Self-employment as Self-insurance

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Abstract

This paper investigates the role of microentrepreneurship as a substitute for unemployment insurance in emerging economies. Using microenterprise surveys from Latin America, I document that a significant proportion of microentrepreneurs—ranging from 15% to 39%—start firms because they do not find jobs. These *necessity entrepreneurs* operate smaller, less profitable firms and experience higher income gains when transitioning to wage employment. I propose a two-sector model of entrepreneurship with labor market frictions, where workers can become self-employed to avoid unemployment. I calibrate the model for Mexico and show that self-insurance through self-employment decreases unemployment by 1.2 p.p. and reduces welfare losses due to unemployment risk by 22%. Consequently, enforcing costly taxes and regulations among informal microenterprises might harm workers' ability to self-insure. Despite the presence of this additional channel of insurance, introducing a non-contributory unemployment insurance system increases welfare and is strongly progressive.

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1 Introduction

The prevalence of small firms in economic activity is a hallmark of emerging economies. Market stalls, workshops, and small shops form the backbone of these economies, serving as the primary source of income for millions of households. They also matter for aggregates as microenterprises, or firms with no more than 10 workers, constitute the overwhelming majority of firms, employ large shares of the workforce, and concentrate a significant proportion of productive resources[1] (Gollin 2008; La Porta and Shleifer 2014). High levels of microentrepreneurship coexist with weak social safety nets and labor markets characterized by widespread informality and substantial worker flows between wage employment, self-employment, and unemployment.

A growing body of work suggests that the high prevalence of small businesses in developing countries stems, at least partly, from the absence of job displacement insurance programs. This means that unemployed individuals often cannot afford to search for jobs for extended periods (Gerard, Gonzaga, and Naritomi 2024). The possibility that many of these workers resort to microentrepreneurship to escape unemployment, a phenomenon denoted as *necessity* or *subsistence* entrepreneurship, has long been acknowledged by the literature (Banerjee and Duflo 2012; Lewis 1954; Schoar 2009). Although this hypothesis is backed by an increasing volume of empirical work (Breza, Kaur, and Shamdasani 2021; Dix-Carneiro and Kovak 2019; Donovan, Lu, and Schoellman 2023), its broader implications for labor market dynamics, aggregate productivity, and policy in emerging economies are not well understood.

This project argues that microentrepreneurship is an important substitute for the missing social safety net in developing countries, and that this has significant public policy implications. More precisely, I find that necessity entrepreneurship drives the creation of relatively small and unproductive firms while enabling better consumption smoothing. Preventing unemployed workers from starting small firms increases unemployment and generates large welfare losses, which warns against enforcing taxes and costly regulations in a way that threatens the economic viability of informal microenterprises. Moreover, introducing a non-contributory unemployment insurance system (UI) financed through distortionary payroll taxes on large firms reduces output and strongly increases unemployment, but is nevertheless welfare improving. I reach these conclusions in the context of a two-sector model of entrepreneurship with labor market frictions that endogenously generates necessity entrepreneurs, which I discipline using data from Mexican microentrepreneurs.

[1]For example, in Mexico microenterprises constitute more than 95% of firms, hire more than 45% of the workforce and operate around a quarter of the aggregate capital stock (Levy 2018). In turn, microenterprises in the US represent approximately 70% of firms and employ around 15% of the workforce.

I begin by providing empirical evidence on the quantitative importance of self-employment as a source of insurance. I define *necessity entrepreneurs* as those individuals who became self-employed because they could not find wage employment. Using microentrepreneurship surveys from Brazil, Chile, Colombia, and Mexico, I show that they represent between 15-39% of microentrepreneurs, or a striking 3.7-21% of the workforce.

Then I focus on Mexico, a country with better data availability, no unemployment insurance, and a large microenterprise sector. By combining data from microenterprise and labor force surveys, I document novel facts that are consistent with self-employment acting as a source of income of last resort. Necessity-driven entrepreneurship is more prevalent in cities with higher unemployment rates, as well as cities with larger flows from wage employment to unemployment and smaller transitions from unemployment back to wage employment. This suggests that self-employment is more frequently used as a fallback income alternative in locations where workers struggle to find and keep jobs. When looking into business characteristics, the picture that emerges is consistent with the need to self-insure pushing relatively unproductive individuals into microentrepreneurship. Indeed, necessity entrepreneurs create smaller, less profitable firms, and have shorter self-employment spells than comparable small business owners. Moreover, they experience larger income gains when transitioning into wage employment, which is indicative of their comparative advantage being in wage employment rather than entrepreneurship.

