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Gender Gaps in Entrepreneurship and their Macroeconomic Effects in Latin America

Brechas de género en el emprendimiento y sus efectos macroeconómicos en América Latina

David Cuberes* y Marc Teignier**ϒ

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Abstract

Objective: To analyze gender gaps in entrepreneurship in Latin America and the Caribbean and quantify their aggregate effects on productivity and income per capita. ***Methodology:*** Gender differences in entrepreneurship were documented using evidence on the participation and size of female-run firms, and an occupational choice general equilibrium framework was employed to quantify their aggregate effects. The model assumes that the barriers faced by some women to become firm managers increase with managerial talent, leading female-run firms to be smaller than male-run firms in equilibrium. ***Findings:*** The results show that only about one fourth of firms are managed by women and that female-run firms are approximately three times smaller than those managed by men. For Latin America, gender gaps in entrepreneurship generate a 9% loss in output per capita, entirely explained by resource misallocation and the resulting decline in aggregate productivity. This loss is 1.3 times larger than that obtained under a framework in which barriers to entrepreneurship are assumed to be independent of talent. ***Implications:*** The findings indicate

* Maynooth University, david.cuberes@mu.ie, https://orcid.org/0000-0002-4933-9369.
** Universitat de Barcelona, marc.teignier@ub.edu, https://orcid.org/0000-0003-0760-5662.
ϒ Autor de correspondencia.

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that reducing gender-based barriers to entrepreneurship can improve resource allocation, increase aggregate productivity, and raise income per capita. ***Originality:*** The study quantifies the aggregate costs of gender gaps in entrepreneurship using a theoretical framework in which barriers to entrepreneurship depend on managerial talent.

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Resumen

Objetivo: Analizar las brechas de género en el emprendimiento en América Latina y el Caribe y cuantificar sus efectos agregados sobre la productividad y el ingreso per cápita. ***Metodología:*** Las diferencias de género en el emprendimiento se documentaron utilizando evidencia sobre la participación y el tamaño de las empresas dirigidas por mujeres, y se empleó un marco de equilibrio general de elección ocupacional para cuantificar sus efectos agregados. El modelo asume que las barreras que enfrentan algunas mujeres para convertirse en directoras de empresa aumentan con el talento empresarial, lo que lleva a que las empresas dirigidas por mujeres sean más pequeñas que las dirigidas por hombres en equilibrio. ***Resultados:*** Se encontró que únicamente alrededor de una cuarta parte de las empresas son dirigidas por mujeres y que estas empresas son aproximadamente tres veces más pequeñas que las administradas por hombres. Asimismo, en América Latina, las brechas de género en el emprendimiento generan una pérdida del 9% del ingreso per cápita, atribuible por completo a la asignación ineficiente de recursos y a la consecuente reducción de la productividad agregada. Esta pérdida es 1.3 veces mayor que la estimada bajo un marco en el que las barreras al emprendimiento son independientes del talento. ***Implicaciones:*** Los resultados muestran que reducir las barreras de género en el emprendimiento puede contribuir a mejorar la asignación de recursos, incrementar la productividad agregada y elevar el ingreso per cápita. ***Originalidad:*** El estudio cuantifica los costos agregados de las brechas de género en el emprendimiento mediante un marco teórico que incorpora la relación entre las barreras de acceso al emprendimiento y el talento gerencial.

Introduction

Gender inequality is present in many socioeconomic indicators around the world in both developed and developing countries. These gaps can be observed in education, earnings, occupation, access to productive inputs, political representation, or bargaining power inside the household,

among others.[1] One important aspect of gender inequality in the labor market that has been largely overlooked in the literature is the low representation of women in entrepreneurship. In this paper, we study this issue for Latin America and the Caribbean (LAC) using data from the World Bank Enterprise Survey.[2] In that region, on average, female-run firms account for only about 25% of all firms, and the average firm managed by a woman is about 3 times smaller than that of a man.

We then use the general equilibrium model in Cuberes and Teignier (2022) to quantify the effects of gender gaps in entrepreneurship on aggregate productivity and income. In our theoretical framework, agents are endowed with a random entrepreneurship skill, on which they decide whether to become employers, self-employed, or workers. An employer in this model produces a homogeneous good using span-of-control technology that combines their entrepreneurial skills with capital and labor. We assume that men and women are identical in terms of their managerial skills- in the sense that both groups draw their managerial talent from identical distribution functions- but women are subject to exogenous constraints in their occupational choices, which results in a fraction of them being excluded from employership. This generates a loss in income per worker because less able managers run firms of sub-optimal size and productivity. An important question in determining the magnitude of this aggregate loss is which types of women are excluded from employership. To determine how entrepreneurial skills and selection into entrepreneurship are related, we examine our empirical results through the lens of our model. In our model, in the absence of gender frictions or when these frictions are independent of talent, both men and women manage firms of identical size. Since the data indicate that firms' size is significantly smaller for women, this means, through the lens of our model, that the probability of being excluded from employership must increase with a woman's talent. Our empirical

[1] See the World Development Report 2012 (World Bank, 2012) for a comprehensive review of these and other gender gaps discussed in the literature.

[2] We acknowledge that there is substantial institutional and economic heterogeneity across Latin American and Caribbean countries. Differences in regulatory quality, access to finance, female labor force participation, and economic development may generate heterogeneous effects on entrepreneurial constraints and the associated efficiency losses. However, the availability of comparable data limits our ability to conduct a reliable country-level or subgroup analysis. Estimating the model requires a sufficiently large number of observations to identify the relevant parameters, which is not feasible for many countries individually. Therefore, a systematic analysis of regional heterogeneity is beyond the scope of this paper. Our objective is to provide an aggregate estimate for the region based on the best comparable data available, rather than to characterize cross-country differences.

analysis indicates that, in our set of countries, women tend to run smaller firms than men, which, in our framework, implies that more talented women are less likely to become employers.

