbrace{\frac{1}{2} \left[ \int_{z_2}^{z_{\max}} n_e(z) dF(z) \right]}_{\text{labor demand (men)}} + \underbrace{\frac{\lambda}{2} \mu \left[ \int_{z_2}^{z_{\max}} n_e(z) dF(z) \right]}_{\text{labor demand (women)}} \\
= & \underbrace{\frac{1}{2} F(z_1)}_{\text{labor supply (men)}} + \underbrace{\frac{\lambda}{2} \{F(z_1) + (1 - \mu)(1 - \mu_0)[1 - F(z_1)]\}}_{\text{labor supply (women)}}
\end{aligned} \tag{18}$$

and aggregate consumption  $C$  and investment equals aggregate output  $Y$ , where:

$$\begin{aligned}
C + \delta K = & \underbrace{\frac{1}{2} \left[ \int_{z_2}^{z_{\max}} y_e(z) dF(z) + \int_{z_1}^{z_2} y_s(z) dF(z) \right]}_{\text{output (men)}} + \\
& \underbrace{\frac{\lambda}{2} \left\{ \mu \int_{z_2}^{z_{\max}} y_e(z) dF(z) + [\mu + (1 - \mu)\mu_0] \int_{z_1}^{z_2} y_s(z) dF(z) + (1 - \mu)\mu_0 \int_{z_2}^{z_{\max}} y_s(z) dF(z) \right\}}_{\text{output (women)}}.
\end{aligned} \tag{19}$$

## 2.8. Algorithm to find the steady-state equilibrium

The first step is to discretize the distribution of talent. To do so, I create 10,000 ordered values of talent points that range from  $z_{\min}$  to  $z_{\max}$ . With them, I calculate the cumulative density function for the Truncated Pareto Distribution using equation (1), and then I obtain the probability density function for each talent point.

The solution requires three prices: the price of the consumption good, which is the numeraire, the capital's rental rate, and the wage rate. The rental rate of capital is pinned down using the household's first-order condition (FOC). Because of the assumption of a single representative household that makes the decisions of the heterogeneous agents, the FOC are the same as in the neoclassical growth model. Using known results that one can find in textbooks, for example, in Ljungqvist and Sargent (2018), the rental rate of capital is fixed and given by

$$r = \frac{1}{\beta} - (1 - \delta). \tag{20}$$

With that, we only need to find one additional price: the wage rate. To find it, I used the following iterative algorithm.

1. Start by fixing the wage rate  $w$  to some initial value that we will call  $w = \hat{w}$ .



2. Given  $r$  and  $\widehat{w}$ , calculate optimal choices for men and women and earnings for each  $z$  for the three occupations (self-employed, formal, and informal employer).
3. Find occupations for each  $z$  for men and women using equation (16).
4. Given the occupations and prices, calculate the aggregate labor demand and supply.
5. Calculate excess labor demand as the difference between labor demand and supply.
6. If the excess of labor is positive, make a new guess of the wage rate  $w_{\text{new}}$ , such that  $w_{\text{new}} = w_{\text{update}} > \widehat{w}$  or, if the excess of labor is negative, make a new guess of the wage rate  $w_{\text{new}}$ , such that  $w_{\text{new}} = w_{\text{update}} < \widehat{w}$ .
7. Repeat steps 2 to 6 until the demand and supply of labor converge to the same value (with some tolerable error).

### 3. Calibration and estimation of parameters

The misallocation literature usually assumes that the United States is a relatively undistorted economy. Therefore, in some studies, like in Restuccia and Rogerson (2008), Guner et al. (2008), and Bhattacharya et al. (2013), the models are calibrated first to match U. S. moments to study the aggregate effects and then the idiosyncratic distortions are introduced. In this study, I will differ in that approach and assume that the economy I study is already distorted. I will then recover the idiosyncratic distortions using the model, the data, and the calibration. After that, I will eliminate the recovered distortions and calculate the aggregate effects. Some papers that have used the same approach are Leal-Ordonez (2014), Cuberes and Teignier (2016), and Ranasinghe (2017). Finally, to calibrate the model, I will use the quarterly average of INEGI's National Survey of Occupation and Employment for 2019.