In order to evaluate the aggregate implications of self-insurance through self-employment, I propose a two-sector entrepreneurship model a la Quadrini (2000) expanded to incorporate bi-dimensional skill heterogeneity and labor market frictions. Production takes places in both a modern (large firm) and a traditional (small firms) sector. Agents in the economy can be wage earners, entrepreneurs in the traditional sector, or searching for employment. Workers may always start firms, but access to wage employment is subject to search frictions in the style of Ljungqvist and Sargent (2008). Both the unemployed and the self-employed may search, and the probability of receiving job offers depends on their search effort and occupation-specific search efficiency. Workers choose occupations based on their comparative advantage, and may insure against risk by accumulating precautionary savings as well as through their behavior in the labor market. A key feature of the model is that agents may become self-employed to avoid unemployment, which will drive relatively unproductive individuals to enter into microentrepreneurship (Herreño and Ocampo 2023).

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 for wage earners, the self-employed and the unemployed, as well as within-occupation income moments and consumption inequality. I validate the model

by showing that it generates a share of necessity entrepreneurs that is close to the data, and that it replicates facts about their relative input demands and performance.

To quantify the aggregate and welfare consequences of necessity entrepreneurship, I perform a thought experiment in which I compare the outcomes of the model to those of a counterfactual economy in which entry into microentrepreneurship is restricted to individuals with access to wage employment, so that workers separated from their jobs are forced into unemployment. In this counterfactual, no one chooses self-employment while preferring wage employment, which effectively eliminates necessity entrepreneurship. I find that the counterfactual economy features a 1.2 p.p. higher unemployment rate, and 1.41% lower utilitarian welfare. This welfare loss is large and equivalent to increasing unemployment risk in the calibrated model by approximately 40%. These results underscore the role of self-employment as a substitute for the missing unemployment insurance. They also provide a rationale for why governments in developing countries do not effectively enforce costly regulations and taxes among small and informal microestablishments, as doing so could curtail workers' ability to insure against unemployment risk. Consistent with this idea, both Almeida and Carneiro (2012) and Ponczek and Ulyssea (2021) find that stricter enforcement decreases self-employment while increasing non-employment in Brazilian cities.

I also find that self-insurance through self-employment drives labor market dynamics, as the counterfactual without necessity entrepreneurship features significantly smaller self-employment inflows and outflows. At the aggregate level, this results in a 17% smaller job finding rate and a 9% larger job exit rate, findings that complement recent empirical work attributing a key role to self-insurance through self-employment in driving cross-country differences in labor market dynamics (Donovan, Lu, and Schoellman 2023).

Finally, I explore how the presence of this additional insurance channel determines the consequences of introducing a non-contributory unemployment insurance (UI) system. In principle, the role of self-employment as an informal safety net may significantly reduce the welfare benefits from additional insurance, especially so when accounting for the challenges associated with raising revenue and targeting expenditures that result from limited state capacity. I assume that the government finances unemployment insurance through a payroll tax on the modern sector while microenterprises in the traditional sector, which are mostly informal, evade taxation. That is, limited state capacity results in the provision of public insurance coming at the cost of distorting the most productive sector in the economy.

When the government can target UI benefits precisely, a 2% payroll tax sustains an average replacement rate of 17%. This policy raises unemployment by 2.3 percentage points, while reducing self-employment by a similar margin. With less reliance on microentrepreneurship as a fallback income source, necessity entrepreneurship declines by around

30%. The modern sector shrinks under the new tax burden, and the traditional sector contracts due to fewer microentrepreneurs, resulting in a 0.5% output decline. Nonetheless, the utilitarian welfare of an incoming cohort rises by 0.23%, indicating that UI increases welfare despite reduced output and the introduction of sectoral distortions.