We find large effects of the employer-gender gap on aggregate output and productivity. In the Latin America and Caribbean region (LAC), we estimate an 8.9% fall in aggregate output in the short run when we keep the stock of capital fixed, and 9.4% in the long run when this stock is also negatively affected. These losses are 1.3 times larger than those we would obtain using a model in which the exclusion probability is independent of talent.[3] The intuition behind the output loss is as follows. When a woman with very good management skills cannot become an employer, a less skilled man takes her position and becomes the manager of a firm and, as a consequence, the average firm size and output per worker in the economy fall. On top of that, if more talented women face a higher probability of exclusion, the average talent of employers declines further, resulting in a larger loss.

To our knowledge, there are very few articles that quantify the macroeconomic effects of gender gaps in the labor market. The International Labor Organization provides estimates of the output costs associated with labor gender gaps but does not propose any specific theoretical model (International Labor Organization, 2014). One shortcoming of their exercise is that it does not shed light on the mechanisms by which gender gaps in the labor market may affect aggregate efficiency. Cavalcanti and Tavares (2016) construct a growth model based on Galor and Weil (1996) that includes exogenous wage discrimination against women. Calibrating their model using U.S. data, they find very large effects associated with these wage gaps: a 50 percent increase in the gender wage gap in their model leads to a decrease in income per capita of a quarter of the original output. Their results also suggest that a large fraction of the actual difference in output per capita between the U.S. and other countries is indeed generated by the presence of gender inequality in wages. Hsieh et al. (2019) use a Roy model to estimate the effect of changes in the occupational allocation of white women, black men, and black women between 1960 and 2008 on U.S. economic growth and find that the improved allocation of talent accounts for 17 to 20 percent of growth over this period. Finally, Cuberes and Teignier (2016) calculate the macroeconomic effects of gender inequality in the labor market using data from the International Labor Organization for a large sample of countries, including several countries from the LAC

[3] See Cuberes and Teignier (2014) for a critical literature review of the two-directional link between gender inequality and economic growth.

region, while Cuberes and Teignier (2022) analyze the case of Chile, and Cuberes and Teignier (2025) study the case of Mexico, taking into account the household sector production. An important difference is that, in this article, we use firm-level data for Latin America and the Caribbean, rather than labor aggregates, to conduct our analysis. Regarding the analysis of firm size by gender in Latin America, Arellano and Peralta (2015) report significant differences in firm size and productivity in Chile. Still, they do not use any theoretical model in their analysis.

It is important to emphasize that our analysis constitutes a theoretical model based on a specific model and set of assumptions. Other factors, including credit constraints, sectoral segregation, differences in preferences, family responsibilities, business networks, and accumulated managerial experience, may also help explain the patterns observed in the data.

The rest of the paper is organized as follows. Section 1 presents the empirical facts, and Section 2 sketches the general equilibrium occupational choice model. The numerical results of the paper are presented and discussed in Section 3, while Section 4 contains the sensitivity analyses. Finally, conclusions.

1. Empirical facts

We begin the analysis by documenting existing differences in employership between men and women in the LAC region. First, using data for the latest available year for all countries in this region from the International Labor Organization (KILM, 8th edition) on employers by gender, we find that women are clearly underrepresented[4] among employers. As we can see in Table 1, the share of female employers in the working-age population is less than one-third of that of males.

Table 1
Share of employers in working-age population by gender (Data source: ILO KILM, 8th edition)

(%)	Females	Males	Ratio
LAC	1.75	5.66	0.31

We then compare the size distribution of firms with male and female top managers in LAC, using data from the World Bank Enterprise Survey for

[4] http://kilm.ilo.org/KILMnetBeta/default2.asp.

2010.[5] The World Bank Enterprise Survey is a firm-level survey of a representative sample of an economy's private sector conducted for a large set of countries.[6] For Latin America and the Caribbean, it contains information on 13,855 firms, with sizes ranging from 5 to 21,955 employees, from 26 countries.[7] The survey covers registered firms, excluding the informal sector and self-employment, where women are likely to be more heavily represented. We do not expect this limitation to significantly affect our estimates of the aggregate costs of gender gaps, as most productivity losses arise from medium-sized and large firms rather than from small firms or self-employment.

As we can see in Table 2, female-run firms –defined as firms where the top manager is a woman– are not only outnumbered by male-run firms, but they are also significantly smaller in terms of employees. The median size of firms with a female manager, for example, is 16 workers, while it is 30 workers for firms with a male manager.[8]

Table 2
Percentiles of the firm-size distribution by gender (Data source: WB Enterprise Survey)

