# Self-employment as Self-insurance

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**Abstract**

In a sample of developing countries, 19% of microentrepreneurs report starting their businesses because they could not find jobs. Consistent with a self-insurance motive, these "necessity microentrepreneurs" are more likely to transition from unemployment and run smaller and less profitable firms. To study the aggregate implications of self-employment functioning as a last resort income, I develop an occupational choice model where risk-averse workers can resort to informal microentrepreneurship to smooth income risk from unemployment. Enforcing entry regulations can reduce welfare even while increasing output. Despite limited state capacity, introducing unemployment insurance increases welfare and is strongly progressive

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The prevalence of microenterprises, or firms with no more than 10 workers, is a hallmark of developing countries.[1] Businesses like market stalls, street food vendors, workshops and small shops constitute the overwhelming majority of firms, employ large shares of the workforce, and concentrate a significant proportion of productive resources (Gollin, 2008; La Porta and Shleifer, 2014; Levy, 2018). Due to their small scale, reliance on traditional production technologies and pervasive informality, the dominance of microenterprises is consistently pointed out as a driver of low aggregate productivity and a challenge to state capacity that curtails revenue collection and the effective provision of public services (Midrigan and Xu, 2014; Besley and Persson, 2014; Ulyssea, 2018).

However, high levels of microentrepreneurship coexist with absent or insufficient job displacement insurance policies, which implies that displaced workers typically cannot afford to search for jobs for extended periods of time (Gerard et al., 2024). Consequently, growing attention is being paid to the role that self-employment plays as a temporary escape from unemployment, particularly for the poor, and how this can have consequential implications for labor market dynamics and development policy (Breza et al., 2021; Donovan et al., 2023; Herreño and Ocampo, 2023).

I study the aggregate implications of microentrepreneurship functioning as a source of last resort income. I make two contributions. First, and using microenterprise surveys from developing countries, I document novel facts about the breadth and characteristics of individuals who start small businesses because they could not find wage employment. Second, I study the macroeconomic effects of two types of policies that directly impact the attractiveness of self-employment as a last resort income: the enforcement of entry regulations and the provision of unemployment insurance. I do so through the lens of a two-sector occupational choice model with labor market frictions, where risk-averse workers can become microentrepreneurs driven by either comparative advantage or subsistence concerns stemming from a lack of job offers.

I begin by documenting the extent to which workers turn to microentrepreneurship when job opportunities are unavailable. Leveraging questions on the reasons for business start ups in microenterprise surveys, I classify as 'necessity microentrepreneurs' those individuals who report having started a small business because they could not find wage employment. For a range of developing countries I find that, on average, 19% of microentrepreneurs start firms out of necessity. Given the high self-employment rates in these countries, this number corresponds to approximately 6.4% of the aggregate workforce.

Then, by combining microenterprise and labor force surveys for Mexico, a country with no unemployment insurance and a large microenterprise sector, I document novel facts that

[1] Throughout this paper I refer to the owners of microenterprises as microentrepreneurs or self-employed.

are supportive of job loss being an important driver of microentrepreneurship entry. Necessity microentrepreneurs create smaller, less profitable firms and are more likely to transition from and into unemployment. In addition, necessity-driven self-employment is more prevalent in cities with higher unemployment rates, higher wage job exit rates and lower wage job finding rates. This suggests that its use as a fallback option is more prevalent in locations where workers struggle to find and keep wage jobs. Finally, I also show that necessity microentrepreneurs that transition into wage employment experience larger income gains than comparable non-necessity microentrepreneurs. This is consistent with necessity microentrepreneurs having a comparative disadvantage in self-employment relative to wage employment and with their entry decisions being motivated by job loss.

In order to evaluate the aggregate and welfare implications of self-insurance through self-employment, I propose a two-sector occupational choice model with labor market frictions and bi-dimensional skill heterogeneity. Production takes places in a modern (formal, large firm) and a traditional (informal, microenterprise) sector. Workers in the economy can be wage earners, microentrepreneurs in the traditional sector, or unemployed. Workers may always become microentrepreneurs, but access to wage employment is subject to search frictions. Both the unemployed and the self-employed may search, and the probability of receiving job offers depends on their occupation-specific search efficiency and their search effort. Occupational choices depend on workers' comparative advantage and, in the case of microentrepreneurship, wealth, due to the presence of a collateral constraint.

In the model, workers are risk averse and cannot borrow, but may insure against risk by accumulating precautionary savings as well as through their behavior in the labor market. More precisely, when deciding between unemployment and microentrepreneurship, workers without job offers weigh the higher search efficiency of unemployment, which leads to a higher probability of finding wage employment in the future, against the income they can earn in self-employment. In this context, and as in Herreño and Ocampo (2023), low unemployment earnings induce agents, and particularly the poor, to become self-employed as a way to hedge against unemployment risk. As a result, the model generates two motives for microentrepreneurship entry: comparative advantage and subsistence needs, in a way that parallels the empirical characterization.

A parameterized version of the model accounts well for salient features of the Mexican economy and its microestablishments: the size of the traditional (microenterprise) sector, aggregate occupational shares, flows across occupations, as well as within-occupation earnings dispersion and persistence. Beyond the calibration targets, the model closely matches key untargeted moments such as the overall share of necessity microentrepreneurs and their concentration at the lower end of the earnings distribution, with relative input demands

and performance consistent with the data. I use the calibrated model to evaluate the aggregate and welfare effects of two separate policies that alter the trade-off associated with microentrepreneurship decisions: the enforcement of entry regulations and the introduction of unemployment insurance.

A large body of work finds that increasing enforcement of taxes and regulations among informal firms can generate sizable productivity and output gains.[2] However, the use of microentrepreneurship as an option of last resort suggests that policies that threaten the economic viability of microenterprises may have adverse welfare consequences. I evaluate this hypothesis by studying the enforcement of entry regulations, which I model by assuming that entry into microentrepreneurship requires paying a one-time regulatory entry cost. I discipline the regulatory entry cost using World Bank estimates for Mexico and evaluate three scenarios that differ in the benefits associated with formalization. In the first, the policy is not associated with any additional benefits. In the second, formalization is associated with better access to financial markets (D'Erasmo and Moscoso Boedo, 2012), which I model as a relaxation of microentrepreneurs' collateral constraints. In the third, I assume formalization increases modern sector productivity, capturing potential gains from fewer negative externalities imposed by informal firms on the formal sector (Meghir et al., 2015).

Across all three scenarios, regulatory entry costs discourage microentrepreneurship and in particular its use to self-insure. In the labor market, this translates into large reductions in necessity microentrepreneurship and approximately 1 p.p. higher unemployment. Consistent with the literature, all three counterfactuals generate output gains ranging from 0.54% (scenario 1) to 6.2% (scenario 3). These gains are explained by higher precautionary savings as well as the benefits associated with formalization in each counterfactual. Despite resulting in higher output, the first two scenarios lead to large welfare losses, and only the third scenario increases welfare (0.82%). Moreover, in all three cases the welfare losses (gains) are larger (smaller) among the poor. These results illustrate that, given the high regulatory burdens observed in developing countries, stricter enforcement is not necessarily justified on welfare grounds.[3] They also highlight how policies impacting the profitability of small firms can have consequential equity effects, and may rationalize why governments in developing countries seem to tolerate widespread informality among microenterprises.

Next, I study the introduction of a stylized unemployment insurance system (UI) in which all unemployed workers, regardless of their previous occupation, receive UI benefits which are financed through payroll taxes. To account for the challenges associated with the presence of

[2]See Ulyssea (2020) for a review.

[3]For cross-country evidence on the magnitude of regulatory costs see (Djankov et al., 2002; Alaimo et al., 2017; Tamkoç and Ventura, 2024).

a large and informal microenterprise sector, I assume that microentrepreneurs avoid taxation and that the government struggles to effectively target resources to the unemployed. I do this by allowing both wage earners and microentrepreneurs to submit fraudulent UI claims that succeed probabilistically. I assume wage earners may also make fraudulent claims to account for informal employment and collusive layoffs, as around 40% of wage earners in Mexico are informal (Bobba et al., 2022). I consider three different scenarios that vary in the proportion of expenditures that are spent in fraudulent claims (0, 20 and 50%).

Several model features imply that aggregate and welfare effects of such a policy are not straightforward. On the one hand, and besides improving consumption smoothing, UI may speed the reallocation of talent in the economy by allowing workers to search from the high search efficiency occupation. On the other hand, unemployment insurance reduces both precautionary savings and search effort. In addition, and because microentrepreneurs avoid taxation, the payroll tax distorts the modern sector, reduces its size and wages, and alters occupational choices.

In the scenario with perfect targeting, I find that unemployment insurance funded by a 2% payroll tax finances an average replacement rate of 15%, which substantially reduces necessity microentrepreneurship and increases unemployment by around 2p.p. The additional insurance reduces precautionary savings, and taxation distorts and shrinks the modern sector, which leads to an output contraction of 0.55%. Despite this, I find that unemployment insurance increases welfare (0.27%), with the gains concentrated in the left tail of the wealth distribution. These results remain robust to the inclusion of imperfect targeting, although widespread fraudulent claims reduce benefits, lowering both average welfare gains and their progressivity.

I contribute to the body of literature on self-employment in developing countries, particularly the strand studying its relationship with labor market frictions and its role as a last resort income (Breza et al., 2021; Donovan et al., 2023; Feng et al., 2024; Poschke, 2023; Herreño and Ocampo, 2023). Empirically, I contribute by documenting novel facts about the prevalence and characteristics of necessity microentrepreneurs that strongly support the importance of self-employment as escape from unemployment.[4]

My model is closest to Herreño and Ocampo (2023), who use a similar framework with risk averse workers and labor market frictions to study the aggregate effects of credit expansions and directed transfers in Mexico. Relative to their model, I add search effort, an important margin of adjustment when evaluating the value of employment protection

[4]I classify microentrepreneurs based on their stated reasons for self-employment entry. Related work in the context of development partitions the self-employed based on education (Feng and Ren, 2023; Poschke, 2013a), employer status (Gollin, 2008; Schoar, 2009), their intention to exploit profitable business opportunities (Poschke, 2013b), or whether they hire R&D workers (Akcigit et al., 2025).

(Marinescu and Skandalis, 2021). I also incorporate a two-sector structure with imperfect enforcement similar to Lagakos (2016), necessary to evaluate the aggregate and welfare implications of enforcement and the provision of unemployment insurance under limited state capacity. Gaillard and Kankanamge (2024) use a similar model with endogenous search effort to study how unemployment insurance generosity interacts with self-employment decisions in the US. VanVuren (2023) uses a search-and-matching framework to study active labor market policies in Ethiopia. Aggregate responses to many of these policies hinge on the share and characteristics of necessity microentrepreneurs. Unlike previous structural work, I measure these directly using detailed microenterprise data and use them to validate my model.

My work is also connected to the body of work studying the macroeconomic consequences of enforcement. A common message in this literature is that increasing compliance of taxes and regulations can increase output and productivity, in part because it encourages the exit of the least productive firms (Meghir et al., 2015; Leal Ordóñez, 2014; Ulyssea, 2018). My findings on necessity microentrepreneurs suggest that these are the firms that are most likely being used as insurance mechanisms, a dimension that the preceding literature ignores. Indeed, Almeida and Carneiro (2012) find that higher enforcement reduces self-employment and increases unemployment across Brazilian municipalities. I focus on regulatory entry costs because they are typically large in developing countries (Djankov et al., 2002; Barseghyan and DiCecio, 2011) and they may curtail self-employment entry. My findings are in line with those of Ulyssea (2018, 2010), who also finds that enforcing formal entry costs among informal firms can have adverse welfare consequences, although his analyses abstract from microentrepreneurship and self-insuring behavior.

Finally, I contribute to the literature on unemployment insurance in developing countries, which is concerned with the challenges created by limited state capacity and labor market informality. Both Bosch and Maloney (2008) and Cirelli et al. (2021) study the introduction of contributory unemployment insurance systems in Mexico. The unemployment insurance system I consider is close to that in Ndiaye et al. (2025), who expand the static Chetty (2008) framework to account for fraudulent claims and limited tax collection to study the introduction of UI in Senegal. None of these analyses account for either precautionary savings or necessity microentrepreneurship. The finding that unemployment insurance increases welfare despite significant challenges associated with limited state capacity is consistent with the results of Gerard and Gonzaga (2021); Liepmann and Pignatti (2024); Ndiaye et al. (2025).

# 1 Microentrepreneurship in Mexico

In this section, I document a set of empirical facts characterizing Mexican microentrepreneurs, with a particular focus on those who enter self-employment out of necessity. I begin by describing the Mexican institutional context and the data sources, and by explaining how I measure necessity self-employment using individuals' self-reported reasons for starting their businesses. Next, I document several patterns consistent with self-employment serving as a last resort income. These findings provide the empirical motivation for the quantitative model developed in the next section.

## 1.1 Institutional Environment

Like in most developing countries, microenterprises are ubiquitous in Mexico. Using the Economic Census, Levy (2018) shows that microenterprises (defined as firms employing 10 workers or less) comprise more than 95% of establishments, hire around 45% of the workforce and employ one fourth of the economy's capital stock. In contrast, in the US establishments with 1-9 workers are 71% of the total and hire less than 15% of the workforce.

The Mexican labor market is characterized by high levels of informality and the absence of a robust social security system that assists workers in the event of adverse shocks. Indeed, only around 60% of the workforce actively contributes to the social security registry (IMSS in Spanish), a commonly used measure of informality.[5] Mexico is also the only OECD member without an official unemployment insurance scheme, and expenditure in active labor market policies is small (OECD, 2020). Although in principle salaried workers terminated from their jobs are legally entitled to severance payments, limited enforcement and prevalent informality result in the former being a rather ineffective job displacement insurance policy. Sadka et al. (2024) find that, among *formal* workers dismissed in the past 3 years, only 50% report receiving severance payments. The lack of social protection has been linked to short unemployment duration and the prevalence of small scale entrepreneurship in Mexico, as dismissed workers cannot sustain long periods of job search without alternative sources of income (Fleck and Sorrentino, 1994). Indeed, the average unemployment duration is 9 weeks, half that of the US, and transitions between unemployment and self-employment are frequent.[6] The dual feature of lack of job displacement insurance plus high flows into and out of self-employment is prevalent among emerging countries, and broadly consistent with self-employment being used to hedge against unemployment risk (Donovan et al., 2023).