Related literature

The idea that workers resort to small scale, unproductive self-employment when wage employment is hard to find dates at least from Lewis (1954). Evidence in favour of this view comes from several strands of literature. Breza, Kaur, and Shamdasani (2021) provide experimental evidence of excess labour supply in Indian villages, with unemployed workers turning to self-employment. Donovan, Lu, and Schoellman (2023) study labor market dynamics in a broad sample of countries and find that self-employment flows are strongly decreasing with development. Because differences in wage job finding rates between the self-employed and the unemployed are smaller in developing countries than in developed ones, and because workers obtain similar wages regardless of their previous status in employment, they conclude that self-employment in emerging economies acts as a substitute for the missing unemployment insurance. Consistent with this view, Bosch and Maloney (2008) and Loayza and Rigolini (2011) study cyclical fluctuations and find that self-employment is strongly counter-cyclical. Finally, both Feng, Ying, Lagakos, and Rauch (2024) and Poschke (2019) use structural models to show that workers turning to self-employment in response to stringent labor market frictions may rationalize cross-country differences in labor market aggregates. I contribute to this literature by providing a novel empirical characterization of necessity entrepreneurs and by using a structural model to quantify the aggregate importance of this channel of insurance for workers in emerging economies.

This paper relates to the large body of work that uses structural models with limited enforcement to study the aggregate consequences of informality. A common finding in this literature is that increased enforcement of the informal economy can increase productivity by improving the allocation of labor across firms (Dix-Carneiro, Goldberg, et al. 2024; Meghir, Narita, and Robin 2015; Ulyssea 2018), reducing search externalities that make formal jobs hard to find (Meghir, Narita, and Robin 2015), and increasing capital accumulation due to better access to finance in the formal sector or reduced incentives for informal firms to remain small to avoid detection (D'Erasmo and Moscoso Boedo 2012; Leal Ordóñez 2014). Although my model abstracts from these channels, it explicitly connects the appearance of small and unproductive firms to workers' self-insuring behavior and shows that eliminating this insurance channel generates substantial welfare losses. Consequently, evaluating the

welfare effects of stricter enforcement should account for both potential productivity gains and the reduction in workers' ability to self-insure through microentrepreneurship, while considering how these impacts vary across the wealth distribution.

Finally, I contribute to a growing body of quantitative work studying social protection and unemployment insurance in developing countries. Bosch and Esteban-Pretel (2015) use a search and matching framework to study the introduction of contributory unemployment insurance in Mexico and find that it would increase formality and generate small increases in unemployment. Also for Mexico, Cirelli, Espino, and Sánchez (2021) study the introduction of an unemployment insurance savings account system and find that it would reduce unemployment but would not improve the welfare of low-skilled individuals, who struggle to find and maintain formal employment. My focus on occupational choice and non-contributory UI brings me closer to Herreño and Ocampo (2023), who add labor market frictions to the benchmark macro-development model and use it to study the aggregate effects of microfinance, UI, and directed transfers. Relative to their work, my model features aspects that are key at the moment of evaluating unemployment insurance: moral hazard due to search effort and limited revenue raising capacity due to informality. I show that introducing a moderate UI system would strongly increase unemployment while simultaneously increasing welfare, consistent with the large welfare gains from additional insurance found in the applied literature studying UI in emerging economies (Gerard and Gonzaga 2021; Liepmann and Pignatti 2024).

The remainder of the paper is structured as follows: Section 1 presents the data on Mexican microestablishments, my measure of necessity entrepreneurship and the main empirical findings. Section 2 introduces the model while Section 3 details the calibration procedure and its results. Section 4 presents the counterfactual analysis, where I first shut down necessity self-employment and then study the introduction of UI. Section 5 presents a brief conclusion.

2 Microentrepreneurship in Mexico

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. To the extent that the Economic Census excludes establishments without fixed premises, which tend to be predominantly

small, this is likely to be an underestimation[2]. For comparison, and in the US, establishments with 1-9 workers are 71% of the total, and hire less than 15% of the workforce. As in most developing countries, Mexican microenterprises are rarely registered with the tax authorities, seldom pay sales or income taxes, and they do not register nor contribute to mandatory social security programs on behalf of their employees (see Table 1). The prevalence of informality among small firms is mirrored by a large degree of labor market informality, measured as the proportion of the workforce that actively contributes to the social security registry (IMSS in Spanish). According to this measure, approximately 60% of the Mexican workforce is informal, and a sizeable share is concentrated in small firms, as informality is strongly and negatively correlated with firm size (Levy 2018)[3].