	10 pct	25 pct	50 pct	75 pct	90 pct
Females	5	8	16	45	119
Males	6	12	30	100	279

[5] http://www.enterprisesurveys.org/

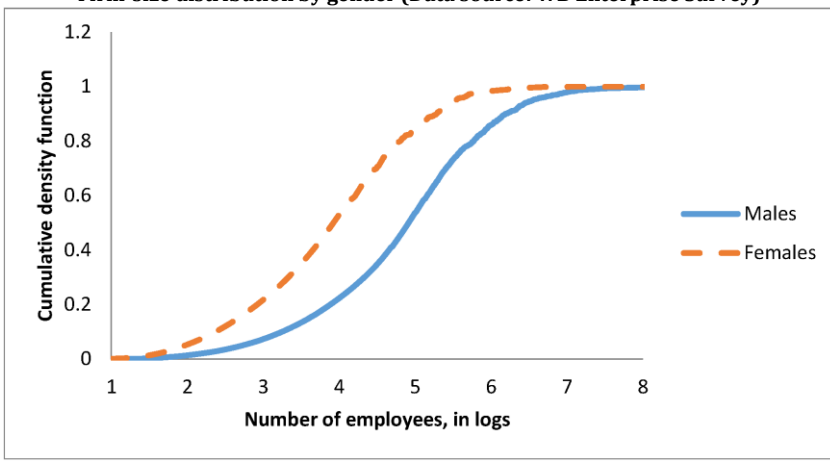
[6] The Enterprise Survey is answered, in most cases, by business owners and top managers. Typically, 1200-1800 interviews are conducted in larger economies, 360 interviews are conducted in medium-sized economies and for smaller economies 150 interviews take place. The manufacturing and services sectors are the primary business sectors of interest. This corresponds to firms classified with ISIC codes 15-37, 45, 50-52, 55, 60-64, and 72. Formal (registered) companies with 5 or more employees are generally targeted for interview and microenterprises are not always included. Firms with 100% government/state ownership are not eligible to participate in an Enterprise Survey. In each country, businesses in the cities/regions of major economic activity are interviewed. The sampling methodology for Enterprise Surveys is stratified random sampling, that is, all population units are grouped within homogeneous groups and simple random samples are selected within each group.

[7] The countries are Argentina (1054 firms), The Bahamas (150 firms), Barbados (150 firms), Bolivia (362 firms), Brazil (1802 firms), Chile (1033 firms), Colombia (942 firms), Costa Rica (538 firms), Dominican Republic (360 firms), Ecuador (360 firms), El Salvador (360 firms), Grenada (153 firms), Guatemala (590 firms), Guyana (165 firms), Honduras (360 firms), Jamaica (376 firms), Mexico (1480 firms), Nicaragua (336 firms), Panama (365 firms), Paraguay (361 firms), Peru (1000 firms), St. Kitts and Nevis (150 firms), St. Vincent and the Grenadines (154 firms), Trinidad and Tobago (370 firms), Uruguay (607 firms), and Venezuela (320 firms).

[8] We acknowledge that the number of employees is not a perfect measure of entrepreneurial capacity or firm performance, and that alternative indicators such as sales, value added, or total factor productivity could provide a more comprehensive assessment. However, the lack of homogeneous and comparable data across all countries in our sample substantially limits the set of measures available for our analysis.

Figure 1 shows graphically that the firm-size distribution of female-run firms is shifted to the left relative to the distribution of firms managed by men or, in other words, the distribution of female-run firms has a thicker density at low numbers of employees.[9]

Figure 1
Firm-size distribution by gender (Data source: WB Enterprise Survey)



2. Theoretical framework

2.1 Setup description

In this section, we briefly describe the general equilibrium framework presented in Cuberes and Teignier (2022), which is based on the span-of-control model of Lucas (1978) and Cuberes and Teignier (2016). The model is an occupational choice framework in which individuals are endowed with heterogeneous entrepreneurial ability and choose among becoming employers, self-employed workers, or wage workers. We also consider a fourth employment category, namely out-of-necessity entrepreneurs, who choose this occupation because they have no other occupational options but to run their own business.[10] An employer in this

[9] We plot the natural logarithm of the number of employees to help visualize the plots. Without taking logs, the large number of small firms in the data make it hard to appreciate the shape of the entire distribution.

[10] Using data from the Global Entrepreneurship Monitor survey, Poschke (2013) finds that out-of-necessity entrepreneurs represent almost 50% of all entrepreneurs in non-OECD countries.

model can produce goods using a span-of-control technology that combines their entrepreneurship skills, with capital, and workers:

$$y(x) = x\left(k^{\alpha}n^{1-\alpha}\right)^{\eta}, \tag{1}$$

where y denotes the amount of output, x the employer's managerial talent, k the number of units of capital rented, and n the number of units of labor. The parameter η takes values between 0 and 1, implying that firms with different productivity levels coexist in equilibrium and that more talented agents manage larger firms. On the other hand, a self-employed agent can produce goods using a similar technology - adjusted by the productivity parameter τ - but without hiring any workers:

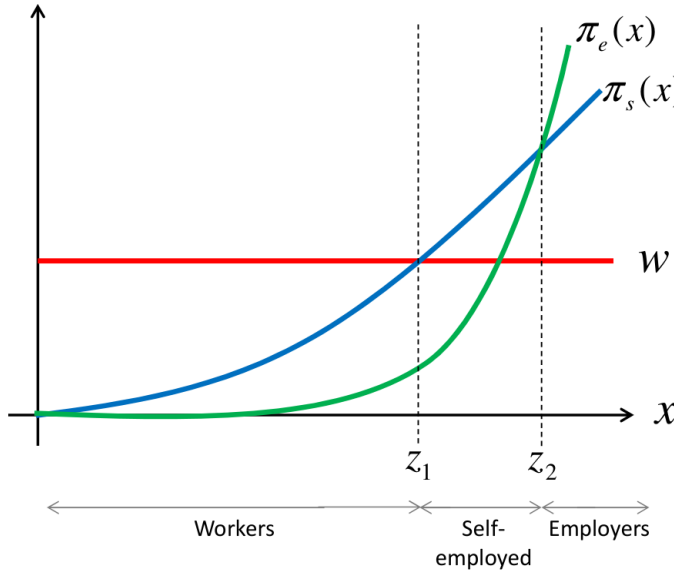
$$\widetilde{y}(x) = \tau x k^{\alpha\eta}.$$

The parameter τ is a self-employed productivity parameter, which can be interpreted as one minus the fraction of time a self-employed agent spends on management tasks.