The parameters to calibrate are the discount rate  $\beta$ , the depreciation rate of capital  $\delta$ , the tax rate  $\tau$ , the share of capital  $\alpha$ , the minimum and maximum values of entrepreneurial talent  $z_{\text{min}}$  and  $z_{\text{max}}$ , the *span-of-control* parameter  $\eta$ , the self-employment productivity parameter  $\kappa$ , the entrepreneurial ability distribution parameter *shape*, and the maximum capital that informal employers can rent without being caught,  $k_{\text{caught}}$ .

I take the parameters  $\beta$ ,  $\delta$ , and  $\tau$  from Leal-Ordonez (2014), who follows Solimano and Soto (2005) and Bergoeing et al. (2002). The parameter  $\alpha$  is equal to 0.193 to match an aggregate capital share of 0.33, like Bergoeing et al. (2002), Solimano and Soto (2005), and Garcíá-

Verdú (2005). Finally, the value of  $z_{\min}$  is set to one because what matters for the chosen Pareto distribution is the proportional scale of entrepreneurial talents relative to the minimum value. Table 1 presents a summary of the calibrated parameter values.

Table 1: Calibrated parameters and source

Parameter	Description	Value	Source
$\beta$	Subjective discount	0.943	
$\delta$	Depreciation rate of capital	0.050	Leal-Ordonez (2014)
$\tau$	Income tax rate	0.25	
$z_{\min}$	Minimum value of talent	1.000	Standardization
$\alpha$	Share of capital	0.193	Garcia-Verdú (2005)
$\eta$	<i>Span of control</i>	0.820	
$\kappa$	Self-employment productivity	0.782	
$z_{\max}$	Maximum value of talent	16.799	Computer estimations
<i>shape</i>	Shape of Truncated Pareto	5.517	
$k_{\text{caught}}$	Maximum capital of informals	7.349	

Note. The table shows the parameters, description, calibrated values, and source. The computer simulations consist of simulating the moments presented in Table 2 and then minimizing the distance of those computer moments from the observed ones in 2019. To do it, I minimize the Euclidean distance between the observed and simulated moments using `BlackBoxOptim.jl` of Julia 1.7.2, which guarantees a global minimum in the chosen parameter space.

The rest of the parameters ( $\eta$ ,  $\kappa$ ,  $z_{\max}$ , *shape* and  $k_{\text{caught}}$ ) are simultaneously estimated by minimizing the Euclidean distance between a set of observed moments and its model counterparts. I use the `BlackBoxOptim.jl` algorithm of Julia 1.7.2 to minimize the Euclidean distance; the algorithm allows me to find a global minimum in the chosen parameter space. The moments I match are:

- the employers' share (fraction of workers who report in ENOE 2019 [average of the four quarters] having an establishment and employees),
- the mean size of the establishment (average number of workers in an establishment from the Economic Census of 2019 of INEGI),
- the worker share of establishments with more than 51 workers (from the Economic Census of 2019),

- the share of self-employed workers (fraction of workers who report in ENOE 2019 [average of the fourth quarters] having an establishment but no employees), and
- the informality rate (labor informality rate TIL1 of INEGI).

The parameter  $\kappa$  determines the self-employed share, and the parameter  $k_{\text{caught}}$  the informality rate. The rest of the parameters ( $\eta$ , *shape* and  $z_{\text{max}}$ ) simultaneously determine the employers’ share, the mean size of the establishment and the worker share of establishments with more than 51 workers. Table 2 shows the observed and model moments. The parameters do a reasonably good job of matching the observed moments in 2019.

Table 2: Calibration targets: observed in data and simulated in model

Determined by parameter(s)	Moment	Observed	Model
$\eta$ , <i>shape</i> and $z_{\text{max}}$	Employers’ share	4.8	4.5
	Establishment mean size	5.7	4.1
	Worker share in establishments 51+	45.3	39.2
$\kappa$	Self-employed share	22.6	17.4
$k_{\text{caught}}$	Informality rate (%)	56.4	49.9

Note. The table compares the moments for 2019 using INEGI’s National Survey of Occupation and Employment and the Economic Census and their model counterparts. In general, the model has a good fit for replicating the observed moments. The algorithm minimizes the Euclidean distance between the observed and simulated moments using `BlackBoxOptim.jl` of `Julia 1.7.2`, which guarantees a global minimum in the chosen parameter space.