[5]Contributing to the IMSS qualifies workers to receive a variety of benefits such as health insurance and retirement pensions (Bobba et al., 2022).

[6]This number is computed from the Mexican Labor Force Survey (ENOE). Unemployment duration for the US is 20 weeks, according to the Bureau of Labor Statistics.

## 1.2 Data

The main data source for this project is the Mexican National Survey of Microenterprises (ENAMIN). ENAMIN is a cross-sectional survey of non-agricultural small businesses hiring up to 10 workers in services and up to 15 workers in manufacturing. The survey has 8 waves dating from 1992 to 2012. Of those, the first 5 waves are representative of urban areas with a population larger than 100.000 inhabitants, whereas the last three are nationally representative. It is a matched employer-employee dataset that collects information on owner, firm and employees' characteristics, including capital stocks, inventories, and workforce demographics.[7] ENAMIN interviews business owners regardless of their registration or formality status, and it includes establishments without fixed premises. This makes it more representative of small firms than related instruments that sample from municipality registries or similar administrative data sources such as the Economic Census (Leal Ordóñez, 2014). Typical businesses surveyed in ENAMIN include convenience stores, food manufacturers or vendors, and small retailers with and without fixed premises. Observations in ENAMIN are sampled from Mexico's main labor force survey, a rotating panel that tracks individuals for up to 5 quarters, which allows me to observe microentrepreneurs for a few quarters after and/or before they appear in ENAMIN.[8]

I focus on microentrepreneurs aged between 25-65 years old, who report working at least 30 hours per week, and who have non-missing values on capital stock and profits. Capital stock is defined as the (self-declared) resale value of machinery, tools and vehicles used by the business, plus the value of inventories and unfinished products. Profits correspond to owners' self-reported average monthly profits. All nominal variables are adjusted using the Mexican CPI and expressed as relative to the average wage. Table 13 in Appendix A displays summary statistics. Several well-known features of small firms in developing countries are replicated here. Only 21% of microenterprises hire outside labor, and those who hire do not hire many: the average workforce is 1.74. Microenterprises are predominantly informal: more than 60% are not registered in any public registry, and less than 10% report paying social security contributions on behalf of their workers.[9] Moreover, and although many business owners earn above median incomes and accumulate sizable capital stocks, there is also a significant mass of small and unprofitable microenterprises, consistent with the observed U-shaped pattern of self-employment along the earnings distribution (see Figure 6 in the Appendix and Herreño and Ocampo (2023)).

[7] See McKenzie and Woodruff (2006) for a detailed overview.

[8] *Encuesta Nacional de Empleo Urbano* (ENEU) from 1992 to 2004, and *Encuesta Nacional de Ocupaciones y Empleo* (ENOE) starting from 2005.

[9] Consistently, Levy (2018) finds that 8% of microestablishments are formal using the Economic Census.

## 1.3 Measuring necessity self-employment

To measure the extent to which microentrepreneurship is being used to self-insure against unemployment risk, I use survey questions inquiring about the reasons for business start up. More precisely, all ENAMIN waves have a question inquiring about the *main* reason that led the owner to start (or acquire) their firm; an example is presented in Table 11 in Appendix A. Among the alternatives respondents may choose are pecuniary reasons, like exploiting profitable business opportunities or looking to improve their income, as well as non-pecuniary reasons, such as having preferences for flexibility, or a desire to be your own boss. There are also alternatives indicative of microentrepreneurship being chosen to avoid unemployment, which I use to categorize business owners. In particular, I label as *necessity microentrepreneurs* those business owners who declare that they started their business either because of *i)* the inability to obtain wage employment, *ii)* the loss of previous wage employment, or *iii)* the absence of any other sources of income (and their variants). For example, in the year 2010 necessity microentrepreneurs are those who answered either that they started their business because they 'could not find salaried employment' or as a result of 'job loss, or reduction at previous employment'.

This classification links entry into microentrepreneurship with available labor market alternatives at the moment of entry; the assumption behind it is that necessity microentrepreneurs would not have chosen self-employment if they had readily accessible wage employment opportunities at the moment of starting their firms. A potential concern is misclassifying as necessity microentrepreneurs those who started businesses because of poorly paid rather than absent job opportunities. Although this cannot be done generally, this concern can be directly verified for Mexico in 2012, where only 1.3% of respondents selected 'finding poorly paid jobs' as their reason, suggesting this issue is limited.

Table 1 shows the breadth of necessity self-employment for Mexico as well as other countries for which I was able to compute comparable measures, expressed both as a share of small business owners (column 1) and as a proportion of the workforce (column 2). To construct Table 1, I use microenterprise surveys conducted either by national statistical agencies or the World Bank. An important caveat of using the World Bank's microenterprise surveys is that they only cover formal establishments. Because formality is positively correlated with productivity, measures of necessity self-employment derived from this instrument probably understate its prevalence. For the US I take the number from Hurst and Pugsley (2011), who tabulate the reported reasons for business start-up among nascent entrepreneurs in the Panel Study of Entrepreneurial Dynamics. Column 2 is constructed by mutlypling the share of necessity microentrepreneurs times the non-agricultural self-employment share; see Appendix A for a detailed explanation of the construction of Table 1.

| | % Entrepreneurs | % Workforce |
|---|---|---|
| Armenia† | 18.1 | 2.8 |
| Brazil | 32 | 9.1 |
| Central African R.† | 7.7 | - |
| Chile | 16 | 4.1 |
| Colombia | 39 | 17 |
| Congo, D.R.† | 19.5 | 6.4 |
| Georgia† | 22.4 | 4.5 |
| India† | 4.7 | 2.8 |
| Iraq† | 24.2 | 6.4 |
| Mexico | 15 | 4.7 |
| Mozambique† | 12.9 | 6.5 |
| United States | 3.8 | 0.26 |

The second column equals to the numbers in the first column times the self-employment share of non-agricultural employment, taken from ILOSTAT.
† Computed using the World Bank's Micro Enterprise surveys, see Appendix A for details.

Table 1. Necessity microentrepreneurship across countries

The main takeaway is that necessity entrepreneurship is pervasive: when excluding the US, it averages a 19% of microentrepreneurs or 6.4% the workforce. The magnitude of these numbers, comparable to national unemployment rates, speaks of the importance of self-employment as a last resort income. In contrast, this phenomenon seems to be significantly less pronounced in the US, where necessity self-employment amounts only to 3.8 % of entrepreneurs or 0.26% of the workforce. The figures in Table 1 are in the ballpark of previous reduced form estimates of labor market slack in India (Breza et al., 2021) as well as results from structural work for the US (Gaillard and Kankanamge, 2023). For Brazil, and using a firm dynamics framework, Ulyssea (2018) concludes that around 50% of informal firms are created by low productivity entrepreneurs as a survival strategy, comparable to the 32% in Table 1.

These findings are closely related to previous work using the Global Entrepreneurship Monitor (GEM) data (Poschke, 2013b), which defines necessity entrepreneurs as individuals who started their firms because they had 'no better choices for work' as opposed to opportunity entrepreneurs who aim to 'take advantage of business opportunities'. The coarseness of GEM's classification implies that it classifies as necessity entrepreneurs individuals with

motivations that are different from the absence of job opportunities, such as preferences for non-pecuniary job characteristics. Nevertheless, a similar cross country pattern appears in GEM: developing countries have higher shares of necessity entrepreneurship, and it is negatively correlated with owner's education and both current and expected number of employees (Poschke, 2013b). ENAMIN contains richer information on firm performance and owner characteristics, including profits, capital stocks, and the possibility to match it with labor force survey data, which allows for a more detailed comparison between necessity and non-necessity microentrepreneurs in what follows.

## 1.4 Stylized facts on Mexican microentrepreneurs

Now I turn back to the Mexican data to document a series of facts about Mexican microenterprises, focusing on necessity microentrepreneurs.

**Fact 1: Necessity microentrepreneurs create smaller, less profitable firms, but don't comprise the majority of unproductive microestablishments**

The second and third columns of Table 13 in Appendix A presents summary statistics dis-aggregated by microentrepreneur type. Necessity microentrepreneurs are slightly older, less likely to be college educated and disproportionately male.[10] Table 2 shows that they underperform non-necessity business owners in several indicators of performance. It displays the estimates for $\alpha$ resulting from the following regression:

$$y_i = \alpha \text{Necessity}_i + X_i\beta + \varepsilon_i,$$

where $y_i$ is a performance variable such as profits or log capital stock, $\text{Necessity}_i = 1$ if $i$ is a necessity microentrepreneur, and $X_i$ is a set of controls. Controls in $X_i$ include demographic and education variables, city and time fixed effects, as well as firm-specific controls such as industry fixed effects, and, when they are not the dependent variables, log capital stock and the owner's tenure in the business. Necessity self-employment is associated with 11% lower profits and 42% smaller capital stocks than microentrepreneurs with similar observable characteristics. They are also 22% less likely to be employers and, conditional on being employers, hire 0.18 fewer workers, which amounts to a 47% difference relative to the mean. Additionally, they report shorter tenures, are less likely to be registered with the authorities, and less likely to have any type of bookkeeping. The large magnitudes of the coefficients in Table 2 is consistent with the need for insurance pushing relatively unproductive individuals

[10] Women in Mexico are traditionally secondary earners, and are more likely to start businesses to *supplement family income*, see Table 11.

into microentrepreneurship. Figure 5 in Appendix A shows that necessity self-employment is also more prevalent in industries with low capital intensity, supportive of the idea that they don't have many resources at the moment of business start up.

| **Dependent variable** | $\hat{\alpha}$ |
|---|---|
| *log(1 + capital)* | -0.538*** (0.029) |
| *log(profits)* | -0.114*** (0.011) |
| *isEmployer* | -0.223*** (0.025) |
| *nEmployees* | -0.179*** (0.051) |
| *businessTenure* | -2.351*** (0.103) |
| *registration* | -0.079*** (0.014) |
| *bookkeeping* | -0.101*** (0.012) |

*Outcome variables*: *isEmployer*, *registration*, and *bookkeeping* are dichotomous indicators equal to one if the business owner has paid employees, keeps any type of bookkeeping, or is registered with any government or industry association.
*Controls*: education, demographics, and firm characteristics. Time and location fixed effects.
Indicator variables are normalized by their average.

Table 2. Necessity microentrepreneurship and performance

Despite sizable average differences between the two groups of microentrepreneurs, there is considerable overlap in their characteristics and performance. Indeed, ignoring necessity microentrepreneurs does little to change the distribution of microentrepreneur earnings (see Figure 6 in Appendix A). While the concentration of the self-employed in the left tail of the earnings distribution is often interpreted as evidence that self-employment serves as income of last resort for the jobless (Donovan et al., 2023; Herreño and Ocampo, 2023), this result cautions against equating all poor firm performance with unwilling entrepreneurship. A significant share of unproductive self-employment may instead reflect sorting due to individuals' comparative disadvantage in wage work (Allub and Erosa, 2019), or a preference for the non-pecuniary benefits of self-employment (Hurst and Pugsley, 2011).

**Fact 2: Most self-employment spells are brief. Necessity microentrepreneurs are twice as likely to come from, and transition into, unemployment.**

Transitions into and out of self-employment in developing countries are frequent and strongly countercyclical (Bosch and Maloney, 2008; Donovan et al., 2023). Relatedly, and using data from the Mexican labor force survey, I find that most self-employment spells are short-lived: nearly half of new entrants exit self-employment after a single quarter, and fewer than one-third remain self-employed for more than a year (see Table 14 in the Appendix).

| | Non-necessity | Necessity |
|---|---|---|
| *Where do they come from* | | |
| inactive | 26% | 19% |
| unemployed | 4.0% | 8.6% |
| unpaid worker | 11% | 7.6% |
| wage earner | 59% | 65% |
| *Where do they go* | | |
| inactive | 26% | 19% |
| unemployed | 4.6% | 8.8% |
| unpaid worker | 11% | 7.0% |
| wage earner | 58% | 65% |

Table 3. Previous and subsequent job market spells

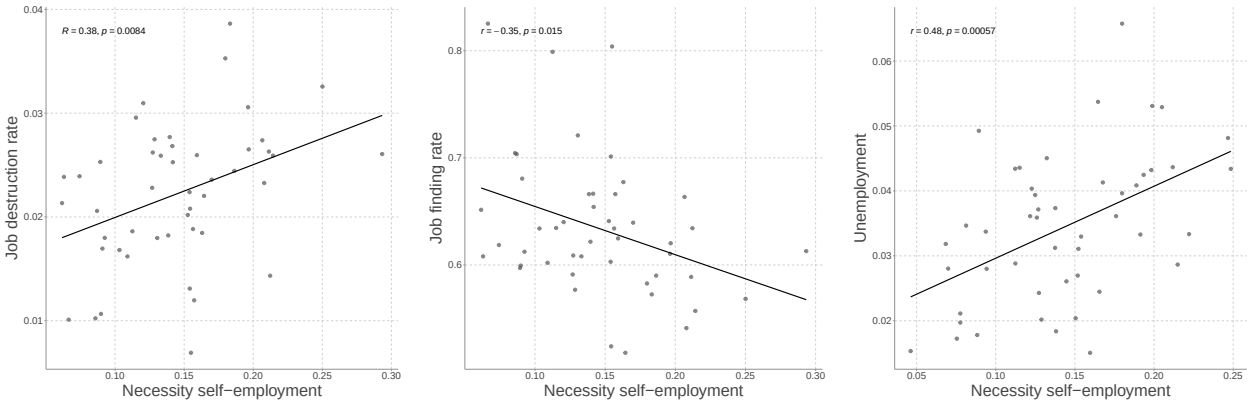
The high volume of self-employment flows and the short duration of self-employment spells are consistent with its role as a substitute for the missing unemployment insurance (Donovan et al., 2023). Consistently, Herreño and Ocampo (2023) show that agents that are less able to smooth consumption while unemployed, proxied by the absence of secondary earners in the household or the lack of remittance income, are more likely to transition into self-employment when unemployed. Table 3 shows both the previous and subsequent labor market spells, defined as consecutive strings of identical labor market statuses, for the subset of small business owners for which I observe more than one labor market spell. Necessity microentrepreneurs are twice more likely to come from unemployment, strongly indicative of their entry being driven by job loss. Consistent with the reduced profitability of their enterprises, they are also twice as likely to transition into unemployment, and around 7 p.p. more likely to transition into wage employment than non-necessity microentrepreneurs.[11]

[11]The microentrepreneurship survey for Brazil is the only one that inquires into owners' plans for the next year. Table 16 in Appendix A shows that necessity microentrepreneurs are disproportionately more likely to report that they intend to shut down their businesses and search for jobs.