Figure 2 displays the payoff of the three occupations at each talent level. It shows that in this model, agents with the highest entrepreneurial skill (those with a talent equal to or greater than $z2$) optimally choose to become employers. In contrast, those with the lowest skill (those with a talent below $z1$) become workers, leaving the self-employment occupation to agents with intermediate skill levels. Specifically, denoting the employers' profits by $\pi_e(x)$, the self-employed profits by $\pi_s(x)$, the equilibrium wage rate w, and the capital rental rate by r, the payoff functions are

$$\begin{aligned}\pi_e(x) &\equiv \max_{w,\,r}\{y(x) - rk - wn\},\\ \pi_s(x) &\equiv \max_{r}\{\widetilde{y}(x) - rk\}.\end{aligned}$$

Figure 2
The occupational map



In this economy, aggregate production per capita is the sum of output by employers and self-employed:

$$y \equiv \frac{Y}{N} = \left[\int_{z_2}^{\infty} y(x) d\Gamma(x) + \int_{z_1}^{z_2} \tilde{y}(x) d\Gamma(x) + \frac{(1-\theta^f)}{2} \int_{1}^{z_1} \tilde{y}(x) d\Gamma(x) + \frac{(1-\theta^m)}{2} \int_{1}^{z_1} \tilde{y}(x) d\Gamma(x) \right]$$

where θ^m and θ^f are the fractions of men and women who cannot obtain job offers as workers and instead choose self-employment, even if their managerial talent is z_1. Γ denotes the cumulative density function of managerial talent, which is assumed to be Pareto:

$$\Gamma(x) = 1 - x^{-\rho}, \; x \geq 0, \qquad (2)$$

where $\rho > 0$.

As Appendix B shows, using the talent distribution defined in equation (2) and the optimal number of employees, $n(x) = \left[x\eta(1 -\right.$

$\alpha)\left(\frac{\alpha}{1-\alpha}\right)^{\alpha\eta}\frac{w^{\alpha\eta-1}}{r^{\alpha\eta}}\Big]^{1/(1-\eta)}$, we obtain the following cumulative density function of firms'size $S(n)$ in equilibrium:

$$S(n) = 1 - n^{-\rho(1-\eta)}\left(\eta\left(\frac{\alpha}{r}\right)^{\alpha\eta}\left(\frac{1-\alpha}{w}\right)^{1-\alpha\eta}\right)^{\rho},$$

where n is the number of workers, our measure of a firm's size; we can then calculate the statistic Ψ:

$$\Psi \equiv \frac{\partial \ln(1 - S(n))}{\partial \ln(n)} = -\rho(1-\eta), \tag{3}$$

which corresponds to the log-log slope of the function $1 - S(n)$.

The assumption that men and women draw their entrepreneurial ability from the same distribution constitutes a fundamental feature of the model. Our purpose in adopting this assumption is not to claim that the two groups are identical across all dimensions relevant to entrepreneurial performance, but rather to establish a benchmark framework that allows us to isolate and quantify the economic consequences of barriers that impede the efficient allocation of entrepreneurial talent.

We acknowledge that the observed differences may partly reflect disparities in the accumulation of specific human capital, managerial experience, or access to productive opportunities. However, the dataset used in our analysis does not contain the information needed to empirically identify the contribution of each mechanism. Consequently, modeling and quantifying these alternative channels are beyond the scope of the present study. Furthermore, many of these differences may themselves be the result, at least partially, of persistent inequalities in access to educational, labor market, and entrepreneurial opportunities over the life cycle, rather than reflecting inherent differences in entrepreneurial ability. Under this interpretation, assuming an identical potential distribution of entrepreneurial talent among men and women provides a natural benchmark for evaluating the efficiency losses associated with an imperfect allocation of talent.

2.2 Introducing gender gaps into the framework

As explained above, the model assumes that men and women are identical in managerial skills, in the sense that they draw their talent from the same

distribution. However, in our framework, women are subject to an exogenous constraint on their occupational choice: a fraction of women who would like to be employers are excluded from this occupation. This distorts efficient talent allocation and reduces employers' average talent. Specifically, females face a probability $1 - \tilde{\mu}_e(x)$ of being excluded from employership, which depends on their ability in the following way:

$$\widetilde{\mu}(x) = \mu x^{\gamma}, \tag{4}$$

where μ is a positive constant while γ can be positive or negative. When $\gamma < 0$, the slope of this exclusion function is negative, i.e., $\tilde{\mu}'(x) = \gamma\mu x^{\gamma-1} < 0$, which implies that more talented women are more likely to be excluded from employership.

The parameter μ determines the fraction of women excluded from employership when x=1, while the parameter γ determines the change in this exclusion probability as x increases.[11] The more negative γ is, the larger the output loss, since it implies that more talented women face a higher probability of being excluded from employment. Our analysis in Section 2 shows that female-run firms are significantly smaller in all the cases, which we interpret as evidence that $\gamma < 0$ in the LAC region. It is important to note that the data could be reproduced equally well with γ = 0 if we removed the assumption that men and women draw their managerial talent from the same distribution and that women draw their talent from a distribution with a thinner upper tail.