### 3.1. Identification of frictions by gender

I use data from 2019 from INEGI’s National Survey of Occupation and Employment (ENOE) to recover the parameters associated with the gender-based frictions in the labor market for each state, region, and national. Because my model does not consider unpaid workers, I did not consider them in the computations. The parameter  $\lambda$  represents the fraction of women not excluded from the labor force. I obtain its value by calculating the ratio between female labor and male participation rate—the lower the parameter, the higher frictions women face to enter the labor market. The estimated values are shown in Table 3, and they are 0.6076 for the northern region, 0.5896 for the north-central, 0.5940 for the central region, 0.5242 for the southern, and 0.5795 for the national.

I calculate the parameter  $\mu$  as the ratio between the fraction of female employers (i.e., the number of female employers divided by the number of women participating in the labor market) and the fraction of male employers. In the northern region, the frictions to entrepreneurship are more significant since  $\mu$  has the lowest estimated value with 0.3759. On the contrary, the frictions to entrepreneurship in the north-central region are the lowest ( $\mu = 0.4138$ ).

Table 3: Estimated gender frictions in entrepreneurship and participation

Region	$\mu$	$\mu_0$	$\lambda$
Northern	0.3759	0.8015	0.6076
North-Central	0.4138	0.8099	0.5896
Central	0.3835	0.8117	0.5940
Southern	0.4065	0.8708	0.5242
National	0.3944	0.8229	0.5795

Note: The table shows the estimated gender-based frictions using data from 2019 from INEGI's National Survey of Occupation and Employment. The parameter  $\lambda$  represents the fraction of women not excluded from the labor force; therefore,  $1 - \lambda$  represents the share of women excluded from participating in the market. The parameter  $\mu$  represents the share of women participating in the market and can freely choose an entrepreneurial occupation; therefore, a fraction of  $1 - \mu$  of them are excluded from becoming formal or informal employers. Of the fraction of excluded women, the parameter  $\mu_0$  represents the share of women who have the possibility of becoming own-account workers (or self-employed); therefore, the fraction  $1 - \mu_0$  is excluded from self-employment.

Finally, given the values of  $\mu$ , the parameter  $\mu_0$  is estimated by matching the model's self-employed fraction with the self-employed fraction calculated with the values of the ENOE. The estimated value is the lowest in the northern region, with 0.8015, and in the southern region, it is the highest, with 0.8708.

## 4. Results

### 4.1. National effects

In this section, I quantify the increase in aggregate income at the national level by removing the gender frictions in the labor market and increasing the effectiveness of the government in detecting informal establishments. The exercise compares the economy between two steady states: the benchmark economy that resulted from the calibration presented in Section 3 and two counterfactual economies without the estimated gender-based restrictions. In the

first exercise, I eliminate the frictions women face in their occupational choice; I set  $\mu = \mu_0 = 1$ , while keeping the parameter  $\lambda$  fixed to its calibrated value. In the second exercise, I eliminate all gender-related frictions to entrepreneurship and participation; that is, I set  $\lambda = \mu_0 = \mu = 1$ . Table 4 displays the effects on occupational shares by gender.

The share of self-employed men and women decreases by removing the frictions to entrepreneurship. Furthermore, the share of men who are employers decreases as well, while the share of women who are employers increases. The reason is that by lifting the frictions women face, a cohort of more talented women enters the market. This entry increases aggregate productivity since the average entrepreneurship talent increases. The increase in aggregate productivity expands the wage rate, as shown in Table 5, along with other aggregate variables. With the increase in the wage rate, it is no longer profitable for some male employers to produce, so they change occupations to become self-employed or workers, depending on their entrepreneurial talent. Also, the higher wage rate induces some low-productive self-employed to become workers; consequently, the share of workers increases for both genders (Table 4). The net effect is that the overall labor supply increases (third column of Table 4). Although the increase in labor supply puts downward pressure on wages, the increase in aggregate productivity that arises from lifting gender frictions more than compensates for such downward pressure, and the net effect on the wage rate is positive. As for other aggregate effects, the change in labor supply and aggregate productivity increase aggregate capital by 1.97% and aggregate income (or output) by 4.34%. In addition, because of the market exit of some self-employed and low-productive male employers, the informality rate decreases marginally, and the mean size of the establishment increases.