Table 15 in Appendix A

**Fact 3: Necessity self-employment is more prevalent in locations where workers struggle to find and keep jobs.**

Using ENAMIN it is possible to compute city-specific necessity self-employment rates for up to 45 of the largest cities in Mexico. These rates are then combined with labor force survey data to analyze how necessity self-employment relates to local labor market conditions. If microentrepreneurship serves as a fallback in the absence of salaried employment, we would expect higher rates of necessity self-employment in cities where securing and maintaining wage jobs is more challenging. Figure 1 presents evidence that suggests this is indeed the case. It shows the relationship between city-specific necessity self-employment rates—averaged across the eight available ENAMIN waves—and city-specific quarterly labor market indicators, averaged for the period 1991-4 to 2012-4. Figure 1a and Figure 1b show that necessity self-employment is positively correlated with employment exit rates, defined as the wage employment to unemployment transition rate, and negatively correlated with the job finding rate, defined as the unemployment to wage employment transition rate. Figure 1c shows that necessity self-employment is also higher in cities with higher unemployment rates. Results remain robust after controlling for time and city fixed effects (see Table 17 in Appendix A), confirming that these patterns persist when looking into within-city time variation.




(a) (b) (c)

Figure 1. Necessity Entrepreneurship and Local Labor Markets

*Note*: The x-axis is average city-level necessity entrepreneurship rates computed using all ENAMIN waves. Labor market moments in the y-axis are computed using labor force surveys and are averages for the years 1991-2014. The job destruction rate is the flow from wage employment to unemployment. The job finding rate is the flow from unemployment to wage employment.

**Fact 4: Necessity microentrepreneurs exhibit larger earning gains from switching to wage employment**

Finally, I study how individual's earnings in wage employment compare to earnings in microentrepreneurship for the subset of agents for whom I observe spells in wage employment adjacent to the microentrepreneurship spell observed in ENAMIN. I compute spell-specific measures of (hourly) earnings by averaging hourly earnings across quarters within the labor spell. I then estimate the following regression:

$$\omega^W_{i,s+1} - \omega^S_{i,s} = \alpha \text{Necessity}_i + X_i\beta + \varepsilon_i,$$

where $\omega^j_{i,s}$ stands for log hourly earnings of agent $i$ in occupation $j$ in spell $s$ and $X_i$ is a set of controls. The interpretation of $\alpha$ is the additional income increase experienced by necessity microentrepreneurs when switching into wage employment. Positive values of $\hat{\alpha}$ are thus indicative that necessity microentrepreneurs exhibit larger income gains from switching to wage employment than non-necessity business owners, which is consistent with them having a comparative *disadvantage* in self-employment.

The results from this exercise are presented in Table 4, where the different columns progressively incorporate demographic controls (gender, age, education), location and time controls, and business characteristics (specifically, industry dummies, capital stocks, workforce and tenure). Estimates for $\alpha$ are positive and statistically significant across all specifications; column 4 shows that the estimate is 12% for the most detailed exercise. Similar results hold when looking into the income changes of agents switching from wage employment into self-employment (see Appendix A). The decision to stay or switch occupation is endogenous, and the results of this exercise do not have a causal interpretation. Nevertheless, the existence of systematic differences in the earning dynamics of the two groups of microentrepreneurs, even after accounting for observables, is consistent with microentrepreneurship being chosen by agents with a comparative disadvantage as a way to avoid unemployment, and thus provides novel evidence in favor of this mechanism.

**Taking stock** This section uses microenterprise surveys to document that a large proportion of small business owners in developing countries start their businesses because they cannot find wage employment. In Mexico, these necessity microentrepreneurs are more likely to come from, and transition into, unemployment, create smaller and less profitable businesses, and experience larger income increases when transitioning to wage work. Together, these patterns suggest that self-employment often serves as a fallback mechanism that helps individuals sustain income in the absence of salaried employment opportunities. In the next section, I present a quantitative model in which microentrepreneurship can be used to hedge against unemployment risk, which I use to assess its implications for the aggregate and welfare effects of development policy.

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | $\omega_{t+1}^W - \omega_t^S$ | | | |
| | (1) | (2) | (3) | (4) |
| | 0.188*** | 0.191*** | 0.192*** | 0.120*** |
| | (0.022) | (0.022) | (0.022) | (0.025) |
| Demographic controls | ✓ | ✓ | ✓ | ✓ |
| Time fixed effects | X | ✓ | ✓ | ✓ |
| Location fixed effects | X | X | ✓ | ✓ |
| Firm controls | X | X | X | ✓ |
| Observations | 18,374 | 18,374 | 18,300 | 14,553 |
| $R^2$ | 0.004 | 0.069 | 0.080 | 0.097 |

*Note:* *p<0.1; **p<0.05; ***p<0.01
Demographic controls: gender, age, and education.
Firm controls: industry fixed effects, capital stock, workforce, tenure.

Table 4. Income changes from $S$ to $W$ transitions

# 2 Model

## 2.1 Environment, preferences and demographics

The economy is closed, and time is discrete and infinite. In every period there is a unit measure of workers making occupation, consumption, search and savings decisions subject to occupation-specific productivity shocks and unemployment risk. Workers die with probability $p$ and are replaced by an identical agent with zero wealth. They maximize the following lifetime utility that is additively separable in consumption and search effort:

$$\mathbb{E}\sum_t \left(\beta(1-p)\right)^t \left(\log(c_t) - \chi\frac{e_t^{1+\phi}}{(1+\phi)}\right),$$

As in Krueger et al. (2016), agents are heterogeneous in their degree of impatience: discount factors $\beta$ are drawn at birth from a discrete set $B$ and remain constant throughout their lifespans. Preference heterogeneity improves the model's match of consumption and wealth inequality, which matters when evaluating the welfare consequences of distributive policies. The government collects involuntary bequests and uses the proceeds to finance exogenous government expenditure $g$. For simplicity, I abstract from non-pecuniary benefits associated with occupational choice.

## 2.2 Production

Production of a single good takes place in two sectors: modern and traditional. This divide is common in the development literature (Midrigan and Xu, 2014; Lagakos, 2016; Feng and Ren, 2023), and is a convenient way of distinguishing between large, formal, and professionally managed firms and the small and mostly informal businesses, which are the focus of this project. The modern sector consists of a representative firm hiring capital and labor and producing with a constant returns to scale production function:

$$\max_{K_M,N_M} A_M\left(K_M^{\alpha}N_M^{1-\alpha}\right) - (r+\delta_k)K_M - w(1+\tau)N_M.$$

Input prices are given by $(r+\delta_k)$ and $w$, where $r$ is the rental rate for capital, $\delta_k$ the depreciation rate, and $w$ the wage per efficiency unit of labor. Both $r$ and $w$ are determined competitively, and thus, are taken as exogenous by the representative firm and microentrepreneurs. Payroll tax $\tau$ is used by the government to finance unemployment insurance. I assume that the government has full enforcement capacity in the modern sector so the representative firm cannot evade payroll taxation.

Entrepreneurial profits in the traditional sector are given by:

$$\pi(\theta_S, a) = \max_{k,n} \left\{ \theta_S \left( k^\alpha n^{1-\alpha} \right)^\eta - (r + \delta_k)k - (1 + \overline{\tau})wn \right\} \text{ s.t. } k \leq \lambda a,$$

for $\eta < 1$. Unlike the modern sector firm, traditional sector microentrepreneurs do not have unrestricted access to financial markets, and are instead bound by a collateral constraint limiting their borrowing as a function of their wealth ($\lambda \geq 1$). It follows that profits $\pi$ depend on microentrepreneurs' wealth. For simplicity, I abstract from formalization decisions and do not allow microentrepreneurs to transition into the modern sector. This assumption is consistent with evidence in La Porta and Shleifer (2014) and Ulyssea (2018), who argue that most informal firms are unlikely to formalize or grow substantially.

Due to their small scale, traditional sector microentrepreneurs avoid government oversight and may evade taxation. This is captured by a sector specific tax rate $\overline{\tau} \leq \tau$. The assumption that small firms evade government oversight while large firms bear the costs of taxation counts with extensive empirical support (see Table 13, La Porta and Shleifer (2014); Bachas et al. (2019)). Aggregate demand for labor and capital in the traditional sector are given by:

$$N_T = \int n(a, \theta_S) d\mu^S(a, \theta, \beta), \quad K_T = \int k(a, \theta_S) d\mu^S(a, \theta, \beta),$$

where $\mu^S$ is the (endogenous) measure of microentrepreneurs across the state space.

## 2.3 Occupations and skills

At any given moment, agents may work as wage earners ($W$), as microentrepreneurs in the traditional sector ($S$, for self-employed), or search from unemployment ($U$), which I refer to as *occupations* and index by $j$. Agents are heterogeneous in their occupation-specific skill. Ability $\theta = (\theta_W, \theta_S)$ is random and fluctuates across time according to the following process:

$$\log(\theta'_W) = \rho_W \log(\theta_W) + \epsilon_W, \quad \log(\theta'_S) = \rho_S \log(\theta_S) + \epsilon_S, \quad (\epsilon_W, \epsilon_S) \sim N(0, \Sigma).$$

Here, $\theta_W$ stands for the worker's endowment of efficiency units of labor, whereas $\theta_S$ is her entrepreneurial ability. Abilities may be arbitrarily correlated, and they may differ in their persistence $\rho_j$ and their volatility $\sigma_j$. Wage earners sell their endowment of efficiency units of labor in a competitive market and receive $w\theta_W$. Microentrepreneurs receive the proceeds from the operation of their firms: $\pi(\theta_S, a)$. Unemployed agents receive an income of $b$, which for the purpose of this article should be interpreted as unemployment insurance. Wage earners may sell efficiency units of labor to both traditional sector firms and to the modern

sector. Because they receive the same competitive wage, they are indifferent between the two.[12]

Bi-dimensional skill introduces a distinction between absolute ability ($\theta_j$) and comparative advantage ($\frac{\theta_j}{\theta_k}$), which can generate heterogeneous occupational choices at all points across the income distribution (Allub and Erosa, 2019). In particular, it can explain why there are many unproductive microestablishments with owners that are not looking to transition into wage employment and are not classified as necessity self-employed.

## 2.4 Labor markets and occupational choice

At the beginning of each period, an agent chooses between the occupations that are available to her. Unemployment and microentrepreneurship in the traditional sector are always available, but access to wage employment is frictional. More precisely, I assume that there is a competitive market for efficiency units of labor, and that workers lose or gain access to this market stochastically. Access (or lack thereof) to the spot labor market is denoted by an individual labor market state variable $\mathfrak{z} \in \{o, n\}$. When an agent has access to the spot market ($\mathfrak{z} = o$ for 'job offer'), her occupational choice set consists of all three occupations, $\mathcal{J}(\mathfrak{z}) = \{W, S, U\}$. Workers without access to the spot market, $\mathfrak{z} = n$ ('no offer'), may only choose between $S$ and $U$. Job offers are only valid for one period and cannot be postponed, which implies that workers choosing $S$ or $U$ must search in order to regain access to $W$ in the subsequent period.

The evolution of labor market state $\mathfrak{z}$ depends on workers' choices. Workers with $\mathfrak{z} = o$ that choose to work as wage earners receive a new job offer next period ($\mathfrak{z}' = o$) with probability $\xi^W$ and lose access to the spot market ($\mathfrak{z}' = n$) with probability $(1 - \xi^W)$ (the model's equivalent of the job destruction rate). For workers choosing $S$ or $U$, the probability of receiving a job offer in the coming period is an increasing function of the current search effort $e \in [0, 1]$. Search efficiency depends on their current occupation: the probability of receiving a job offer from unemployment (self-employment) when exerting effort $e$ is given by $\xi^U e$ ($\xi^S e$). I assume that $\xi^S < \xi^U$, which is consistent with the literature studying self-employment in developing countries (Narita, 2020; Herreño and Ocampo, 2023). Note that the described law of motion for $\mathfrak{z}$ implies that access to the spot labor market *tomorrow* does not depend on access *today* above and beyond the role that $\mathfrak{z}$ plays in determining occupational choice.

Finally, I allow for occupational switching costs: workers who transition from occupation $j_{-1}$ to $j$ must pay a monetary cost $\kappa(j_{-1}, j)$. Switching costs will only be relevant for

[12] The absence of a 'formality premium' is consistent with the findings of Pratap and Quintin (2006) and Ulyssea (2018).

counterfactuals studying the consequences of the enforcement of entry regulations on the traditional sector.[13] In such case, $\kappa(j_{-1}, j)$ will only be positive when $j_{-1} \neq S$ and $j = S$.

## 2.5 Value functions

At the beginning of each period workers observe the realization of their skills $\theta$ and labor market state $\mathfrak{s}$, choose one of the available occupations $\mathcal{J}(\mathfrak{s})$ and then make consumption, savings and search decisions. We may write the agent's value function as follows:

$$V(\theta, a, \mathfrak{s}, j_{-1}, \varepsilon) = \max_{j \in \mathcal{J}(\mathfrak{s})} \left\{ v^j(\theta, a - \kappa(j_{-1}, j)) + \varepsilon^j \right\}$$

Here, $v^j(\theta, a)$ represents the *occupation-specific* value function associated with occupation $j$. The presence of switching costs $\kappa(j_{-1}, j)$ implies that we must keep track of the agent's previous occupation, $j_{-1}$, as a state variable. Shocks $\varepsilon = (\varepsilon^W, \varepsilon^S, \varepsilon^U)$ are distributed iid Gumbel($\beta_\varepsilon$); their purpose is to smooth possible kinks in the value functions resulting from the presence of discrete choices (Iskhakov et al., 2017). All value functions depend on $\beta$ which varies across workers; this dependence is omitted for clarity.