An important feature of the Mexican labor market is the absence of a robust social security system that assists workers in the event of adverse shocks. Mexico is the only OECD member without an official unemployment insurance scheme (OECD 2020), and expenditure in active labor market policies is small. Although in principle salaried workers terminated from their jobs are legally entitled to severance payments, Sadka, Seira, and Woodruff (2024) review how limited state capacity and prevalent informality result in the former being a rather ineffective job displacement insurance policy. Workers are usually paid in cash and lack written contracts, so they struggle to prove the real wage levels or even the existence of a working relationship when dismissed. Firms often take actions in order to avoid severance payments, such as requesting workers to sign undated letters of resignation, or threatening with non-compliance in order to negotiate substantially lower payments. Finally, the justice system is ineffective in ensuring the timely and complete payment of rightful claims. Sadka, Seira, and Woodruff find that, among *formal* workers that report being dismissed in the past 3 years, only 50% had received 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[4]. 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, Lu, and

[2]The Economic Census surveys non-agricultural establishments producing goods or services to be sold in the market, with fixed premises and in localities with at least 2500 inhabitants (Levy 2018).

[3]According to Levy (2018),45% of the workforce works in microenterprises. Using the microentrepreneur data I find that less than 10% of employers report paying social security contributions in behalf of their workers.

[4]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.

Schoellman 2023).

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[5]. It also inquiries about the formality status of each individual worker, by asking whether the worker has a written contract and if the owner pays in their behalf the mandatory contributions to the IMSS. One advantage of this survey is that it interviews business owners regardless of their registration or formality status; it also contains information on establishments without fixed premises, which the Economic Census ignores. This makes it more representative of small firms than related instruments that sample from municipality registries or similar administrative data sources. I focus on business owners aged between 25-65 years old, that report working at least 30 hours per week, and that 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 median wage. Observations in ENAMIN are sampled from Mexico's main labor force survey[6]. The survey is structured as a rotating panel that tracks individuals for up to 5 quarters, which allows me to follow business owners (but not their workers) over time. Each ENAMIN wave sample is drawn from a single quarter of the labor force survey (8 quarters in total). I take from the labor force survey information on demographics, labor market status, income, hours worked and industry for employed individuals.

Table 1 presents basic summary statistics of small business owners and their businesses from ENAMIN. 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

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

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

security contributions on behalf of their workers, which is consistent with the findings of Levy (2018) who shows that less than 8% of microestablishments are formal. The median capital stock corresponds to 3.61 times the national median wage, but the average is several times larger, consistent with a large share of aggregate capital being in the hands of small businesses (Levy 2018). Although many business owners earn above median incomes and accumulate sizeable capital stocks, there is also a significant mass of small and unprofitable microenterprises.

Variable	**All**	**Opportunity**	**Necessity**
N	35,368	31,053	4,315
Women (%)	40.43	42.52	25.40
Age (years)	43.31	43.15	44.51
College (%)	15.06	15.28	13.44
Weekly Hours	53.00	52.99	53.08
Tenure (years)	10.03	10.20	8.83
Employer-paid (%)	20.75	21.62	14.51
Employer-unpaid (%)	21.88	21.89	21.78
Workforce size	1.74	1.77	1.52
Written Contract (%)	4.10	4.25	2.80
Insurance (%)	9.25	9.75	4.98
Average Profits	1.33	1.37	1.05
Median Profits	0.89	0.89	0.82
Average Capital	20.29	21.29	12.89
Median Capital	3.61	3.71	2.52
Independent Establishment (%)	43.31	44.72	33.16
Registration (%)	38.84	39.67	32.86
Bookkeeping (%)	42.53	43.83	33.19

Nominal variables are expressed relative to national median wages. Source: ENAMIN.