In the next counterfactual exercise, I lift all gender frictions; I set  $\mu$ ,  $\mu_0$  and  $\lambda$  to one. The results are in the fourth row of Table 4 and the fourth column of Table 5. Because of the assumption that men and women draw their talent from the same distribution (in equation 1), the occupational distribution is the same as in the previous counterfactual exercise. The elimination of frictions to female participation enhances the effects mentioned in the last counterfactual. A large pool of women enters the labor force, so the size of all occupations expands, as shown in the fourth column of Table 5. The result is that aggregate capital

increases by 29.1%, compared to the benchmark, and aggregate income increases by 32.1%. In addition, the informality share decreases marginally. These results are similar to Cuberes and Teignier (2016), who estimated an increase in aggregate income of 34.2%, and Banco de México (2021), that estimated a counterpart value of 30.2%. Both studies use a similar approach as this study; however, they do not consider the informal sector in their models. In addition, Hsieh et al. (2019) found that falling labor market discrimination drove over 56% of the rise in labor force participation in the U. S. between 1960 and 2010. Moreover, the increase in labor force participation combined with a convergence of occupations between women, men, and different races accounts for two-fifths of the growth in GDP per person in the same period.

Table 4: Occupational share by gender with and without gender-based frictions

Scenario	Gender	Participation	Occupational share		
			Worker	Self-employed	Employer
All gender frictions $\lambda = 0.58, \mu = 0.39, \mu_0 = 0.82$	Men	1.0000	0.7735	0.1688	0.0577
	Women	0.5795	0.7978	0.1794	0.0228
No entrepreneurial frictions $\mu = \mu_0 = 1.00, \lambda = 0.58$	Men	1.0000	0.8127	0.1398	0.0475
	Women	0.5795	0.8127	0.1398	0.0475
No gender frictions $\lambda = \mu_0 = \mu = 1.00$	Men	1.0000	0.8127	0.1398	0.0475
	Women	1.0000	0.8127	0.1398	0.0475

Note. The table presents the occupational shares (worker, self-employed, and employer) by gender in different steady states of the economy. The Benchmark represents the economy's steady-state consistent with the calibrated parameters presented in Section 3. The No entrepreneurial frictions economy represents the economy's steady-state without the entrepreneurial frictions but keeping the participational frictions; that is, by setting  $\mu = \mu_0 = 1.00, \lambda = 0.58$ . The No gender frictions economy represents the economy's steady state without gender frictions; that is,  $\lambda = \mu_0 = \mu = 1.00$ .

As is a tradition in the misallocation literature, the counterfactual exercises of Table 5 denote the (potential) maximum effects that arise by removing the distortions. However, in the last column, I present a more realistic counterfactual in which I estimate the changes in the aggregate variables if Mexico's labor market had frictions similar to the average of OECD

countries calculated by Cuberes and Teignier (2016). In this scenario, the increases are still relatively large: around 10% in steady-state output and capital.

In Table 6, I estimate a final counterfactual exercise that prevents entrepreneurs from hiring workers informally; that is, I set  $k_{\text{caught}}$  to zero. I allow, though, for entrepreneurs to operate in the informal sector without hiring workers; they can still avoid their tax obligations by producing as self-employed. In addition, I further eliminate the gender frictions and calculate the total aggregate effects associated with them. As in the previous exercise, column (2) denotes the benchmark economy, which consists of the one that resulted from the calibration and includes both gender and informal sector distortions.

Table 5: Steady-state aggregate variables with and without gender-based frictions (while keeping the distortions associated to informality)

	All gender frictions	No entrepreneurial frictions	No gender frictions	OECD frictions
Participation (%)	78.98	78.98	100.00	88.94
Workers	61.79	64.18	81.27	71.24
Self-employed	13.64	11.04	13.98	13.62
Employers	3.54	3.75	4.75	4.08
Capital	100.00	101.97	129.12	110.07
Income (Output)*	100.00	104.34	132.13	110.97
Wage rate	100.00	104.19	104.19	98.38
Informality share (%)	49.90	49.82	49.82	50.03
Mean size of establishment	4.09	4.81	4.71	4.46