Occupation value functions are given by:

$$\begin{aligned} v^W(\theta, a) = \max_{a' \geq 0} \{ & \log(w\theta_W + (1+r)a - a') + \\ & \beta(1-p)\mathbb{E}_{\theta,\varepsilon} \left[ \xi^W V(\theta', a', o, W, \varepsilon') + (1 - \xi^W) V(\theta', a', n, W, \varepsilon') \right] \}, \end{aligned}$$

for wage earners ($W$), and

$$\begin{aligned} v^S(\theta, a) = \max_{e \in [0,1],\ a' \geq 0} \Bigg\{ & \log(\pi(\theta_S, a) + (1+r)a - a') - \chi \frac{e^{1+\phi}}{(1+\phi)} + \\ & \beta(1-p)\mathbb{E}_{\theta,\varepsilon} \left[ \xi^S e V(\theta', a', o, S, \varepsilon') + (1 - \xi^S e) V(\theta', a', n, S, \varepsilon') \right] \Bigg\}, \\ v^U(\theta, a) = \max_{e \in [0,1],\ a' \geq 0} \Bigg\{ & \log(b + (1+r)a - a') - \chi \frac{e^{1+\phi}}{(1+\phi)} + \\ & \beta(1-p)\mathbb{E}_{\theta,\varepsilon} \left[ \xi^U e V(\theta', a', o, U, \varepsilon') + (1 - \xi^U e) V(\theta', a', n, U, \varepsilon') \right] \Bigg\}, \end{aligned}$$

for microentrepreneurs ($S$) and the unemployed ($U$). Because wage earners don't need to search, they always set $e = 0$, so search costs are omitted for brevity. Search effort impacts the probability of receiving a job offer on the next period, as embodied by the $\xi^j$ parameters.

[13] McKenzie and Woodruff (2006) study early waves of ENAMIN and find no evidence of non-convexities in microentrepreneurs' production functions, consistent with the abscence of entry costs.

As discussed above, workers' earnings depend on their occupation, skills, and in the case of microentrepreneurs, their wealth, due to the presence of collateral constraints. I assume limited access to financial markets, implying that wealth must be non-negative.

Agents have three margins of adjustment they may use in response to adverse shocks: precautionary savings, search effort and occupational choice. Consistent with the classification used in the previous section, I refer to necessity microentrepreneurs as individuals who start firms when wage employment is not available and self-employment is preferred over unemployment. Conversely, non-necessity microentrepreneurs are those who choose self-employment because it offers higher expected utility than wage work. Formally, an individual becomes a necessity microentrepreneur if, at the moment of entry into self-employment, $\left(v^W + \varepsilon^W\right) > \left(v^S + \varepsilon^S\right)$.This characterization implies that $\imath = n$ is necessary to be classified as necessity self-employed, as otherwise individuals would choose $W$.

Agents separated from their jobs will become necessity microentrepreneurs when the higher search efficiency while unemployed, captured by $\left(\xi^U - \xi^S\right)$, is not enough to compensate the income loss due to forgone self-employment earnings, $(\pi(\theta_S, a) - b)$. This is particularly true for poor individuals in settings with low unemployment income, as they cannot effectively smooth consumption. This pushes poor workers separated from wage work into self-employment out of subsistence concerns even if they are relatively unproductive as entrepreneurs (Herreño and Ocampo, 2023), which means that microentrepreneurship effectively functions as a channel of insurance.

Proposition B.1 in Appendix B shows that search effort, when interior, is increasing in search efficiency and in the expected difference between having or not having an offer next period, $\mathbb{E}_{\theta,\varepsilon}\left[V(\theta', a', o, j_{-1}, \varepsilon') - V(\theta', a', n, j_{-1}, \varepsilon')\right]$. Because $\xi^S < \xi^U$ workers search less intensely in $S$ relative to $U$, which implies that entry into entrepreneurship to avoid unemployment delays their reemployment in the salaried sector. This raises the concern that the use of self-employment to self-insure may reduce aggregate efficiency if workers with a comparative advantage in $W$ are spending too long in a relatively unproductive occupation. Theorem B.1 also highlights that the model features the classical issue of moral hazard common in the literature of optimal unemployment insurance (Chetty, 2008), as the provision of unemployment benefits will reduce search effort.

## 2.6 Government

The government simply collects revenue through the payroll tax $\tau$ and transfers it back to the population in the form of unemployment benefits $b$. The government must balance its

budget period-by-period, so its budget constraint is given by:

$$b \int d\mu^U(\theta, a, \beta) + g = \tau w N_M + \overline{\tau} w N_T + p \int a d\mu(\theta, a, \beta).$$

The last term in the right hand side of the equation corresponds to the revenue from accidental bequests.

### 2.7 Equilibrium

For a given government policy $(\tau, b)$, a (stationary) competitive equilibrium in this environment consists of input prices $(w, r)$, global and occupation-specific value functions $(V, v^W, v^S, v^U)$, policy functions specifying savings and search effort $(g_a^j, g_e^j)$ for $j \in \{W, S, U\}$ and stationary measures, consistent with said policy and value functions, for the distribution of workers across each occupation $(\mu^W, \mu^S, \mu^U)$ such that:

1. Given input prices $(w, r)$, the modern sector firm maximizes her profits.
2. Given input prices $(w, r)$, policy functions $(g_a^j, g_e^j)_{j \in \{W,S,U\}}$ constitute a solution for the functional equations defining the agent's problem.
3. Input markets clear:

$$N_M + N_T = \int \theta_W d\mu^W(\theta, a, \beta),$$
$$K_M + K_T = \int a d\mu(\theta, a, \beta),$$

   for $\mu = \mu^W + \mu^S + \mu^U$. By Walras Law, if input markets clear then the output market must also clear.
4. The government budget is balanced.
5. Measures $(\mu^W, \mu^S, \mu^U)$ comply with

$$1 = \int d\mu^W(\theta, a, \beta) + \int d\mu^S(\theta, a, \beta) + \int d\mu^U(\theta, a, \beta).$$

## 3 Calibration

I calibrate the model so that it matches salient aggregate features of the Mexican economy, and validate it by showing that it replicates important features of Mexican microestablishments and necessity microentrepreneurs. Consistent with the empirical section, I consider

the traditional sector to be comprised of firms hiring less than 10 employees and derive its characteristics from ENAMIN. The calibration follows a multi-pronged approach. A first subset of parameters values are directly estimated from the data or set to standard values. The remaining parameters are chosen so that the model matches targeted moments. A model period corresponds to one quarter, and I use notation $w + s + u = 1$ for occupational population shares.

I discretize the bi-dimensional skill process following Farmer and Toda (2017), which implies that I only need to specify 5 parameters: the persistence of each skill ($\rho_W$, $\rho_S$), and the variance-covariance matrix of innovations $\epsilon$, fully characterized by their standard deviation and correlation ($\sigma_W$, $\sigma_S$ and $\rho_{WS}$). Details on the numerical solution of the agent's problem can be found in Appendix B.

### 3.0.1 Externally calibrated parameters

Table 5 summarizes the choices with respect to the externally calibrated parameters. I set $\alpha = 0.35$, and the value of depreciation $\delta_k$ to match a yearly depreciation rate of 6%. To set a value for the collateral constraint $\lambda$, I compute the average debt-to-capital ratio from the data. More precisely, the last three waves of ENAMIN inquire about whether owners ever took a loan, and in case the answer is affirmative, they contain information on the date of issuance of the loan, date of expiration, and monthly debt payments for the last loan taken. I set leverage to zero for business owners that declare never requesting a loan (the vast majority), and for those whose last requested loan had already expired at the moment of the interview. For business owners with active loans, I compute outstanding debt as the monthly debt payment times the months to expiration of the loan, and use this number to compute the debt-to-capital ratios. I set $\lambda = 1.1$ equivalent to the average debt-to-capital ratio obtained after trimming the smallest (largest) 1% of debt-to-capital ratios in the sample.

A consequence of the functional forms assumed for the search disutility and job offer arrival probabilities is that only two out of three of parameters $\xi^S$, $\xi^U$ and $\chi$ are identified. Indeed, the first order condition with respect to search effort implies that search effort in occupation $j$ is determined by the ratio $(\xi^j/\chi)$, which in turn suggests that multiple combinations of the parameters may lead to the same levels of search effort. For this reason, and to simplify, I set externally search efficiency for the unemployed $\xi^U = 0.8$, equal to the value calibrated by Herreño and Ocampo (2023) for Mexico and close to the job finding rate used by Hubmer (2018) for the US. I set $\xi^W = 0.96$, which implies a job destruction rate of 4%, close to the rates estimated by Bobba et al. (2022) using the Mexican labor force survey. Consistent with the absence of unemployment insurance and switching costs, I set

$\tau = 0$, $b = w \times 10^{-5}$, and $\kappa(j_{-1}, j) = 0$ for all $j_{-1}, j$.

| **Parameter** | | **Value** |
|---|---|---|
| $p$ | Probability of death | $(4 \times 100)^{-1}$ |
| $\alpha$ | Capital share | 0.35 |
| $\delta_k$ | Depreciation rate (annual) | 0.06 |
| $\lambda$ | Collateral constraint | 1.1 |
| $(1 - \xi^W)$ | Job destruction rate | 0.04 |
| $\xi^U$ | Offer arrival rate from $U$ | 0.8 |
| $b$ | Unemployment income | $w \times 10^{-5}$ |
| $\tau$ | Payroll tax | 0.0 |
| $\beta_\varepsilon$ | Shift parameter, taste shocks | $5 \times 10^{-3}$ |

Table 5. Externally Calibrated Parameters

### 3.0.2 Internally calibrated parameters

The internal calibration consists of choosing the values of 12 parameters to minimize the distance between 12 model-implied moments and their data counterparts. Although each individual moment is jointly determined by all 12 parameters, when describing the calibration it is useful to relate each moment to the parameters that are most relevant to it. Technological parameters $A_M$ and $\eta$ determine the relative size of the modern sector and the share of the population that chooses self-employment. In the model, relative sector size is determined by relative input demands, where labor demand is measured in efficiency units of labor. Matching the relative labor demand of the modern sector is particularly important for policy experiments modelling the introduction of unemployment insurance, as it determines the government's revenue from payroll taxation. Consequently, I use $A_M$ to target the share of employment, *net of owners*, in establishments with no more than 10 employees, which is 27% (Levy, 2018).[14] In turn, $\eta$ targets the self-employment share ($s$), which is 24.5%. Second, parameters determining the evolution of skills, $(\sigma_W, \rho_W, \sigma_S, \rho_S, \rho_{WS})$, are chosen

[14] According to Levy (2018), the traditional sector hires 45% of the workforce, which in the model represents $0.45(1-u)$ of the population. This number includes small business owners, so the proportion of *wage earners* in the traditional (modern) sector is determined by the following equations:

$$w_M + w_T = w, \quad 0.45(1-u) - s = w_T.$$

Replacing $u = 0.045$ and $s = 0.245$ leads to $w_M = 0.51$, $w_T = 0.19$ and $w_T/(w_M + w_T) = 0.27$.

to match the cross-sectional dispersion and the (quarterly) autocorrelation of log-earnings within occupations, and the log-earnings ratio between the self-employed and wage earners, which I compute from the ENOE after controlling for education, age and gender effects.

The search disutility parameters $\chi$ and $\phi$ determine the average cost of search effort and the convexity of search effort disutility, and thus are relevant for the unemployment rate and for flows across occupations. The arrival rate of job offers for microentrepreneurs, $\xi^S$, determines the substitutability between searching from $U$ and $S$. These parameters are chosen to jointly match an unemployment rate of 4.5%, and the $(U \to W)$ and $(S \to W)$ quarterly transition rates of 59% and 21% respectively.

For preference heterogeneity I follow Carroll et al. (2017) and assume that discount factors $\beta$ are drawn from a set $B$ consisting of a discretized uniform distribution $U[\bar{\beta}-\epsilon, \bar{\beta}+\epsilon]$; $\beta$ can take 3 possible values. In the calibration, I choose $\bar{\beta}$ to target a capital-output ratio of 2.18, which I compute following Greenwood et al. (2013). I choose $\epsilon$ to target a level of dispersion of consumption of 0.52 . I derive this target from the 2014 wave of the *Encuesta Nacional de Gastos e Ingresos de los Hogares* (ENIGH), and it is the dispersion of (log) total consumption expenditures after controlling for household demographics and location as in Attanasio et al. (1999).

Finally, I set government expenditure $g$ equal to the revenue from accidental bequests. The value of $g$ does not matter for the calibration, but it might matter when evaluating counterfactuals that alter the wealth distribution, and thus the government's earnings through accidental bequests. I keep $g$ fixed when performing policy counterfactuals.