The value of γ can be estimated by comparing the cumulative density functions of male- and female-run firms. Under the exclusion probability in equation (4), the expected number of workers of a firm run by a female manager with talent x becomes

$$n^f(x) = \mu x^{\gamma+\frac{1}{1-\eta}} \left[\eta(1-\alpha)\left(\frac{\alpha}{1-\alpha}\right)^{\alpha\eta} \frac{w^{\alpha\eta-1}}{r^{\alpha\eta}}\right]^{1/(1-\eta)},$$

which is simply the product of the probability that a woman is not excluded from employership, $\tilde{\mu}_e(x)$, and the firm's size at given talent

[11] Since they do not have firm-level information, Cuberes and Teignier (2016) assume that $\gamma = 0$, which means that the probability that a woman is banned from becoming an employer is independent of her managerial talent.

level x, $n(x)$. Replacing this into equation (2), we obtain the cumulative density function of female-run firms.

$$S^f(n) = 1 - n^{-\frac{\rho(1-\eta)}{1+\gamma(1-\eta)}} \left(\mu^{1-\eta} \eta \left(\frac{\alpha}{r} \right)^{\alpha\eta} \left(\frac{1-\alpha}{w} \right)^{1-\alpha\eta} \right)^{\frac{\rho}{1+\gamma(1-\eta)}},$$

where $S^f(n)$ denotes the density function of female-run firms. This leads to the statistic Ψ^f, which is the female-equivalent of the one defined in equation (3):

$$\Psi^f \equiv \frac{\partial \ln\left(1 - S^f(n)\right)}{\partial \ln(n)} = -\frac{\rho(1-\eta)}{1+\gamma(1-\eta)}. \tag{5}$$

Taking the ratio between equations (3) and (5), we get

$$\frac{\Psi^f}{\Psi} = \frac{1}{1+\gamma(1-\eta)}, \tag{6}$$

which can be estimated using the firm-size distributions of men and women.

3. Numerical results

3.1 Model Parametrization

To simulate the model, we first need to assign values to its parameters: the technology parameters [α,η,τ,ρ], the out-of-necessity entrepreneur parameters θf and θm, and the female exclusion probability parameters [μ, γ]. In this section, we describe the procedure and the data moments used to parametrize the model. Table 3 summarizes these values.

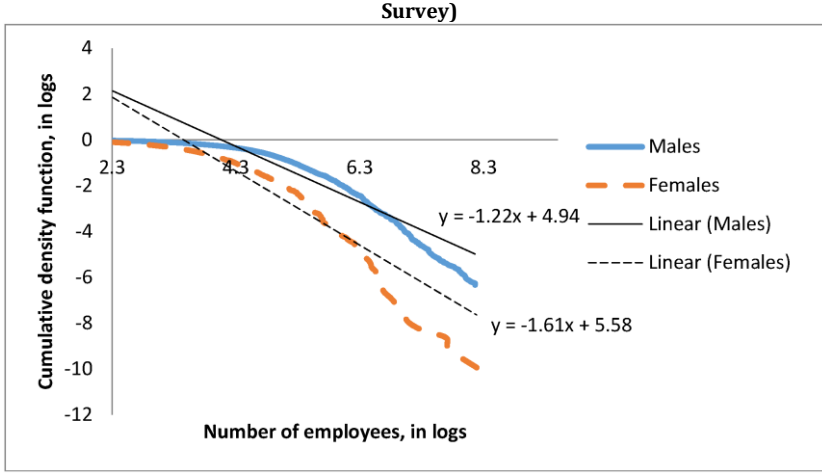
Table 3
Parameter values

	Value	Description
τ	0.71	To match the share of male self-employed.
η	0.72	To match the share of male employers.
ρ	4.41	To match the males' firms size distribution.
α	0.08	To match the aggregate capital income share.
θ^f	0.88	To match the share of female necessity entrepreneurs.
θ^m	0.87	To match the share of male necessity entrepreneurs.
γ	-0.90	To match the females' firms size distribution.
μ	0.67	To match the share of female employers.

We start by choosing the values of θ^f and θ^m to match the fractions of necessity entrepreneurs, which are 25% for males and 35% for females.[12] We next express the parameters $[\alpha,\rho,\gamma]$ as functions of η. In particular, to obtain a capital income share of 1/3, a value generally accepted, α must satisfy $\alpha\eta+(1-\eta)=1/3$, provided that profits are treated as capital income. Similarly, using equations (3) and (5) together with the fact that Ψ is equal to -1.2 and Ψ^f is equal to -1.6 (see Figure 3), we get that $\rho(1-\eta)=-1.2$ and $1+\gamma(1-\eta)=0.75$. Finally, we jointly estimate the remaining parameters $[\eta,\tau,\mu]$ to match the shares of male and self-employed employers, as well as the ratio of female-to-male employers in the working-age population.

Figure 3 shows the ratios of the slopes of the male and female distribution functions in the data. As we can see in this figure, the absolute value of the slope is greater for females than for males, with a female-to-male ratio of 1.33.[13]

Figure 3
Slope of cumulative density functions by gender (Data source: WB Enterprise Survey)



[12] See the 2015-16 Global Entrepreneurship Report, page 128 for the LAC region.
[13] We do the estimation using the sample of firms with size between 10 or more workers and the largest female-run firm.

3.2 Economic losses due to the entrepreneurship gender gaps

The introduction of employership gender gaps leads to a significant fall in aggregate output, both in the short run —when the capital stock is kept fixed — and the long run —when the capital stock is adjusted to its new steady-state level. As explained in Section 3.1, this output loss is due to aggregate productivity decreasing as the average talent of employers declines, driven by the exclusion of some talented female employers. As Table 4 shows, we estimate a fall of aggregate output of about 9% in the short run and 9.4% in the long run. These losses are almost one-third larger than those we would obtain using a model where the exclusion probability is independent of talent, i.e., where γ=0, since γ<0 implies negative selection of women into employership.