Note. The table presents aggregate variables in different steady states of the economy. The All gender frictions economy represents the Benchmark, the economy's steady-state consistent with the calibrated parameters presented in Section 3. The No entrepreneurial frictions economy represents the economy's steady-state without the entrepreneurial frictions but keeping the participational frictions; that is, by setting  $\mu = \mu_0 = 1.00$ ,  $\lambda = 0.58$ . The No gender frictions economy represents the economy's steady state without gender frictions; that is,  $\lambda = \mu_0 = \mu = 1.00$ . The OECD frictions represents the economy's steady state with the average frictions of OECD countries calculated by Cuberes and Teignier (2016); that is,  $\lambda = 0.38$ ,  $\mu_0 = 0.30$  and  $\mu = 0.78$ .

\*Since the measure of agents is one, income denotes aggregate and average income.

Column (3) of Table 6 presents the results from preventing entrepreneurs from hiring workers informally but keeping the gender-based distortions. By setting  $k_{\text{caught}}$  to zero, the government enforces taxation on all employers, and mechanically labor informality disappears. Low productive entrepreneurs do not necessarily become formal employers since, as column (3) shows, the overall share of employers reduces from 3.5% to 0.7%. The reason is that low-skilled entrepreneurs now find it more profitable to produce using only capital as self-employed since the government cannot enforce taxation on them. As a result, the share of self-employed increases from 13.6% to 22.6%, and aggregate capital increases by 27.3%. The increase in the share of self-employed (who employ a less efficient technology that does not require workers) decreases the demand for labor, contracting wages, and the share of workers. As a result, a group of previous workers switches to self-employment. The increase in aggregate capital compensates for the decrease in aggregate labor, so income (or output) increases by 6.8%.

Table 6: Aggregate variables with and without gender-based frictions (while eliminating the distortions associated with informality)

(1)	(2) Gender dist. Informality	(3) Gender dist. No informality	(4) Participation dist. No informality	(5) No gender dist. No informality
Participation (%)	78.98	78.98	78.98	100.00
Workers	61.79	55.76	58.79	74.44
Self-employed	13.64	22.57	19.49	24.68
Employers	3.54	0.65	0.70	0.88
Capital	100.00	127.29	132.12	167.30
Income (Output)*	100.00	106.80	112.05	141.88
Wage rate	100.00	93.83	97.53	97.53
Informality share	49.90	0.00	0.00	0.00
Establishment size	4.09	3.02	3.52	3.39



Note. The table presents aggregate variables in different steady states of the economy. Column (2) represents the benchmark economy, the economy's steady-state consistent with the calibrated parameters presented in Section 3. Column (3) represents the economy's steady state without labor informality but keeping gender frictions. Column (4) represents the economy without informality or participation frictions. Finally, column (5) represents the economy without informality or gender frictions in the labor market. \*Since the measure of agents is one, income denotes aggregate and average income.

Column (4) of Table 6 presents the aggregate effects of removing the occupational distortions, and column (5) of the same table presents the aggregate effects of removing the occupational and participational distortions. The mechanisms by which the aggregates change are the same as those described previously. The main takeaway is that the increase in income from simultaneously removing informality and gender distortions is larger than the sum of individually removing informality and gender distortions. Although the results surge by various direct and general equilibrium effects overlapping (described in the previous paragraphs), a basic intuition is that by lifting all restrictions women face in the labor market and frictions that allow informality, the entry of agents into entrepreneurship is more prominent, which results in a higher average talent (because the entrepreneurial pool is larger). These results suggest that policies targeting both labor informality and equality in the labor market between men and women improve the aggregate economy more than individual policies.

#### **4.2. Regional and state level effects**

In this section, I present the aggregate effects of gender distortions at the regional and state level. To do it, I use the calibrated parameters of the national level estimated in Section 3 as the benchmark economy, calculate the gender-based distortions for each region and state using the ENOE (that is, the parameters  $\lambda$ ,  $\mu$  and  $\mu_0$ ), and estimate the aggregate effects by eliminating the frictions. Instead of calibrating the model for each region and state, fixing a base calibration allows a more direct comparison between areas of the effects of gender-related frictions. With a personalized calibration, the differences may also arise because of differences in productivity by state and region.