### 3.0.3 Results and validation

Table 6 and Table 7 present the parameter values and the model fit resulting from the calibration exercise. The calibrated model provides a good fit to the data; some of the resulting parameters merit some discussion. First, the decreasing returns parameter $\eta$ equals 0.6, in line with the literature on firm dynamics in developing countries (Arellano et al., 2012). Second, the calibrated value for search efficiency from self-employment $\xi^S$ is 15% smaller than search efficiency from unemployment, $\xi^U$, in line with the estimates of Bobba et al. (2021) and Herreño and Ocampo (2023). Martinez et al. (2018) provide experimental evidence showing that grants for microentrepreneurs make them less likely to transition into wage employment, while Jackson (2022), who shows that engaging in gig work delays reemployment. The values of $\chi$ and $\phi$ are relatively large, which imply that the disutility of search is low for low effort levels but substantial when effort is high. Figure 2c shows that search effort is interior, decreasing in wealth and higher in the occupation with higher search

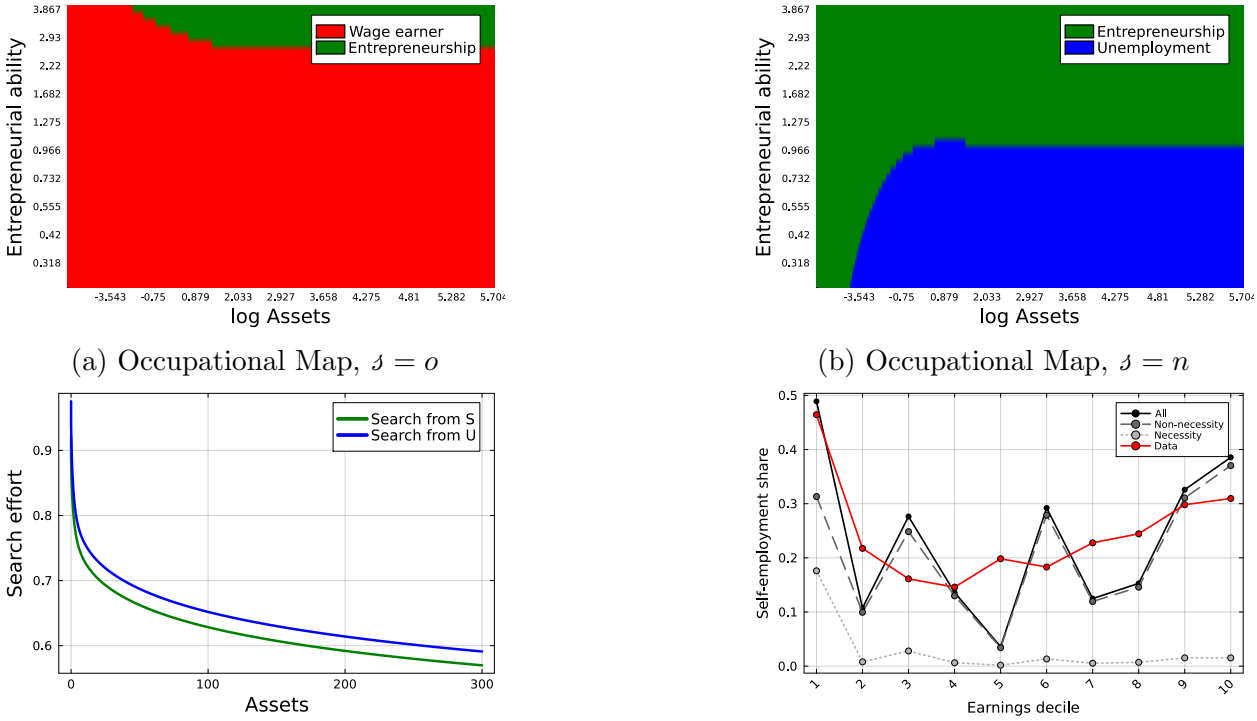
efficiency, consistent with the characterization in Theorem B.1.

| Parameter | | Value |
|---|---|---|
| $A_M$ | Modern sector productivity | 0.94 |
| $\eta$ | Decreasing returns | 0.60 |
| $\sigma_w^2$ | Variance of skill innovations, $W$ | 0.22 |
| $\rho_w$ | Autocorrelation of skill innovations, $W$ | 0.61 |
| $\sigma_s^2$ | Variance of skill innovations, $S$ | 0.31 |
| $\rho_S$ | Autocorrelation of skill innovations, $S$ | 0.76 |
| $\rho_{SW}$ | Correlation of skill innovations | $-0.62$ |
| $\xi^S$ | Job offer arrival rate, $S$ | 0.68 |
| $\chi$ | Search cost, intercept | 19 |
| $\phi$ | Search cost, convexity | 11 |
| $\overline{\beta}$ | Discount factor midpoint | 0.96 |
| $\epsilon$ | Discount factor dispersion | 0.04 |
| $g$ | Government expenditure | 0.048 |

Note: Government expenditure equals revenue from accidental bequests.

Table 6. Internally Calibrated Parameters

Besides providing a good match along the targeted dimensions, the model is remarkably consistent with several of the stylized facts documented in section 1 that were not targeted in the calibration. The calibration implies that 12% of microentrepreneurs can be classified as necessity self-employed, close to the 14.5% we observe in the data (see Table 8). Moreover, and as documented in the empirical section, these microentrepreneurs operate smaller, less profitable firms: their average capital stocks and profits are 53% and 46% that of non-necessity microentrepreneurs, whereas their empirical counterparts are 55% and 59% respectively. Occupational maps depicted in Figure 2, which closely resemble those in Herreño and Ocampo (2023), are key to understanding how the model generates these features. They illustrate occupational choices for an agent with a fixed wage employment productivity ($\theta_W$) for different values of states $(\theta_S, a, \mathfrak{z})$. When $\mathfrak{z} = o$ only productive and wealthy enough agents willingly select into traditional sector entrepreneurship; Figure 2a shows that the ability threshold necessary for agents to start firms is *decreasing* in wealth as a consequence of the collateral constraint. In turn, when $\mathfrak{z} = n$, even relatively unpro-




(a) Occupational Map, $\mathfrak{z} = o$

(b) Occupational Map, $\mathfrak{z} = n$

(c) Search effort, $\xi^S < \xi^U$

(d) Self-employment and earnings

Figure 2. Calibration results

ductive agents will turn into self-employment because it improves their capability to smooth consumption. Importantly, this behavior is a consequence of risk aversion: the fact that agents decide to search from unemployment when wealthy implies that the present value of income is higher in $U$, but they choose $S$ when poor due to the large marginal utility of consumption. Figure 2b shows how the ability threshold to become an entrepreneur is now *increasing* in wealth for relatively poor agents. That is, the need to hedge unemployment risk drives unproductive and poor agents into microentrepreneurship, which in turn create smaller and less profitable firms.

This phenomenon can also be appreciated in Figure 2d, which depicts the share and composition of the self-employed across earnings deciles. The model replicates the U-shaped pattern of self-employment across the earnings distribution (Herreño and Ocampo, 2023). Necessity-driven self-employment is concentrated in the lower tail, reflecting their comparative disadvantage in microentrepreneurship. Yet, as documented in section 1, most low-productivity microentrepreneurs do not enter this occupation because of the lack of employment opportunities. Table 19 in Appendix B shows that the model also does a good job at replicating quarterly flows across occupations. Like in the data, most self-employment spells in the model are short-lived; the cumulative exit rate out of self-employment of recent

| Moment | Data | Model |
|---|---|---|
| $L_M/(L_M + L_T)$ | 0.73 | 0.72 |
| Share of entrepreneurs $s$ | 0.25 | 0.22 |
| Earnings ratio (entrepreneurs/workers) | 0.87 | 0.81 |
| Dispersion of log wages | 0.51 | 0.53 |
| Dispersion of log profits | 0.87 | 0.92 |
| Autocorrelation of log wages | 0.56 | 0.57 |
| Autocorrelation of log profits | 0.53 | 0.67 |
| Unemployment rate $u$ | 0.045 | 0.048 |
| $U \to W$ transition rate | 0.59 | 0.61 |
| $S \to W$ transition rate | 0.21 | 0.21 |
| Capital to GDP ratio | 2.2 | 1.9 |
| Standard deviation of consumption | 0.53 | 0.40 |

Table 7. Model fit, targeted moments

entrants is 63% after 3 quarters, close to its empirical counterpart at 68% (see Table 14).

Overall, the calibrated model captures not only the aggregate relevance of microenterprises in the Mexican economy, but also the dynamics of self-employment and the prominence of necessity microentrepreneurs. Importantly, it reproduces these patterns using a calibrated value for unemployment risk in line with those estimated in the literature. This makes the framework well-suited to exploring how self-employment as an income source of last resort shapes both aggregate outcomes and welfare.

# 4 Aggregate effects of development policy

I use the calibrated model to revisit two different policies popular in the developing country context. First, I study the enforcement of entry regulations among microestablishments. Second, I study the provision of unemployment insurance. Due to their impact on relative returns, both these policies impact the attractiveness of microentrepreneurship as a last resort income, and their aggregate and welfare consequences will be partially determined by the prevalence of necessity microentrepreneurship.

Before discussing the counterfactuals, I describe the welfare measures I use to compare between the differing stationary equilibria. When evaluating welfare changes across different

| | Data | Model |
|---|---|---|
| $K_M/(K_M + K_T)$ | 0.75 | 0.83 |
| Necessity microentrepreneurship | 0.15 | 0.12 |
| Relative capital stock | 0.55 | 0.52 |
| Relative profits | 0.59 | 0.46 |
| Exit rate after 3 quarters | 0.68 | 0.63 |

Relative profits and capital stocks correspond to the ratios of average profits and capital stocks computed from Table 13.

Table 8. Untargeted moments

individuals, or subsets of the population, I follow Krusell et al. (2010) and compute the consumption equivalent change $\varphi$ required to make each agent indifferent between staying in the benchmark economy with a modified consumption stream $(1+\varphi) \times c$ or moving to any given counterfactual environment. Consumption equivalent change $\varphi$ depends on the agent's individual state and is given by:

$$\varphi(\theta, a, \jmath; \beta) = \exp\left(\mathbb{E}_\varepsilon\left(\tilde{V}(\theta, a, \jmath, j_{-1}, \varepsilon; \beta) - V(\theta, a, \jmath, j_{-1}, \varepsilon; \beta)\right) \times (1 - (1-p)\beta)\right) - 1.$$

I compute the average value of $\varphi$ for each individual and average it across various subgroups, using the weights derived from the stationary distribution of the benchmark economy. For aggregate welfare changes I use the consumption equivalent change for an incoming cohort:

$$\varphi_0 = \exp\left(\left[\tilde{\mathbb{V}} - \mathbb{V}\right] \times \mathbb{E}_\beta\left[\frac{1}{(1-(1-p)\beta)}\right]^{-1}\right) - 1,$$

for $\mathbb{V} = \int \mathbb{E}_\varepsilon\left(V(\theta, a, \jmath, j_{-1}, \varepsilon; \beta)\right) d\mu_0(\theta, a, \beta)$, $\tilde{\mathbb{V}}$ analogously defined, and where $\mu_0$ is the distribution over the state space of a newborn cohort. Term $\varphi_0$ represents the consumption equivalent change that makes an agent indifferent between being born in the benchmark economy or being born in a counterfactual environment. To average the expected utility streams of agents that enter the economy at different points in the state space, weights are taken from initial distribution $\mu_0$ similar to Krueger et al. (2016).

## 4.1 Enforcement of entry regulations

The vast majority of microestablishments are not registered with tax authorities, avoid taxation, and do not pay social security contributions on behalf of their owners and workers (see section 1). As a result, a large body of work has examined the potential benefits of bringing these informal businesses into compliance, suggesting that stronger enforcement of taxes and regulations can yield sizable output and productivity gains through several channels. First, by discouraging informality, higher enforcement may lead to higher capital accumulation by reducing incentives to remain artificially small and improving access to credit (D'Erasmo and Moscoso Boedo, 2012; Leal Ordóñez, 2014). Because it encourages the exit of unproductive informal firms, enforcement reallocates resources to more productive and formal establishments (Ulyssea, 2018; Meghir et al., 2015; Dix-Carneiro et al., 2024; Erosa et al., 2023). In addition, shrinking the size of the informal sector reduces search externalities that make formal and productive jobs difficult to find (Meghir et al., 2015).

However, there is substantial evidence that the costs stemming from regulation and taxation are particularly high in developing countries (Djankov et al., 2002; Alaimo et al., 2017; Tamkoç and Ventura, 2024), which raises concerns that stricter enforcement may threaten the economic viability of many microenterprises despite potential efficiency gains elsewhere.[15] Moreover, existing studies abstract from the role played by small and informal microestablishments as an income of last resort, and hence do not account for the possibly negative repercussions of such policies on their owners' ability to smooth consumption.

This section uses the calibrated model to study the aggregate and welfare consequences of enforcement. I focus on the enforcement of entry regulations, as these policies can constrain the ability of displaced wage workers—particularly the poor—to resort to microentrepreneurship as an alternative source of income. I model the enforcement of entry regulations by assuming that individuals must now pay an entry cost $\kappa_e$ in order to become microentrepreneurs; in the model's notation, that implies $\kappa(j_{-1}, S) = \kappa_e$ for $j_{-1} \neq S$. I set the value of $\kappa_e$ to be *half* of the estimated value for Mexico in year 2024 (World Bank, 2024), which amounts to 9% of GDP per worker.[16]

While the model captures the key mechanisms linking enforcement and occupational choice, it abstracts from channels through which enforcement endogenously enhances efficiency that are emphasized in the quantitative literature. To account for this, I consider three different scenarios. The first scenario solely introduces entry cost $\kappa_e$. The second

[15] Consistent with this concern, Almeida and Carneiro (2012) and Ponczek and Ulyssea (2021) find that enforcement reduces self-employment and increases unemployment.

[16] This refers to the monetary costs associated with the fees and procedures required to start a new business, see Djankov et al. (2002) and World Bank (2024). The process takes approximately 45 days.

assumes that the enforcement of entry regulations is accompanied by improved access to financial markets (D'Erasmo and Moscoso Boedo, 2012), which I model as a relaxation of microentrepreneurs' collateral constraints. More precisely, I increase $\lambda$ from 1.1 to 1.4, the debt-to-asset ratio of large Mexican firms (Herreño and Ocampo, 2023). The third scenario assumes that enforcement generates an increase in modern sector TFP, which is an indirect way of modeling potential positive effects of enforcement on large firms, such as ameliorating search externalities. Meghir et al. (2015) study the increase of enforcement in a model with informal and formal firms of heterogeneous productivity and search frictions, and find that substantially increasing enforcement raises the log productivity of formal firms by 0.053. Thus, I multiply $A_M$ by 1.05 in this counterfactual.

| **Variable** | **Benchmark** | $(\kappa_e)$ | $(\kappa_e + \lambda)$ | $(\kappa_e + A_M)$ |
|---|---|---|---|---|
| *Aggregates (% change from benchmark)* | | | | |
| Wage earners, $w$ | 0.73 | 5.9% | 4.7% | 7.8% |
| Self-employed, $s$ | 0.22 | -24% | -20% | -30% |
| Unemployed, $u$ | 0.048 | 21% | 21% | 21% |
| Output | 3.8 | 0.54% | 1.2% | 6.2% |
| Output (Modern) | 2.3 | 7.8% | 3.4% | 22% |
| Output (Traditional) | 1.5 | -11% | -2.3% | -19% |
| Capital to GDP ratio | 1.9 | 5.1% | 2.9% | 8.7% |
| Std. Dev. of Consumption | 0.4 | 9.3% | 7.7% | 12% |
| *Welfare changes (%)* | | | | |
| Incoming cohort, $\varphi_0$ | – | -4.3 | -3.3 | 0.82 |
| Wage earners, $\varphi_W$ | – | -3.3 | -2.4 | 0.95 |
| Self-employed, $\varphi_S$ | – | -2.8 | -1.1 | -0.20 |
| Unemployed, $\varphi_U$ | – | -3.3 | -2.5 | 0.81 |

Note: The first column reports benchmark levels. Other columns report percent changes from the benchmark. Welfare changes are in consumption-equivalent units (percent).