Table 4
Output losses due to employership gender gaps in LAC

Short run		Long run	
Baseline sim. (%)	Ratio to γ = 0	Baseline sim. (%)	Ratio to γ = 0
8.9	1.3	9.4	1.3

When a woman with good management skills is barred from employment, the demand for labor and capital decreases. As a result, the equilibrium wage and interest rate decrease, making it more profitable for less-skilled agents to become entrepreneurs. In other words, both occupational thresholds z_1 and z_2 fall. On top of that, if more talented women face a higher probability of exclusion, the average talent of employers falls even further, resulting in a larger decline in total output. Table 5 illustrates this intuition: the introduction of the gender gaps reduces the equilibrium wage rate as well as the talent thresholds z_1 and z_2. If $\gamma < 0$, the fall is even larger, and the gender gap in employers' average earnings becomes positive because the average talent of female managers is now lower than that of male managers. Specifically, the talent thresholds and the wage rate fall by almost 10%, whereas the fall would be 7.5% if we did not account for the difference in the size distribution (i.e., if we assumed that $\gamma = 0$).

Table 5
Short-run results under different scenarios

	No gender gaps (normalized at 100)	Gender gaps with γ < 0	Gender gaps with γ = 0
Workers' wage	100	90.8	92.5
Interest rate	100	91.1	93.1
Talent threshold z_1	100	90.8	92.5

Talent threshold z_2	100	90.8	92.5
Employers earnings gender gap (%)	0	44.0	0

4. Sensitivity analysis

In this section, we present our main results for other parameter values to assess the sensitivity of the results to different assumptions. The first row of Table 6 shows the results from the benchmark simulation, as in Table 4, while the remaining rows show the short- and long-run losses under different scenarios.

The first alternative scenario, presented in the second row, shows the loss in per-capita output due to the introduction of the employership gender gaps in a context where the self-employment gender gap is also present. To be precise, we infer from the data that about 16% of women barred from that occupation can become self-employed while the rest become workers. Taking this into account, we find that introducing the gender gaps in employers generates significantly larger losses, both in the short run and the long run. Intuitively, the output loss is now larger because there is a larger fall in the share of entrepreneurs and a larger fall in the equilibrium wage, and, consequently, in the average talent of entrepreneurs. Although self-employment is clearly central to LAC labor markets, we do not use this simulation as our baseline because we want to focus on gender gaps among employers, where we can compare the size of female- and male-run firms.

The third row displays the losses under the parameter values used in Cuberes and Teignier (2016), namely $[\eta, \rho, \tau] = [0.79, 6.5, 0.7]$, which were estimated using data for OECD countries. In this case, the model predicts significantly smaller losses (about one-third smaller) and a smaller difference relative to the $\gamma = 0$ framework. The main difference with respect to the benchmark parametrization is a somewhat larger value for η, which reduces the contribution of managerial talent to firm productivity, and especially a larger value for ρ, which increases the slope of the pdf and reduces the thickness of the talent distribution tail. As a result, the fall in the talent threshold due to the introduction of employership gaps is smaller, implying a lower loss of aggregate income.

The fourth row, on the other hand, shows that the income losses would also be somewhat smaller if the firm's profits (or compensation to

managerial talent) were treated as labor income rather than capital income, i.e., if $\alpha\eta = 1/3$ and $\alpha = 0.41$. The long-run results are unaffected because the capital stock adjusts to its steady-state value, making the value of α irrelevant for determining the income fall. In the short run, the income fall is smaller because the importance of the fixed factor—namely, capital—is greater. Intuitively, in this case, there is a larger difference between the short- and long-run results because the long-run capital adjustment increases with α.

Finally, the last row shows the results under an alternative setup in which self-employment is never an optimal occupational choice but only a necessity for those unable to find a job as workers. In this setup, the loss in income would be somewhat lower than in the benchmark simulation, especially in the short run, although the ratio to the $\gamma = 0$ case is the same. The explanation is that the parametrization of this alternative setup yields larger values of η and ρ, which, as discussed above, imply smaller output losses.[14]

Table 6
Output losses due to employership gender gaps in LAC

	Short run		Long run	
	Output loss (%)	Ratio to γ = 0	Output loss (%)	Ratio to γ = 0
Benchmark simulation	8.9	1.30	9.4	1.29
Self-employment gender gap present	11.8	1.23	12.5	1.23
OECD parameters (η, ρ, τ) = (0.79, 6.5, 0.7)	5.56	1.23	6.32	1.23
Profits as labor inc. (α = 0.41)	6.37	1.30	9.4	1.29
Only necessity self-employment	6.83	1.30	8.13	1.30

Conclusions

In this paper, we document that in the Latin American and Caribbean (LAC) region, only about one-quarter of all firms are managed by women, and that female-managed firms are, on average, approximately three times smaller than those managed by men. We quantify the output losses associated with these gender disparities using an occupational choice model in which women face barriers to becoming firm managers, with the severity of these barriers increasing with managerial talent.

[14] In particular, under this alternative setup, matching the fraction of employers as well as the firm-size distribution implies a value of $\eta = 0.83$ and $\rho = 7.24$.

Our benchmark calibration indicates that these gender gaps generate aggregate output losses of approximately 8.9% in the short run and 9.4% in the long run. Misallocation is the root cause of the entire short-run loss, since entrepreneurial barriers exclude high-talent women from it, reducing average managerial talent and, consequently, aggregate productivity. The capital channel amplifies it by about half a percentage point in the long run.

We also show that these estimated losses are about 1.3 times larger than those obtained under an alternative specification in which the barriers to entrepreneurship are unrelated to managerial talent. Sensitivity analyses suggest that the short-run output losses range from 6.4% to 11.8%, while the corresponding long-run losses range from 8.1% to 12.5%.