Table 1. Summary statistics of Mexican microentrepreneurs

Measuring Self-insuring Behavior

To measure the extent to which microentrepreneurship is being used to self-insure against unemployment risk, I use survey questions inquiring about 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. Respondents may choose between pecuniary reasons like exploiting profitable business opportunities, to increase their income or to practice their trade, as well as non-pecuniary reasons such as preferences for flexibility.

There are also alternatives indicative of self-employment being chosen as an option of last resort, which I use to measure self-insuring behavior. I classify as *necessity entrepreneurs or self-employed* those business owners that declare that they started their business either due to the inability to obtain wage employment, the loss of previous wage employment, or the absence of any other sources of income. For simplicity, I refer to the rest of entrepreneurs as *opportunity* self-employed, although it is clear that they are heterogeneous in terms of their motivations. For example, in the 2010 ENAMIN wave necessity entrepreneurs are those who answered either that they started their business because they *could not find salaried employment* or due to *job loss, or reduction at previous employment* (options 4 and 6 in Table 2).

The assumption behind this classification is that necessity entrepreneurs would not have chosen entrepreneurship if they had readily accessible wage employment opportunities at the moment of starting their firms, but did so to avoid being unemployed. Of course, the fact that some individuals started firms because they did not find wage employment does not imply that they would be better off by switching occupations in the present, nor does this imply that the businesses they create will permanently under-perform those created by opportunity entrepreneurs. Nevertheless, it is indicative of the use of microentrepreneurship as a source of income of last resort[7].

[7]This classification is close to the one used by the Global Entrepreneurship Monitor (GEM). The main difference is that GEM classification is not designed to measure self-insuring behavior, but rather distinguish between entrepreneurs looking to exploit profitable business opportunities and those who just view it as a legitimate occupational choice (Poschke 2012)

	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 entrepreneurs are those who answered alternatives 04 or 06.

Table 2. Main Reason for Starting a Business, Mexico 2010

Table 3 shows the breadth of necessity self-employment for Mexico as well as other countries for which I was able to compute equivalent measures using similar surveys[8] expressed both as a share of small business owners (column 1) and as a proportion of the workforce (column 2). The first observation is that in developing countries necessity entrepreneurship is pervasive and ranges between 14.5% and 39% of microentrepreneurs, or between 3.7% (Mexico) and 19.4% (Colombia) of the workforce. The sheer magnitude of these numbers, comparable to national unemployment rates, highlights the important role of self-employment as a source of income of last resort.

[8]Detailed explanations on how necessity self-employment was computed for the pending ENAMIN waves, as well as in the other entrepreneurship surveys, can be found in Appendix 6.

	% Entrepreneurs	% Workforce
Brazil	32	10
Chile	16	4.0
Colombia	39	21
Mexico	15	3.7
United States*	3.8	0.25
United Kingdom*	2.5	0.35

* US from Hurst and Pugsley (2011). UK from Dawson, Henley, and Latreille (2009). Author's computation using microenterprise surveys, see Appendix 6 for details.

Table 3. Necessity Entrepreneurship Across Countries

The results point towards this phenomenon being significantly less pronounced in rich countries. The proportion of self-employed workers that may be classified as necessity entrepreneurs in the UK Labor Force Survey is 2.5% (Dawson, Henley, and Latreille 2009), while for the US the number equals 3.8 % among the nascent entrepreneurs in the Panel Study of Entrepreneurial Dynamics (Hurst and Pugsley 2011). When accounting for the smaller self-employment rates of these countries, necessity entrepreneurship does not exceed 0.4% of the workforce. Structural differences that make self-employment less attractive, as well as the availability of unemployment insurance, may help to account for this pattern.

The numbers presented in Table 3 are in line with the findings of previous work that uses completely different approaches. Breza, Kaur, and Shamdasani (2021) use experimental variation in labor demand in Indian villages and find an excess of labor supply of 24% disguised as self-employment, while Ulyssea (2018) uses a structural model of firm dynamics with informality and finds that approximately 50% of informal firms in Brazil are created as a survival strategy by low-skilled individuals. Finally, Gaillard and Kankanamge (2023) calibrate an entrepreneurship model with search frictions for the US and find a necessity entrepreneurship rate of 7.8%.