The estimated gender distortions are in Table 7. The third column shows the estimated frictions to becoming employers (parameter  $\mu$ ). At the regional level, the highest frictions to employership (smallest value of parameter  $\mu$ ) are in the northern region, with  $\mu = 0.3759$ .

Then, the second-highest frictions are in the central region, with  $\mu = 0.3835$ . The estimated value for the southern region is  $\mu = 0.4065$ . Finally, the region with the lowest friction to becoming employers (highest value of parameter  $\mu$ ) is the north-central region, with  $\mu = 0.4138$ . At the state level, Puebla has the highest frictions, with  $\mu = 0.2289$ , and San Luis Potosí has the lowest frictions, with  $\mu = 0.5670$ .

The estimated frictions to female self-employment appear in the fourth column (parameter  $\mu_0$ ). A value of  $\mu_0$  close to one indicates that there are barely any frictions women face to self-employment. Once again, the highest distortions (lowest value of  $\mu_0$ ) are in the northern region, with  $\mu_0 = 0.8015$ . The second highest distortions are in the north-central region, with  $\mu_0 = 0.8099$ . With a similar value ( $\mu_0 = 0.8117$ ), the central region comes next. Finally, the region with the smallest distortions in self-employment is the southern region, with  $\mu_0 = 0.8708$ .

Column (5) of Table 7 presents the parameter  $\lambda$  that indicates women's frictions to participating in the labor market. Once again, smaller values represent higher frictions, and larger values represent lower frictions. At the regional level, the southern has the largest friction to female participation, with  $\lambda = 0.5242$ . The second region with the highest participation frictions is the north-central, with  $\lambda = 0.5896$ . Furthermore, the central region ( $\lambda = 0.5940$ ) and the northern ( $\lambda = 0.6076$ ) have similar values.

In column (6) of Table 7, I present the counterfactual increase in aggregate income (or output) from eliminating female frictions to entrepreneurship; that is, I set  $\mu = \mu_0 = 1$ . In such a scenario, aggregate income would increase 4.73% in the northern region, 4.35% in the north-central, 4.57% in the central region, and 3.87% in the south. Finally, in the last column, I present the counterfactual increase in aggregate income from eliminating all frictions women face in the labor market (frictions to entrepreneurship and participation); I set  $\lambda = \mu_0 = \mu = 1$ . Although the southern had the lowest occupational frictions, it had the highest labor force participation frictions. The result is that aggregate income would increase the most in the southern (36.29%). In the north, eliminating women's frictions in the labor market would increase aggregate income by 30.29%, the north-central by 31.16%, and the central by 31.20%.

The effects of eliminating female occupational and participational frictions at the state level are plotted in a choropleth map in Figure 4. Subplot (a) shows the effects of eliminating entrepreneurial frictions ( $\mu = \mu_0 = 1$ ) in aggregate income. Some patterns emerge. In the northern and central regions of the country, the effects are, in general, larger. On the contrary, in the southern region, the effects are lower.

Finally, subplot (b) of Figure 4 shows the effects in aggregate income from eliminating all gender-based frictions in the labor market ( $\lambda = \mu_0 = \mu = 1$ ) at the state level.

In this case, the patterns reverse compared to the ones mentioned above. The northern states would see lower increases in aggregate income than the southern states. The reason is that the southern states have higher distortions in the participation of women in the labor market than in entrepreneurship. The opposite is true for the northern states.

## 5. Conclusions

Women face frictions in the labor market that restrict their participation and alter the occupations they can choose. Moreover, such frictions distort the economy and, in the aggregate, diminish its size. In this paper, I simulate the effects on aggregate income of reducing such frictions across Mexican regions, states, and the nation. The results indicate that income would considerably increase, especially in southern states.

In addition, I find that joint policies that target informality, encourage women's participation in the labor market, and seek equality in employment opportunities would increase aggregate income more than implementing them individually. The COVID-19 pandemic has impacted, among other things, women's labor prospects. However, as this paper shows, policies aimed at increasing women's labor force participation may improve the efficiency of the aggregate economy in a post-COVID-19 world.

Finally, one limitation of this work is that I do not rationalize the origin of the gender-based frictions in the labor market or the decisions inside the household to participate in the extensive and intensive margin. As an example, Duval-Hernandez et al. (2021) found that women's labor participation increases if the market provides substitutes for the goods and services produced at home. Future works should include such a mechanism as it is relevant for enacting public policies.