Table 9. Introducing entry costs

The first panel of Table 9 compares aggregate outcomes between the benchmark model and three counterfactual scenarios, labeled $(\kappa_e)$, $(\kappa_e + \lambda)$ and $(\kappa_e + A_M)$, consistent with the underlying changes in the structural parameters. In the first scenario, the introduction of

regulatory entry costs reduces the attractiveness of microentrepreneurship and curtails its use as a last resort income, effectively eliminating necessity self-employment. This leads to a drop of 24% in self-employment, accompanied by a large (1 p.p.) increase in unemployment and an expansion of wage employment. These findings are in line with the literature arguing that the informal sector acts as an 'employment buffer' that ameliorates the negative employment consequences of frictions or adverse shocks (Dix-Carneiro and Kovak, 2019; Ponczek and Ulyssea, 2021; Dix-Carneiro et al., 2024). Ulyssea (2010) evaluates the enforcement of entry costs in a search and matching framework and also finds that this would create large increases in unemployment.

Agents strongly adjust their savings behavior in this environment, leading to a substantial increase in the capital-to-GDP ratio. This response is so pronounced that it more than offsets output losses from lower microentrepreneurship, and aggregate output rises by 0.54%. This outcome reflects a contraction of the traditional sector by 11% and a substantial expansion of the modern sector, which benefits from the larger supply of both capital and labor.

Changes in maroeconomic aggregates in the second and third counterfactuals follow the same broad pattern as in the first scenario. Intuitively, the contraction of self-employment is more pronounced—and the corresponding expansion of wage employment larger—in scenario $(\kappa_E + A_M)$, since the modern-sector expansion raises input prices, making microentrepreneurship relatively less attractive. The opposite holds in the scenario with laxer collateral constraints. The two scenarios also differ in how output shifts across sectors: column $(\kappa_e + \lambda)$ shows that improved access to finance does not fully offset the deterrent effect of entry costs, with traditional sector output falling by 2.3% while the modern sector expands by 3.4%. In contrast, scenario $(\kappa_E + A_M)$ features a 22% expansion of the modern sector alongside a 19% contraction of the traditional sector. In both cases, aggregate output rises relative to the benchmark, but the magnitude differs sharply: 1.2% in the second counterfactual versus more than 6% in the third.

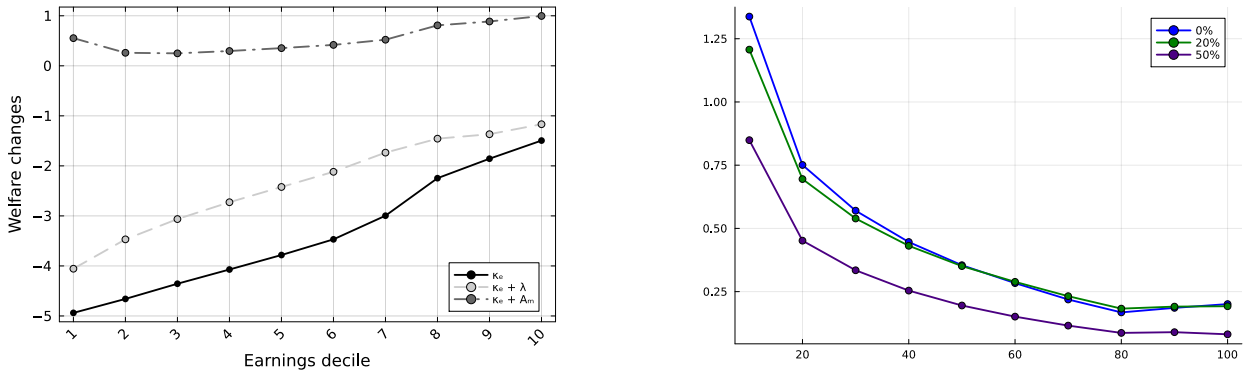
The second panel of Table 9 reports welfare consequences of moving from the benchmark economy to each counterfactual. It presents both the welfare change for incoming cohorts and the average consumption-equivalent change across occupations. In the first scenario, entry costs induce a steep welfare loss, from the perspective of an incoming cohort, of 4.3%. The counterfactual with improved access to credit also entails sizable, though smaller, losses of 3.3%. By contrast, the third scenario is the only one generating welfare gains under the benchmark calibration, at 0.82%. These gains, however, remain modest relative to the large output expansion produced in this counterfactual. Beyond their limited average welfare gains, the effects of these policies are unequally distributed across the population. Figure 3a displays the average consumption equivalent change for each wealth decile of moving from

the benchmark to each of the three counterfactuals. It shows regressive welfare effects, with lower-decile households faring considerably worse than those at the top.

Ulyssea (2018) also finds that enforcement may simultaneously boost output while decreasing welfare. Besides the enforcement of costly regulations, in his model reducing the size of the informal sector decreases the demand for low skilled labor, which informal firms demand more intensively. This decreases the welfare of low skilled workers, who receive lower wages despite higher output. In turn, in my framework enforcement reduces the profitability of microentrepreneurship, impacting agents' occupational returns as well as their ability to smooth consumption in the absence of unemployment insurance.

These results shed doubt on the idea that reducing the size of the informal sector through stricter enforcement is an unambiguously desirable policy. They also help understand why governments in developing countries often appear reluctant to shrink the informal economy through enforcement on the extensive margin. Ultimately, the welfare consequences of enforcement policies depend on a host of factors, among which are the potential efficiency gains from formalization, the expansion of the tax base, and the costs associated with their implementation across different agents. While this paper abstracts from several of these dimensions, it highlights that, given the high observed regulatory burdens in developing countries, it is not obvious that these policies are justified on welfare grounds even after accounting for output gains. Moreover, policies that threaten the economic viability of small and informal microestablishments can have significant distributional implications that should be accounted for when evaluating their effects.

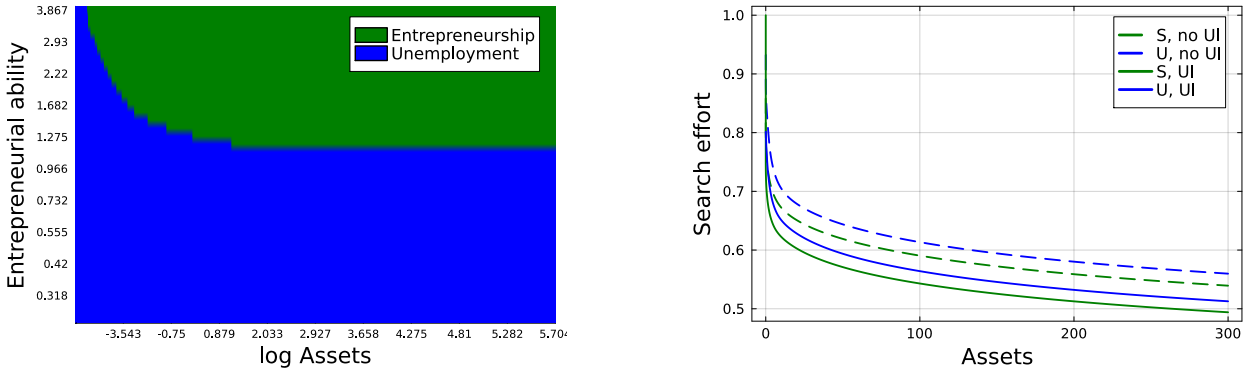
The introduction of regulatory entry costs changes the returns to microentrepreneurship to all prospective microentrepreneurs, not only those starting firms out of necessity, so the welfare changes in Table 9 cannot be solely attributed to the loss of self-employment as a source of insurance. To try to capture the importance of the former, subsection B.3 introduces a thought experiment comparing the outcomes of the benchmark model with those of an alternative environment without entry costs but where entry into microentrepreneurship is subject to the same search friction as wage employment, so individuals separated from wage employment must search from unemployment. In this environment there is no necessity microentrepreneurship as no one ever starts a business while preferring wage employment. Similar to the counterfactuals studied in this section, eliminating necessity microentrepreneurship leads to substantial welfare losses that are concentrated at the left tail of the wealth distribution.




(a) Entry costs (b) Unemployment insurance

Figure 3. Distributional effects of counterfactuals

*Note*: Figures plot the average consumption equivalent change for each wealth decile.




(a) Occupational Map, with UI (b) UI reduces search effort

Figure 4. Behavioral responses to unemployment insurance

*Note*: Panel (a) is the occupational map in the benchmark model. Panel (b) is the occupational map in the counterfactual with UI. Panel (c) shows search effort for agents in both $S$ and $U$ in the benchmark (dashed lines) and the counterfactual (full lines). All plots correspond to an agent with $\theta_W$ fixed at the 50th percentile.

## 4.2 Introducing unemployment insurance

Can the government improve welfare by providing alternative means of insurance? A major concern in the literature studying fiscal policy and social security in developing countries are the challenges imposed by limited state capacity. On the one hand, widespread informality implies that resources must be levied almost exclusively from the formal sector, which reduces its size and possibly aggregate productivity. On the other hand, the government's inability to efficiently verify individuals' wealth or employment status may allow workers to claim benefits while working informally, undermining the efficiency of its expenditures (Gerard and Gonzaga, 2021; Ndiaye et al., 2025). In addition, if self-employment acts as a *de facto* replacement for the social safety net, the welfare gains from providing additional

insurance through public unemployment benefits may be significantly reduced.

To evaluate this concerns, I study the introduction of unemployment insurance (UI) modeled as unconditional transfers to the unemployed financed with payroll taxes. That is, all unemployed agents, regardless of their previous occupation, qualify to receive UI benefit $b$. The choice of such a stylized unemployment insurance scheme is made for the following reasons. The first is tractability: a more realistic unemployment insurance covering only formal workers would require distinguishing between formal and informal wage earners and keeping track of previous occupations (or an alternative state variable such as wealth accumulated in an individual savings account, see Cirelli et al. (2021)). The second is an issue of coverage. Labor market informality is particularly prevalent among the poor and non-college educated (La Porta and Shleifer, 2014), and these workers are the most exposed to unemployment risk (Bosch and Maloney, 2008). In consequence, formal-only unemployment insurance would mechanically exclude the subset of the population that is the most likely to benefit from additional means of insurance. Consistent with this concern, Cirelli et al. (2021) study the introduction of the unemployment individual savings account (UISA) system in Mexico, and find that it does not improve the welfare of low-skilled individuals, who already struggle to find and keep formal employment.

I incorporate the challenges associated with limited state capacity by assuming that the government is limited in both its ability to raise tax revenue and its capacity to target resources. More precisely, I assume that the government cannot tax the traditional sector ($\bar{\tau} = 0$); as discussed previously, this assumption is empirically accurate (see Table 13). This implies that taxes reduce the size of the modern sector, which impacts relative prices and occupations' relative returns. To incorporate imperfect targeting, I assume that both wage earners and the self-employed can, at no cost, submit fraudulent unemployment claims which succeed at rate $\gamma$. Allowing wage earners to submit false claims is quantitatively important, as around 40% of them are employed informally (Bobba et al., 2022). For simplicity I assume that fraudulent UI claims translate into a deterministic income of $\gamma b$ each period. Because there is no readily available estimate of the prevalence of fraudulent claims in the context of developing countries, I choose the value of $\gamma$ such that the government spends a predefined proportion of its revenue on fraudulent unemployment claims.

Table 10 displays the results of introducing an unemployment insurance system financed by a 2% payroll tax on the modern sector. In the table, the different columns display the results for different values of $\gamma$, which vary the proportion of government revenue spent on fraudulent claims from 0% (perfect targeting), 20%, and 50%.[17] Under perfect targeting, the system achieves an average replacement rate of 15%, accompanied by a 2 percentage

[17] A payroll tax of 2% is close to optimal in the perfect targeting scenario.

point increase in the unemployment rate which is driven almost entirely by a decline in self-employment. This rise in unemployment reflects adjustments along two margins: occupational choice and search effort, both illustrated in Figure 4. In the absence of unemployment insurance, displaced workers—particularly those with low wealth—previously turned to self-employment as a fallback option. With UI in place, these agents instead choose to search from unemployment, leading to a 42% decline in necessity self-employment. Moreover, because unemployment becomes less costly, individuals in both $S$ and $U$ reduce their search effort. Together, these behavioral responses explain the observed increase in unemployment and the contraction of self-employment. Interestingly, the search efficiency gains from having more individuals search from unemployment are offset by the reduction in search effort induced by UI benefits, and wage employment barely changes.

The introduction of payroll taxes leads to a reduction in wages and a 0.5% contraction of modern sector output. The traditional sector shrinks because of the smaller share of microentrepreneurs, a result that is partially offset by the expansion of the remaining microentrepreneurs as a result of lower input prices. The combined effect of these forces amount to a decrease in traditional sector output of 0.66%. Overall, output drops 0.55% in response to the policy. Despite the smaller output, the provision of unemployment insurance is welfare improving and progressive. The second panel of Table 10 shows that the policy increases the expected welfare of an incoming cohort by 0.27%, with the gains concentrated among the unemployed and the self-employed. Figure 3b additionally shows that the provision of unemployment insurance is strongly progressive: the welfare gains for households in the poorest wealth decile are around five times those of households in the richest decile.

Columns 3 and 4 of Table 10 present the results of the UI counterfactuals with imperfect targeting. Naturally, with imperfect targeting the policy achieves lower average replacement rates: 13% in the case in which 20% of expenditures go to fraudulent UI claims, and 8% when this number increases to 50%. However, the rest of the quantitative results remain robust to the inclusion of imperfect targeting. Changes in labor market aggregates and output are close to the changes displayed by the perfect targeting case. In the scenario with a high level of inefficiency in government spending, the welfare gains from unemployment insurance drop by around a third, but the policy still disproportionately benefits poor individuals (see Figure 3b).