Our framework attributes the observed differences in the size distributions of male- and female-managed firms to exogenous barriers that affect women's occupational choices, with these barriers assumed to be positively correlated with managerial talent. This assumption provides a tractable way of capturing the idea that more talented women are less likely to become entrepreneurs. Such barriers could reflect labor market discrimination, but they may also arise from other factors, including differences in preferences, such as a stronger preference for family time, or broader constraints affecting occupational choices. Admittedly, the welfare effects of closing gender gaps in entrepreneurship depend on the underlying causes of those gaps. Under a labor market discrimination mechanism, eliminating these disparities would likely increase both output and welfare. By contrast, if the gaps reflect a stronger preference for family among more talented women—driven, for example, by concerns about human capital transmission or by assortative matching in the marriage market—then requiring these women to operate larger firms could reduce welfare.

Our estimates should be interpreted as the outcome of the specific mechanism embodied in the model, rather than as definitive causal evidence regarding the origins of the observed differences in entrepreneurship between men and women. Our model is not intended to identify the underlying sources of these barriers. Determining the fundamental causes of the observed gender differences in entrepreneurial outcomes remains an important question for future research. Alternative explanations include gender differences in the accumulation of entrepreneurial human capital, educational choices, managerial experience, access to productive opportunities, or access to finance.

Distinguishing among these competing mechanisms requires richer data than are currently available and lies beyond the scope of this paper.

We also leave for future research the examination of the evolution of the gender gaps documented in this article through a more recent period, as well as the cross-country heterogeneity within Latin American and Caribbean countries. Regarding the first point, we show in Cuberes et al. (2019) that gender gaps in entrepreneurship participation do not exhibit a strong time trend. Still, we are not aware of any study on the evolution of gender gaps by firm size.

Declarations

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2. *CRediT Authorship Contribution Statement*

[D.C.]: Conceptualization, Methodology, Formal analysis, Writing – original draft, Data curation, Software, Validation, Investigation, Writing – review & editing, Supervision, Project administration, Writing – review & editing.

[M.T.]: Conceptualization, Methodology, Formal analysis, Writing – original draft, Data curation, Software, Validation, Investigation, Writing – review & editing, Funding acquisition, Supervision, Project administration, Writing – review & editing.

All authors have read and agreed to the published version of the manuscript.

3. *Conflict of Interest / Competing Interests*

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

4. *Data Availability Statement*

The data that support the findings of this study are available from the corresponding author upon reasonable request.

5. *Declaration of Generative AI in the Writing Process*

The authors declared that no generative AI or AI-assisted technologies were used in the writing process or performance of this work.

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A APPENDIX: Model details

The economy we consider has a continuum of agents indexed by their entrepreneurial talent x, drawn from a cumulative distribution Γ that takes values between B and ∞. We assume the economy is closed and that it has a workforce of size N and K units of capital. Labor and capital are inelastically supplied in the market by consumers, in exchange for a wage rate w and a capital rental rate r, respectively. Firms then combine these inputs to produce a homogeneous good. Agents decide to become either firm workers, who earn the equilibrium wage rate w—which we assume is independent of their entrepreneurial talent—or entrepreneurs, who earn the profits generated by the firm they manage.[15] In the model, we also include a fourth category, namely the out-of-necessity entrepreneurs, who choose this occupation because they have no other occupational options but to run their own business. We denote by $1-\theta$ the fraction of both males and females that are out-of-necessity entrepreneurs.

An agent with entrepreneurial talent or productivity level x who chooses to become an employer and hires $n(x)$ units of labor and $k(x)$ units of capital produces $y(x)$ units of output and earns profits $\pi(x) = y(x) - rk(x) - wn(x)$, where the price of the homogeneous good is normalized

[15] In what follows we will refer to an entrepreneur as someone who works as either an employer or a self-employed.

to one. As in Lucas (1978) and Buera and Shin (2011), the production function is given by

$$y(x) = x\left(k(x)^{\alpha} n(x)^{1-\alpha}\right)^{\eta}, \tag{7}$$

where $\alpha \in (0,1)$ and $\eta \in (0,1)$. The parameter η measures the span of control of entrepreneurs and, since it is less than 1, the entrepreneurial technology exhibits diminishing returns. On the other hand, an agent with talent x who chooses to become self-employed uses the amount of capital $\tilde{k}(x)$, produces $\tilde{y}(x)$ units of output, and earns profits $\tilde{\pi}(x) = \tilde{y}(x) - r\tilde{k}(x)$. The technology they operate is

$$\tilde{y}(x) = \tau x \tilde{k}(x)^{\alpha\eta}, \tag{8}$$

where τ is the self-employed productivity parameter; one interpretation of this parameter is that self-employed workers spend a fraction of their time on management tasks, implying that τ equals the fraction of time available for work raised to the power $(1-\alpha)\eta$. As explained below, we estimate this parameter to match the average fraction of self-employed in the data.