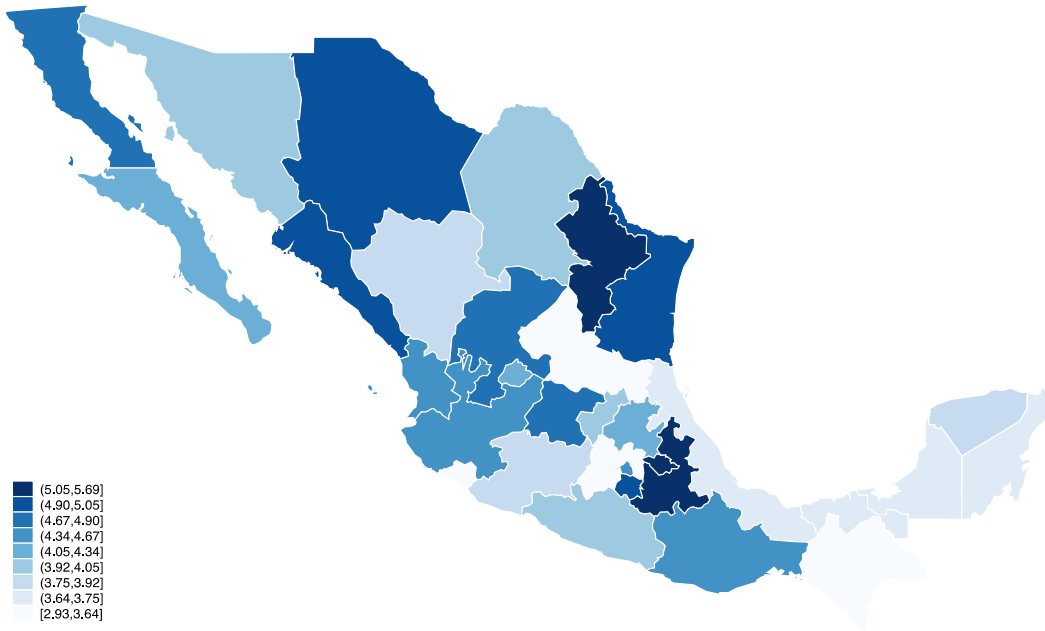
Table 7: Estimated gender-based frictions and income changes by eliminating the frictions

(1) State	(2) Region	(3) $\mu$	(4) $\mu_0$	(5) $\lambda$	(6) Entrep. frictions	(7) All frictions
	National	0.3944	0.8229	0.5795	4.34	32.13
	Northern	0.3759	0.8015	0.6076	4.73	30.29
	North-Central	0.4138	0.8099	0.5896	4.25	31.16
	Central	0.3835	0.8117	0.5940	4.57	31.20
	Southern	0.4065	0.8708	0.5242	3.87	36.29
Aguascalientes	North-Central	0.4041	0.7604	0.5759	4.29	32.35
Baja California	Northern	0.3782	0.8177	0.6342	4.79	28.25
Baja California Sur	North-Central	0.4827	0.7710	0.7014	4.19	22.47
Campeche	Southern	0.4535	0.9213	0.5664	3.75	32.47
Chiapas	Southern	0.3470	0.9650	0.5842	3.64	49.49
Chihuahua	Northern	0.3371	1.1916	0.6943	5.03	32.27
Coahuila	Northern	0.4309	0.5800	0.3866	4.05	31.36
Colima	North-Central	0.5282	0.6204	0.5882	3.64	22.34
Durango	North-Central	0.4431	1.0064	0.5623	3.77	32.83
Guanajuato	Central	0.3213	0.9025	0.5742	4.90	33.27
Guerrero	Southern	0.4408	0.7697	0.5809	4.01	31.57
Hidalgo	Central	0.3950	0.9563	0.5830	4.34	31.83
Jalisco	North-Central	0.3859	0.7216	0.6011	4.61	30.67
Mexico City	Central	0.4601	0.6433	0.6775	4.37	24.44
Mexico State	Central	0.4761	0.9206	0.5792	3.56	31.15
Michoacán	North-Central	0.4116	0.9560	0.5424	3.92	34.75
Morelos	Central	0.3169	0.9191	0.5752	5.01	33.34
Nayarit	North-Central	0.4244	0.8415	0.6614	4.50	25.80
Nuevo León	Northern	0.3204	0.8145	0.5974	5.06	31.54
Oaxaca	Southern	0.3893	0.8424	0.6339	4.67	28.12
Puebla	Central	0.2289	0.7382	0.5657	5.69	35.01
Querétaro	Central	0.4339	0.6153	0.5528	4.02	33.98
Quintana Roo	Southern	0.4936	0.8266	0.6030	3.65	29.32
San Luis Potosí	North-Central	0.5570	0.7779	0.5405	2.93	33.63
Sinaloa	North-Central	0.3453	0.6905	0.6107	5.05	30.44
Sonora	Northern	0.4669	0.8841	0.6504	3.99	26.02
Tabasco	Southern	0.4286	1.2406	0.5330	3.72	35.32
Tamaulipas	Northern	0.3441	0.7974	0.5998	4.91	31.16
Tlaxcala	Central	0.3111	0.7784	0.6166	5.28	30.25
Veracruz	Southern	0.3949	1.0144	0.4886	3.72	39.36
Yucatán	Southern	0.4768	1.1130	0.6143	3.75	28.54
Zacatecas	North-Central	0.3030	0.6497	0.5240	4.87	37.62