Necessity Entrepreneurs: Stylized Facts

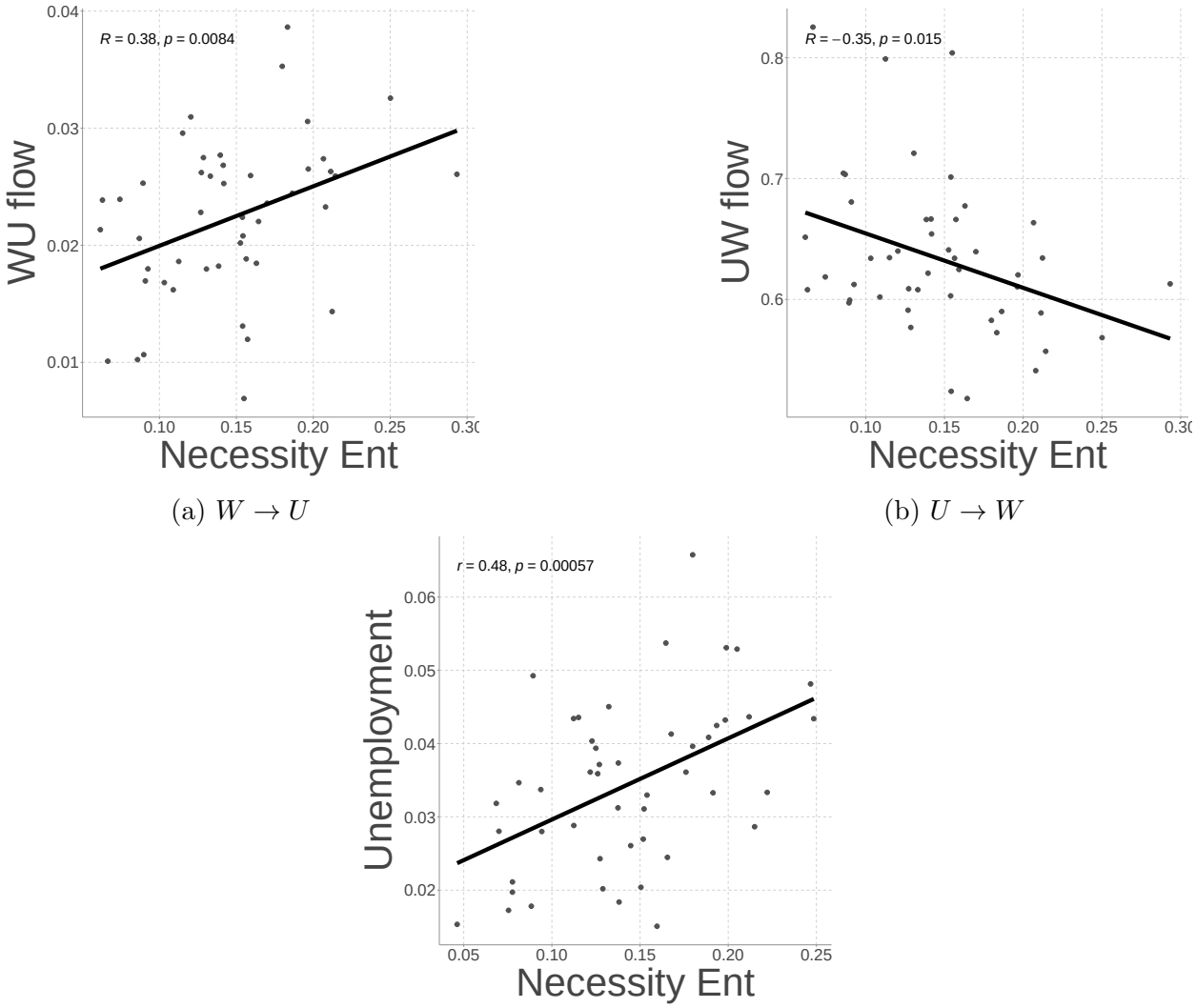
In this section, I present a novel characterization of necessity entrepreneurship using Mexican microdata, highlighting several key patterns that motivate my quantitative model. First, necessity entrepreneurs are concentrated in labor markets where workers face difficulties securing and maintaining wage employment. Second, they are more prevalent in industries with low capital requirements. Third, necessity entrepreneurs' firms have worse business

outcomes, and they spend less time in entrepreneurship. Fourth, they exhibit larger income gains when transitioning back to wage employment than comparable opportunity entrepreneurs. Although these facts are not causal, they strongly suggest that the survey-based definition of necessity entrepreneurship captures that, for these individuals, entrepreneurship acts as a fallback option. The next section introduces a model in which this mechanism plays a central role.