A.1 Agents' optimization

A.1.1 Employers

Employers choose the units of labor and capital to hire to maximize their current profits, π. The optimal number of workers and capital stock, $n(x)$ and $k(x)$, respectively, depend positively on the productivity level x, as equations (9) and (10) show:

$$n(x) = \left[x\eta(1-\alpha)\left(\frac{\alpha}{1-\alpha}\right)^{\alpha\eta} \frac{w^{\alpha\eta-1}}{r^{\alpha\eta}}\right]^{1/(1-\eta)}, \tag{9}$$

$$k(x) = \left[x\eta\alpha\left(\frac{1-\alpha}{\alpha}\right)^{\eta(1-\alpha)} \frac{r^{\eta(1-\alpha)-1}}{w^{\eta(1-\alpha)}}\right]^{1/(1-\eta)}. \tag{10}$$

A.1.2 Self-employed

When we solve for the problem of a self-employed agent with talent x who wishes to maximize their profits, we find

$$\tilde{k}(x) = \left(\frac{\tau x \alpha \eta}{r}\right)^{\frac{1}{1-\alpha\eta}}. \tag{11}$$

A.1.3 Occupational choice

Figure (2) displays the shape of the profit functions of employers, $\pi_e(x)$, and self-employed, $\pi_s(x)$, as well as the wage earned by workers as a function of talent x. The agents' optimization determines the relevant talent cutoffs for the occupational choices. Here we present the equations that define these thresholds: the first one, z_1, defines the earnings such that agents are indifferent between becoming workers or self-employed, and it is given by

$$w = \tau z_1 \tilde{k}\left(z_1\right)^{\alpha\eta} - r\tilde{k}\left(z_1\right). \tag{12}$$

If $x < z1, agents\ choose\ to\ become\ workers$; $if\ x > z1$, they become self-employed or employers. The second cutoff, z_2, determines the choice between being self-employed or an employer, and it is given by

$$\tau z_2 \tilde{k}(z_2)^{\alpha\eta} - r\tilde{k}(z_2) = z_2 x\left(k(z_2)^{\alpha} n(z_2)^{1-\alpha}\right)^{\eta} - rk\left(z_2\right) - wn(z_2) \tag{13}$$

so that if $x > z_2$ an agent wants to become an employer.

A.2 Competitive Equilibrium

We assume that women represent half of the population in the economy and that there is no unemployment. Moreover, any agent in the economy can potentially participate in the labor market, except for the restrictions on women described above. Under these assumptions, in equilibrium, the total demand of capital by employers and self-employed must be equal to the aggregate capital endowment (in per capita terms) k:

$$\begin{aligned} k &= \frac{1}{2}\left[\int_{z_2}^{\infty} k(x)d\Gamma(x) + \int_{z_1}^{z_2} \tilde{k}(x)d\Gamma(x) + (1-\theta)\int_{B}^{z_1} \tilde{k}(x)d\Gamma(x)\right] \\ &+ \frac{1}{2}\left[\int_{z_2}^{\infty} \mu\left(x\right)k(x)d\Gamma(x) + \int_{z_1}^{z_2} \tilde{k}(x)d\Gamma(x) + \int_{z_2}^{\infty} (1-\mu\left(x\right))\tilde{k}(x)d\Gamma(x) + (1-\theta)\int_{B}^{z_1} \tilde{k}(x)d\Gamma(x)\right]. \end{aligned}$$

The upper term is the demand for capital by men, and the two lower terms are the women's demand for capital. The demand for capital by male-run firms has three components: the first represents the capital demand by employers, while the second and third represent the demand by the self-employed. i.e., those with the right ability to be self-employed, plus the capital required by those who become self-employed because they could

not find jobs as workers.[16] These out-of-necessity self-employed demand the optimal amount of capital given their talent or ability.

The demand for capital by female-run firms has four components. The first term represents the capital demand by female employers, i.e., those with sufficient ability to be employers and who are allowed to be so, while the second term represents the capital demand by women who can be self-employed and are allowed to work. The third term shows the capital demand by women who become self-employed because they are excluded from employership, and, finally, the last term shows the fraction of females who would like to be workers but, since they are "excluded" from this occupation, they choose to become out-of-necessity self-employed if they are not excluded from entrepreneurship.

Similarly, the labor market-clearing condition is given by

$$\frac{1}{2}\left[\int_{z_2}^{\infty} n(x)d\Gamma(x)\right] + \frac{1}{2}\left[\int_{z_2}^{\infty} \mu\,(x)\, n(x)d\Gamma(x)\right] = \theta\Gamma(z_1),$$

which shows that in equilibrium, aggregate labor demand equals aggregate labor supply. The first term is the labor demand by male employers, and the second corresponds to the labor demand by female employers, i.e., those women with sufficient ability to be employers who are allowed to choose their occupation freely. The labor supply shows the fraction of men and women who choose to become workers and are not forced to be self-employed out of necessity.

A competitive equilibrium in this economy is a pair of cutoff levels (z_1, z_2), a set of quantities $\left[n(x), k(x), \tilde{k}(x)\right], \forall x$, and prices (w, r) such that entrepreneurs choose the amount of capital and labor to maximize their profits, and labor and capital markets clear.

A.3 Details on size-distribution calculations

Given a level of talent x, firms choose to have $n(x) = \left[x\eta(1-\alpha)\left(\frac{\alpha}{1-\alpha}\right)^{\alpha\eta}\frac{w^{\alpha\eta-1}}{r^{\alpha\eta}}\right]^{1/(1-\eta)}$ workers. We can invert this function to find

[16] As explained in Section 3, a fraction $(1-\theta)$ of both males and females with ability below z_1 become self-employed because they would like to be workers but are not allowed to do so and choose their second-best option.

$$x = n^{1-\eta}\left[\eta(1-\alpha)\left(\frac{\alpha}{1-\alpha}\right)^{\alpha\eta}\frac{w^{\alpha\eta-1}}{r^{\alpha\eta}}\right]^{-1}$$

Substituting this expression into the cumulative density function 2 gives us.

$$S(n) = 1 - n^{-\rho(1-\eta)}B^{\rho}\left(\eta\left(\frac{\alpha}{r}\right)^{\alpha\eta}\left(\frac{1-\alpha}{w}\right)^{1-\alpha\eta}\right)^{\rho}.$$