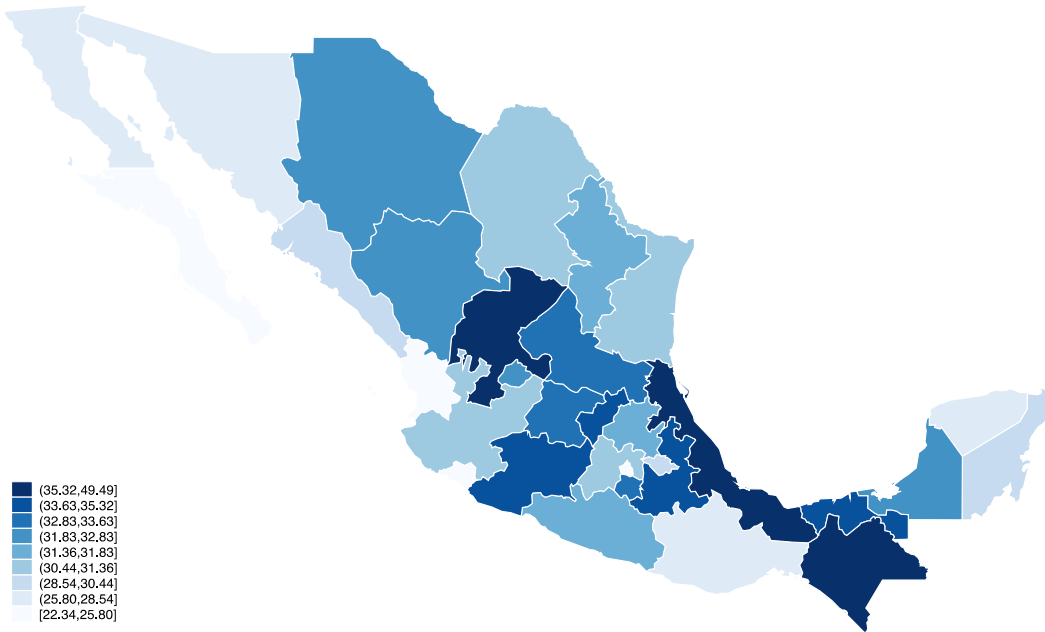
Note. The table shows the estimated gender frictions to entrepreneurship (Columns 3 and 4) and participation (Column 5). It also shows the increase in aggregate (or average) income in % by region and state by eliminating frictions related to entrepreneurship (Column 6) and frictions related to participation and entrepreneurship (Column 7). The comparison is with respect to the calibrated economy presented in Section 3.

Figure 4: Effects in aggregate income of eliminating gender-based frictions in the labor market

(a) Entrepreneurship frictions



(b) All frictions



Note. The map shows the increase in aggregate income in % by eliminating women's frictions in entrepreneurship (subplot a) and all frictions in the labor market (i.e., frictions in entrepreneurship and participation, subplot b).

## 6. References

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