Necessity self-employment and local labor markets

I begin by exploring how my measure of necessity entrepreneurship interacts with labor market dynamics. ENAMIN allows me 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 subsistence self-employment relates to local labor market conditions. If self-employment 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 labor market indicators, calculated as averages from 1991-4 to 2012-4. Panels 1a and 1b show that necessity self-employment is positively correlated with local wage employment exit rates and negatively correlated with job finding rates across Mexican cities. I also find that subsistence self-employment is correlated with local unemployment rates, as displayed in Panel 1c.

This results, as presented in Tables 14 and 15, remain robust after controlling for time and city fixed effects, confirming that these patterns persist when looking into within-city time variation. The effects are economically significant: a one standard deviation increase (decrease) in the $(W \to U)$ flow ($(U \to W)$ flow) is associated with a 2 (1.5) percentage point rise in the necessity self-employment share, respectively. Similar magnitudes are observed for unemployment. Within cities, necessity self-employment is positively correlated with the overall level of self-employment, but the relationship is statistically insignificant. Overall, this evidence suggests that subsistence microentrepreneurship tends to be more prevalent in areas where workers face greater difficulties in securing stable wage employment.



(a) $W \to U$

(b) $U \to W$

(c) Unemployment

Figure 1. Necessity Entrepreneurship and Local Labor Markets

Note: Figures illustrate the correlation between necessity entrepreneurship and labor market moments. 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 years 1991-2014.

Capital intensity and sorting across industries

Next, I study how necessity self-employment varies across industries. If workers separated from their jobs opt into self-employment because they cannot afford to search from unemployment, we should observe that they create firms in industries that do not require large upfront investments or large capital stocks, as these resources could be used to smooth consumption while unemployed. Supportive of this idea, in the data industries with high shares of subsistence entrepreneurship are gardening, car washing and street vendors; all of them have relatively small average capital stocks. In turn, industries with larger shares

of opportunity entrepreneurs have significantly higher capital stocks, such as professional services and those in manufacturing (see Table 16 in the Appendix 6). Although in principle there could be additional costs associated with entry, McKenzie and Woodruff (2006) study early ENAMIN waves and do not find evidence of the presence of substantial entry costs among microestablishments, as the vast majority of young firms do not have employees, formal premises, nor are they registered with the authorities.

Figure 2 shows that this pattern holds more generally: it plots the within-industry share of necessity entrepreneurs against the industry's average capital stock, a measure of capital intensity; dot size indicates the number of observations in each industry. There is a clear negative relationship between capital intensity and the share of necessity entrepreneurs: the correlation is close to -0.5 and statistically significant. Notwithstanding, all industries display non-negligible shares of necessity entrepreneurs, and the average is 14%. This matters because many marginal activities, such as car washing, have high necessity entrepreneurship rates but represent a small share of total necessity entrepreneurship due to their small size. The industries that contribute the largest number of necessity self-employed are also the largest in absolute terms, like retailers, street food and beverage vendors, and food preparation industries.