Naturally, the changes in labor market aggregates reported in Table 10 differ from those in the literature studying the introduction of contributory, formal-only UI systems in Mexico, which has found that UI would generate small, or even negative, changes in unemployment (Bosch and Maloney, 2008; Cirelli et al., 2021). My results are closer to Herreno and Ocampo (2020), who in an earlier version of their paper study a similar non-

| **Variable** | **Benchmark** | **UI (0%)** | **UI (20%)** | **UI (50%)** |
|---|---|---|---|---|
| | | *Aggregates (%)* | | |
| Average replacement rate | - | 15 | 13 | 8 |
| Fraudulent claim income (% of $b$) | - | 0 | 2 | 7 |
| | | *Aggregates (% change from benchmark)* | | |
| Wage earners, $w$ | 0.73 | -0.16% | -0.14% | -0.14% |
| Self-employed, $s$ | 0.22 | -8.5% | -7.8% | -7.8% |
| Unemployed, $u$ | 0.048 | 42% | 38% | 38% |
| Necessity self-employment | 0.12 | -42% | -37% | -37% |
| Output | 3.8 | -0.55% | -0.50% | -0.50% |
| Output (Traditional) | 1.5 | -0.66% | -0.34% | -0.34% |
| Output (Modern) | 2.3 | -0.48% | -0.60% | -0.60% |
| Capital to GDP ratio | 1.9 | -0.028% | -0.17% | -0.17% |
| | | *Welfare changes (%)* | | |
| Incoming cohort, $\varphi_0$ | – | 0.27 | 0.29 | 0.17 |
| Wage earners, $\varphi_W$ | – | 0.20 | 0.21 | 0.087 |
| Self-employed, $\varphi_S$ | – | 0.80 | 0.77 | 0.58 |
| Unemployed, $\varphi_U$ | – | 2.1 | 1.8 | 1.2 |

Note: The first column reports benchmark levels. Other columns report percent changes from the benchmark. Welfare changes are in consumption-equivalent units (percent).

Table 10. Introducing unemployment insurance

contributory UI system without limited state capacity constraints. Even though they consider comparable benefit and tax levels, they report substantially larger aggregate responses: roughly twice the unemployment increase and five times the output decline. These differences likely stem from contrasting job destruction rates: 4% in my model versus 20% in theirs, which leads to a much higher involuntary outflow from wage employment and thus, stronger occupational choice responses to unemployment benefits in their framework. This underscores the importance of matching the share of necessity microentrepreneurs when evaluating UI policies, as it disciplines the mass of workers on the margin of switching occupations in response to unemployment benefits.

The positive welfare effects of UI that persist despite challenges associated with limited

state capacity and moral hazard are consistent with the findings of the literature that expands the Chetty (2008) framework to account for informality (Gerard and Gonzaga, 2021; Liepmann and Pignatti, 2024; Ndiaye et al., 2025). Ndiaye et al. (2025) study the introduction of a very similar unemployment insurance system with tax evasion and fraudulent claims in Senegal, finding large liquidity gains accompanied by small moral hazard effects from both quits from formal to informal jobs and fraudulent unemployment claims. I obtain similar results in a dynamic general equilibrium framework where workers can avoid unemployment by becoming microentrepreneurs, and where the wealth distribution, input prices, as well as the relative size of each sector adjust in response to UI. Overall, the results are supportive of the view that developing countries can significantly improve welfare by pursuing more expansive employment protection.

# 5 Conclusion

This paper documents that a significant share of microentrepreneurs in developing countries start their businesses because they do not find wage employment. In Mexico, which has a large microenterprise sector and lacks unemployment insurance, necessity microentrepreneurs are more likely to come from unemployment, create smaller and less profitable businesses, and experience larger income gains when transitioning to wage work. These patterns suggest that self-employment serves as an informal insurance mechanism that helps individuals sustain income in the absence of salaried employment opportunities.

Building on this evidence, the paper develops a two-sector model of entrepreneurship that incorporates labor market frictions and bi-dimensional skill heterogeneity. A key feature of the model is that workers might opt into microentrepreneurship driven by either comparative advantage or to escape unemployment. The later is particularly important for the poor, and drives the creation of smaller and less productive firms.

Quantitative exercises illustrate that necessity self-employment has relevant public policy implications. First, enforcing costly regulations and taxes that threaten the economic viability of microenterprises reduces microentrepreneurship but hurts workers' ability to self-insure, which helps rationalize why governments in developing countries tolerate widespread informality among small firms. In turn, introducing a moderate, non-contributory UI system reduces necessity self-employment and increases unemployment, but is welfare-improving and strongly progressive despite the distortionary effects of payroll taxation, imperfect targeting, and the existing informal insurance role of self-employment.

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# A Empirical Appendix

## A.1 Construction of Table 1

I describe the sources used to compute necessity self-employment for each of the countries that appear in Table 1. Table 12 lists the sources and year for each country. For Brazil, I use the *Pesquisa de Economia Informal Urbana* (ECINF, 2003), which is nationally representative of firms with up to 5 employees. For Chile, I use the *Encuesta de Microemprendimiento* (EME, 2019), which is nationally representative of firms hiring up to 10 employees. Finally, for Colombia, the *Encuesta de Micronegocios* (EMICRON, 2022), representative of firms hiring up to 9 employees. All these surveys focus on establishments in the manufacturing or service industries. For the US, I take the number from Hurst and Pugsley (2011, Table 9, lack of other employment options). The number is computed from the *Panel Survey of Entrepreneurial Dynamics* (PSED), which surveys *nascent entrepreneurs* or individuals currently working on starting new businesses. Because the samples are not strictly comparable, comparisons must be done with care.

| | Reason | Proportion (%) |
|---|---|---|
| 01 | By family tradition | 8.30 |
| 02 | To supplement family income | 7.53 |
| 03 | To improve income | 27.80 |
| 04 | Could not find salaried work | 13.90 |
| 05 | Needed a flexible schedule | 0.90 |
| 06 | Job loss or reduction at previous employment | 1.93 |
| 07 | Found a good business opportunity | 9.37 |
| 08 | To practice their trade, career, or profession | 8.20 |
| 09 | Has knowledge or experience in the business or activity | 8.14 |
| 10 | Enjoys the activities of the business | 8.82 |
| 11 | Other reasons | 5.12 |

Source: ENAMIN 2010. The question asked respondents to choose the main reason for starting their business. Necessity microentrepreneurs are those who answered alternatives 04 or 06.

Table 11. Main Reason for Starting a Business, Mexico 2010

For the remaining developing countries I use the World Bank's *Microenterprise Surveys*. These surveys are representative of *formal*, non-agricultural firms with fewer than 5 em-

ployees. The exclusion of informal firms most likely leads to an underestimation of the preponderance of this phenomenon for this subset of countries. To compute necessity self-employment, I restrict the sample to sole proprietorships or partnerships in which the main owner does not have an additional salaried job.

All surveys contain a question inquiring about the *main* reason for business start up; see Table 11 for an example. Business owners were classified as necessity entrepreneurs if they report starting their firms for the following reasons (and their variants):

1. Could not find salaried employment.
2. Due to job loss, or reduction at previous employment.
3. Does not have any other income alternative.

The exact wording of the alternatives and the total number of alternatives vary with the survey, and in the case of Mexico, with the year. Numbers in the second column of Table 1 are the product of the share of necessity self-employment times the non-agricultural self-employment rate, retrieved from the ILOSTAT.

| Country | Year | Source |
|---|---|---|
| Armenia | 2019 | World Bank Microenterprise Survey |
| Brazil | 2003 | Pesquisa de Economia Informal Urbana (ECINF) |
| Central African R. | 2023 | World Bank Microenterprise Survey |
| Chile | 2019 | Encuesta de Microemprendimiento (EME) |
| Colombia | 2022 | Encuesta de Micronegocios (EMICRON) |
| Congo, D.R. | 2024 | World Bank Microenterprise Survey |
| Georgia | 2019 | World Bank Microenterprise Survey |
| India | 2022 | World Bank Microenterprise Survey |
| Iraq | 2022 | World Bank Microenterprise Survey |
| Mexico | 1992-2012 | Encuesta Nacional de Micronegocios (ENAMIN) |
| Mozambique | 2018 | World Bank Microenterprise Survey |
| United Kingdom | 1999–2001 | UK Quarterly Labour Force Survey (QLFS) |
| United States | 2006 | Panel Survey of Entrepreneurial Dynamics (PSED) |

Table 12. Sources for Table 1

## A.2 Additional figures and tables

### A.2.1 Summary statistics

| Variable | All | Non-necessity | Necessity |
|---|---|---|---|
| N | 69,654 | 60,248 | 9,406 |
| Women (%) | 32.21 | 34.47 | 17.71 |
| Age (years) | 42.00 | 41.80 | 43.29 |
| College (%) | 15.06 | 15.28 | 13.44 |
| Weekly Hours | 52.59 | 52.58 | 52.61 |
| Tenure (years) | 9.55 | 9.73 | 8.40 |
| Employer-paid (%) | 20.53 | 21.72 | 12.87 |
| Employer-unpaid (%) | 19.23 | 19.22 | 19.29 |
| Workforce Size | 1.73 | 1.76 | 1.51 |
| Average Profits | 1.62 | 1.71 | 1.00 |
| Median Profits | 0.72 | 0.72 | 0.61 |
| Average Capital | 15.80 | 16.83 | 9.34 |
| Median Capital | 3.02 | 3.30 | 1.52 |
| Registration (%) | 41.01 | 42.11 | 34.01 |
| Bookkeeping (%) | 47.34 | 49.11 | 36.03 |

The college variable uses information from the 2008, 2010 and 2012 ENAMIN waves only.
Nominal variables are expressed relative to the average wage.

Table 13. Summary statistics of Mexican microentrepreneurs

### Necessity microentrepreneurship across industries and in the earnings distribution

Figure 5 displays the correlation between industry-specific necessity self-employment shares and the average capital stocks of firms within that industry, a proxy for capital intensity. Necessity self-employment rates are strongly and negatively correlated with capital intensity, suggesting that necessity-drive microentrepreneurs operate in industries with lower capital requirements, consistent with the fact that they should not have resources to sustain job search for extended periods.

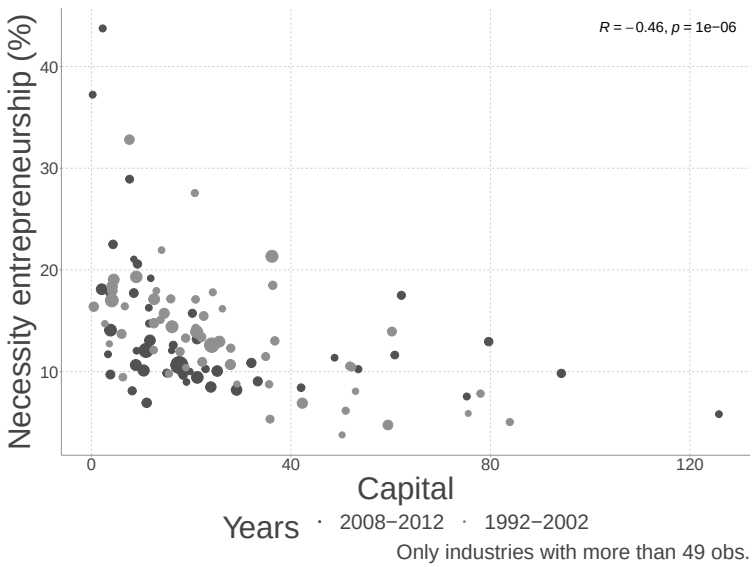


Figure 5. Necessity self-employment across industries

*Note*: The figure illustrates the correlation between necessity entrepreneurship rates and average capital stocks across industries in the ENAMIN survey. Capital stocks are defined as the self-reported value of machinery, tools, and inventories. The x-axis represents the average capital stock for each industry, measured relative to the national median wage, while the y-axis shows the necessity entrepreneurship rate within each industry. Dot sizes correspond to the number of firms in each industry. Different color schemes distinguish observations before and after the 2008 ENAMIN wave, which introduced updated industry coding.

The black line in Figure 6 displays the distribution of ENAMIN microentrepreneurs across the earnings distribution, computed from the labor force survey data. The red line recomputes the distribution, but excludes necessity microentrepreneurs. Consistent with the findings of Herreño and Ocampo (2023), microentrepreneurs' earnings follow a U-shaped pattern. The figure illustrates that, although necessity microentrepreneurs exhibit worse performance on average, some of them eventually operate relatively profitable businesses, as they are present across all earnings deciles. The figure also illustrates how the majority of low productivity microenterprises were not created as a way to avoid unemployment, as the red curve maintains the U-shaped pattern displayed by the aggregate data. This indicates that a significant proportion of unproductive self-employment is driven by reasons differing from the lack of acess to wage employment (Allub and Erosa, 2019; Hurst and Pugsley, 2011).

## Necessity self-employment and labor market dynamics

Table 14 illustrates that the majority of self-employment spells are short. It displays the labor market behavior of recent entrants into self-employment: workers that are not self-employed in the first quarter they appear in the labor force survey, but that transition into self-employment on the second quarter. To construct Table 14, I restrict the sample to workers that I observe for five consecutive quarters. Around 45% of entrants exit self-

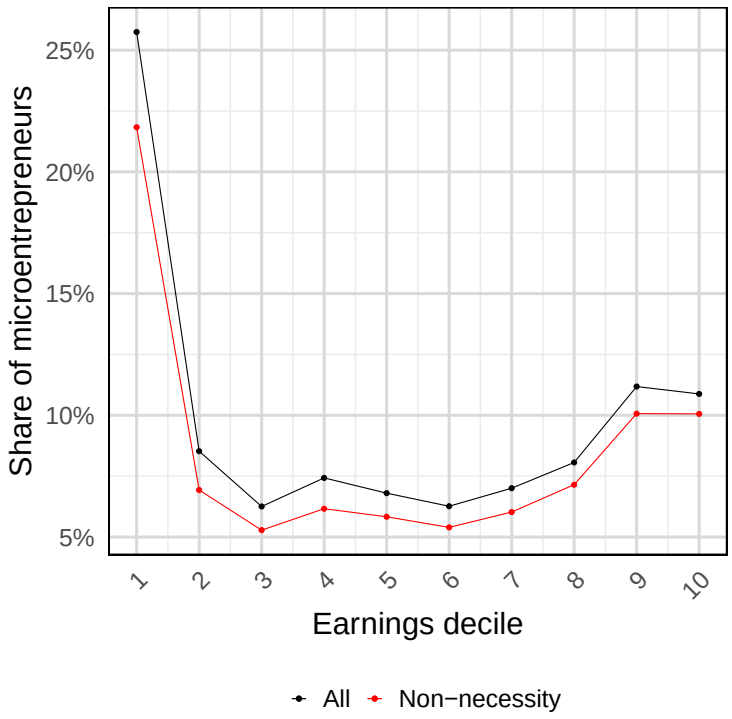


Figure 6. Earning densities of microentrepreneurs

*Note*: The black line presents the share of ENAMIN microentrepreneurs that reports earnings within the range of the earnings deciles in the labor force survey. The red line shows the equivalent number but excluding necessity microentrepreneurs.

employment after a quarter, with the exit rate progressively decreasing for quarters three and four. Overall, less than a third of self-employment spells last longer than a year.

These high exit rates are consistent with the large self-employment inflows and outflows exhibited by developing countries (Donovan et al., 2023).

In turn, Table 15 compliments Table 3 by showing that necessity microentrepreneurship is associated with a higher probability of transitioning into both unemployment and wage employment. It displays the estimates for $\beta_1$ of the following regressions:

$$\text{Status}_{i,t+1} = \alpha_c + \alpha_t + \beta_1 \text{Necessity}_i + X\beta_2 + \varepsilon_i,$$

where $\text{Status}_{i,t+1}$ refers to worker $i$'s employment status in the quarter following their appearance in ENAMIN. Note that the indicator variables are normalized by their means, so they don't add up to one. Being a necessity microentrepreneur is associated with over a 33% higher probability of exiting into unemployment, and a 14% higher probability of transitioning into wage employment. Consistently, Table 16 shows that necessity microentrepreneurs are disproportionately more likely to report that they intend to shut down their businesses in order to search for jobs. These results support the view that for necessity

| | *Quarterly Flows* | | | *Cumulative Exit Rate* |
|---|---|---|---|---|
| | Self-employed | Unemployed | Wage Earner | |
| *2nd quarter* | 55% | 11% | 34% | 45% |
| *3rd quarter* | 72% | 7.4% | 20% | 60% |
| *4th quarter* | 81% | 5.5% | 14% | 68% |

*Note*: The table displays the quarterly transition rates and the cumulative exit rate of entrants into entrepreneurship. Entrants are defined as individuals that were not in self-employment when they first appear in ENOE, but appear as self-employed in the second quarter. Author's computation for individuals observed for 5 consecutive quarters in ENOE, years 2008–2014.

Table 14. Labor market behavior of self-employment entrants

microentrepreneurs, self-employment is a way of transitioning salaried employment.

| | *LM status next quarter* | | | | |
|---|---|---|---|---|---|
| | Unemployed | Wage earner | Self-employed | Inactive | Unpaid worker |
| Necessity | $0.346^{**}$ | $0.142^{***}$ | $-0.021^{**}$ | $-0.007$ | $-0.173$ |
| | (0.149) | (0.052) | (0.009) | (0.039) | (0.106) |
| Demographic controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| Location fixed effects | ✓ | ✓ | ✓ | ✓ | ✓ |
| Time fixed effects | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 25,705 | 25,705 | 25,705 | 25,705 | 25,705 |

*Notes:* Demographic controls: age, gender, education. Standard errors in parentheses. Dummy variables are normalized by their means, so coefficients can be interpreted as percent changes.
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 15. Necessity self-employment and labor market dynamics

Table 17 illustrates that the correlations presented in Figure 1 are robust for controlling for city fixed effects. It displays the estimates for $\beta$ of the following regressions:

$$\text{Necessity}_{ct} = \alpha_c + \alpha_t + \beta \text{LM}_{ct} + \varepsilon_{ct},$$

where $\text{Necessity}_{ct}$ corresponds to the share of necessity microentrepreneurship of city $c$ in period $t$, $\alpha_c$ and $\alpha_t$ are city and time effects, and $\text{LM}_{ct}$ is a city specific labor market moment. Because I only have 8 waves of ENAMIN, this regression contains at most 8 observations for

| | Non-necessity | Necessity |
|---|---|---|
| Expand the business | 47% | 34% |
| Continue at the same level | 27% | 20% |
| Change activity but remain self-employed | 9.3% | 11% |
| Quit and look for a job | 9.1% | 25% |
| Don't know | 5.7% | 7.5% |
| Other | 2.8% | 1.8% |

Source: ECINF 2003.

Table 16. Future plans of Brazilian microentrepreneurs

each city.

Table 17. Necessity self-employment and labor market moments

| | *Dependent variable:* Necessity self-employment | | | | |
|---|---|---|---|---|---|
| | WU | UW | UU | WW | U |
| Coefficient | $0.243^{***}$ | $-0.188^{**}$ | $0.186^{***}$ | $-0.182^{**}$ | $0.266^{***}$ |
| | (0.078) | (0.073) | (0.070) | (0.081) | (0.077) |
| Observations | 223 | 223 | 222 | 223 | 269 |
| $R^2$ | 0.616 | 0.609 | 0.608 | 0.606 | 0.605 |

All regressions control for city and time fixed effects.
Results for moments related to self-employment are all statistically insignificant and are omitted for brevity. Note: $^{*}$p<0.1; $^{**}$p<0.05; $^{***}$p<0.01

All coefficients have the same sign as the values of the correlations in Figure 1, and the estimates are statistically significant at conventional levels. This illustrates that the systematic relationship between necessity microentrepreneurship and the different labor market moments discussed in the empirical section holds within cities and across time.

Finally, Table 18 repeats the exercise displayed in Table 4 but this time for individuals that transition from wage employment into microentrepreneurship. Mirroring the results in Table 4, those that declare being necessity microentrepreneurs display substantially larger income losses than comparable microentrepreneurs.

| | *Dependent variable:* | | | |
|---|---|---|---|---|
| | $\omega_{t+1}^S - \omega_t^W$ | | | |
| | (1) | (2) | (3) | (4) |
| $N$ | - 0.233*** | - 0.206*** | -0.203*** | -0.105*** |
| | (0.021) | (0.021) | (0.021) | (0.025) |
| Demographic controls | ✓ | ✓ | ✓ | ✓ |
| Time fixed effects | X | ✓ | ✓ | ✓ |
| Location fixed effects | X | X | ✓ | ✓ |
| Firm controls | X | X | X | ✓ |
| Observations | 20,679 | 20,679 | 20,605 | 15,477 |
| $R^2$ | 0.042 | 0.055 | 0.064 | 0.088 |

*Note:* *p<0.1; **p<0.05; ***p<0.01
Demographic controls: gender, age and education.
Firm controls: industry fixed effects, capital stock, workforce, tenure.

Table 18. Income changes from $W$ to $S$ transitions

# B Quantitative Appendix

## B.1 Optimal search effort

**Proposition B.1.** *Optimal search effort in occupation $j$, when interior, is increasing in $\xi^j$ and in the difference between the expected value of having and not having an offer next period, represented by $\mathbb{E}_{\theta,\varepsilon}\left[V(\theta', a', o, j, \varepsilon') - V(\theta', a', n, j, \varepsilon')\right]$.*

*Proof.* As in Iskhakov et al. (2017), the first order condition is still necessary (but not sufficient) for optimality. In consequence, the proof follows directly from inspecting the first order condition of the agent's problem with respect to $e$:

$$\chi e^{\phi} = \beta(1-p)\mathbb{E}_{\theta,\varepsilon}\xi^j \left[V(\theta', a', o, j, \varepsilon') - V(\theta', a', n, j, \varepsilon')\right].$$

□

## B.2 Additional validation: labor market flows

Table 19 shows that the model provides a good match to aggregate labor market dynamics. In particular, the model closely matches wage employment and unemployment outflows. Self-employment persistence is a bit higher in the data than in the model, whereas the model features a larger $S \to U$ flow.

| **Moment** | **Data** | **Model** |
|---|---|---|
| $W \to W$ | 0.91 | 0.90 |
| $W \to S$ | 0.06 | 0.08 |
| $W \to U$ | 0.02 | 0.025 |
| $S \to W^*$ | 0.21 | 0.21 |
| $S \to S$ | 0.78 | 0.72 |
| $S \to U$ | 0.02 | 0.073 |
| $U \to W^*$ | 0.59 | 0.61 |
| $U \to S$ | 0.13 | 0.10 |
| $U \to U$ | 0.27 | 0.29 |

* Targeted in calibration.

Table 19. Model fit, labor market flows

Although several transition rates are not directly targeted, they are partially determined in the calibration because two flows and two stocks (the share of microentrepreneurs $s$ and the unemployed $u$) were targeted.

## B.3 Thought experiment: eliminating necessity self-employment

I perform a thought experiment in which I compare the outcomes of the model with that of a counterfactual economy where self-employment cannot be used to avoid unemployment. More precisely, and in the counterfactual, entry into microentrepreneurship is only available to workers with job offers ($\mathfrak{z} = o$), so agents that get kicked out of wage employment ($\mathfrak{z} = n$) cannot immediately become microentrepreneurs and must search from unemployment. Because $W$ and $S$ are only available simultaneously, this effectively eliminates necessity self-employment, as no one ever picks $S$ while preferring $W$. This exercise consists of artificially restricting agents' choice sets, and as such it is better understood as an attempt to quantify the aggregate and welfare consequences of necessity microentrepreneurship rather than simulating a realistic policy counterfactual.

It is useful to introduce the new environment in the following manner. Imagine a world in which starting a firm now requires activating a license, and licensing opportunities arrive simultaneously with job offers. In the search-island analogy, the island where the spot labor market is located, and where licenses may be obtained, are one and the same. Just like before, agents with access to the spot market (represented by $\mathfrak{z} = o$) may choose between all three occupations. Licenses may not be 'activated' in the island, and thus, agents that choose to start firms must exit the island and lose their job offers. Licenses remain active until the microentrepreneurs shut down their firms by switching occupation, so microentrepreneurs with active licenses but no new offers may choose between $S$ and $U$, which is now represented by a new state value $\mathfrak{z} = \ell$ (for 'license'). That is, and consistent with the original model, microentrepreneurs are not subject to unemployment risk but must search to regain access to wage employment. In turn, wage earners separated from their jobs, as well as previously unemployed agents that did not get new job offers must search from unemployment, which is indicated by $\mathfrak{z} = n$ ('no offer'). The probability of receiving new job offers today from either $S$ or $U$ is still a function of last period's search effort.

We may rewrite the new global value function as follows:

$$
\begin{aligned}
V(\theta, a, o, \varepsilon) &= \max\left\{v^W(\theta, a) + \varepsilon^W, v^S(\theta, a) + \varepsilon^S, v^U(\theta, a) + \varepsilon^U\right\}, \\
V(\theta, a, \ell, \varepsilon) &= \max\left\{v^S(\theta, a) + \varepsilon^S, v^U(\theta, a) + \varepsilon^U\right\}, \\
V(\theta, a, n, \varepsilon) &= v^U(\theta, a) + \varepsilon^U,
\end{aligned}
$$

where we are abstracting from entry costs. The occupational value functions for $W$ and $U$ remain the same, and the new value function for $S$ is given by:

$$v^S(\theta, a) = \max_{e\in[0,1],\ a'\geq 0} \Big\{ \log(\pi(\theta_S, a) + (1+r)a - a') - \chi\frac{e^{1+\phi}}{(1+\phi)} + \\ \beta(1-p)\mathbb{E}_{\theta,\varepsilon}\left[\xi^S e V(\theta', a', o, \varepsilon') + (1-\xi^S e)V(\theta', a', \ell, \varepsilon')\right] \Big\}.$$

Table 20 contrasts aggregate outcomes between the two economies. The counterfactual economy features a 1.9 p.p. higher unemployment rate (39%), with most of the increase coming from self-employment. This drop in self-employment leads to a 3.3% lower traditional sector output. In turn, the modern sector expands by 1.4%, and the combined effect of these changes leads to a 0.46% lower aggregate output.

Eliminating necessity self-employment is associated with substantial welfare losses: the utilitarian welfare of an incoming cohort is 1.13% smaller in the counterfactual. To put this number in perspective, the welfare cost of moving from a 0% to a 4% separation rate in the benchmark economy is 5%. Without necessity self-employment this number increases to 6%, implying that free entry into microentrepreneurship reduces the welfare cost of unemployment risk by around 17%. Alternatively, the utilitarian welfare change $\varphi_0$ of transitioning from the benchmark to the counterfactual economy is equivalent to increasing the separation rate in the benchmark from 4% to 5%, or a 25% increase in unemployment risk. The losses are greater for the unemployed and wage earners, who experience an increase in the risk associated with their current occupation.

Importantly, these welfare losses are not entirely explained by the drop in output, but rather reflect a decrease in agents' ability to insure against risk. To illustrate this point, I increase modern sector productivity in the counterfactual economy by 0.5%, which totally offsets the losses in output caused by restricting entry into microentrepreneurship. This change is not enough to compensate for the welfare losses caused by the absence of self-employment as an insurance channel: moving from the benchmark economy to this alternative counterfactual decreases welfare by 0.68%.

| **Variable** | **Benchmark** | **Counterfactual** | Δ% |
|---|---|---|---|
| | *Aggregates* | | |
| Wage | 2.1 | 2.1 | -0.018% |
| Interest Rate | 0.018 | 0.018 | 0.064% |
| Wage earners, $w$ | 0.73 | 0.73 | -0.18% |
| Entrepreneurs, $s$ | 0.22 | 0.20 | -7.8% |
| Unemployed, $u$ | 0.048 | 0.067 | 39% |
| Output | 3.8 | 3.7 | -0.46% |
| Output (Modern) | 2.3 | 2.3 | 1.4% |
| Output (Traditional) | 1.5 | 1.4 | -3.3% |
| Capital to GDP ratio | 1.9 | 2.0 | 0.80% |
| TFP (Traditional) | 1.7 | 1.7 | -1.1% |
| | *Welfare Changes* | | |
| Incoming cohort, $\varphi_0$ | | -1.13 | |
| Wage earners, $\varphi_W$ | | -0.86 | |
| Self-employed, $\varphi_S$ | | -0.78 | |
| Unemployed, $\varphi_U$ | | -1.09 | |

Note: Welfare changes are from moving from the benchmark to the counterfactual.

Table 20. Necessity Self-employment and Outcomes