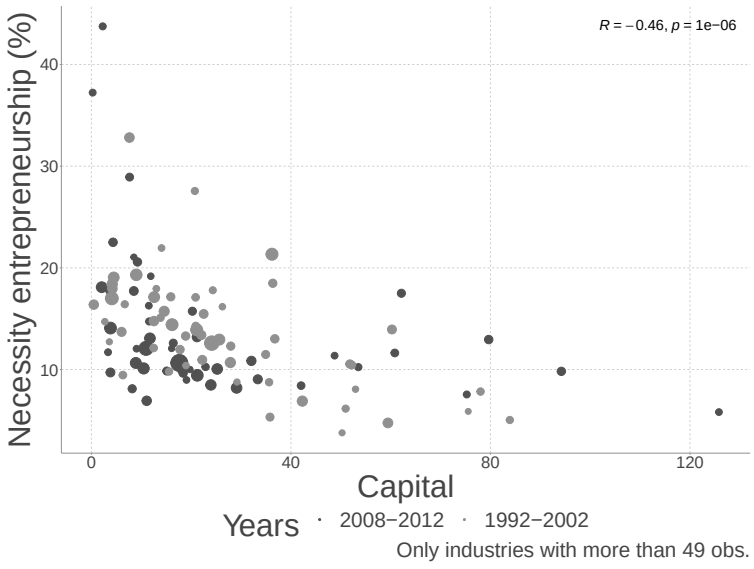


Figure 2. Necessity Entrepreneurship Across Industries

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.

Business performance

The second and third columns of Table 1 presents summary statistics dis-aggregated by entrepreneur type. Relative to opportunity entrepreneurs, subsistence entrepreneurs are slightly older, less likely to be college educated and disproportionately male[9]. There is evidence strongly suggestive of worse performance, as measured by profits, capital stocks, size of workforce. They also have worse managerial practices, as measured by the proportion of business owners that declare having any type of bookkeeping or that provide written contracts to their employees, and are less likely to register their firms (and their workforce) with the authorities. Table 4 show these results are robust to controlling for observable characteristics. It displays the estimates for α resulting from the following regression:

$$y_i = \alpha \mathbb{1}_i^N + X_i\beta + \varepsilon_i,$$

where y_i is a performance variable such as profits or log capital stock, $\mathbb{1}_i^N = 1$ if i is a necessity entrepreneur, 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 12% less profits and 47% smaller capital stocks than *comparable* microentrepreneurs. They are also 22% less likely to be employers, and on average they hire 0.1 less workers, which amounts to a 27% difference relative to the mean. Finally, the last row of Table 4 shows that necessity entrepreneurs have shorter business tenures, which is indicative of the more temporary nature of their enterprises. Overall, the picture that emerges is consistent with the need for insurance pushing relatively unproductive individuals into microentrepreneurship.

Despite the significant average differences between the two groups of microentrepreneurs, there is significant overlap in terms of their characteristics and performance. A sizeable proportion of non-subsistence entrepreneurs create firms that are small, don't grow and generate little profits, but remain in the market. In particular, and given that necessity self-employment in Mexico is close to 15%, the majority of relatively unproductive microestablishments are not owned by individuals escaping unemployment. This cautions against conflating poor firm performance with unwilling entrepreneurship, when a significant share of unproductive self-employment may be a consequence of sorting due to comparative advantage of individuals with overall low ability levels (Allub and Erosa 2019), or driven by preferences for self-employment's non-pecuniary benefits (Hurst and Pugsley 2011). The majority of these individuals are not looking to transition into salaried jobs.

[9]Women in Mexico are traditionally secondary earners, and are thus more likely to report becoming entrepreneurs to *supplement familiy income*, see Table 2.

Dependent variable	$\hat{\alpha}$
log(profits)	-0.115*** (0.011)
log(capital)	-0.472*** (0.023)
isEmployer	-0.223*** (0.025)
nEmployees	-0.104*** (0.013)
tenure	-2.345*** (0.103)

Controls: education, demographics, firm characterstics. Time and location fixed effects.
Indicator variables are normalized by their average.

Table 4. Results of $y_i = \alpha \mathbb{1}_i^{SE} + X_i\beta + \varepsilon_i$

Labor market transitions and income changes of occupation switchers

I leverage the panel structure of the labor force survey to study the labor market transitions of the microentrepreneurs in my sample. I compute quarterly flows by computing individual transitions across labor market statuses reported in the labor force survey from the ENAMIN quarter to the next. The limited number of ENAMIN waves implies that these transitions are computed from only 8 pairs of consecutive quarters. For this reason, and to complement, I construct labor market spells for each microentrepreneur defined as consecutive strings of identical labor market statuses. Table 5 shows both the previous and subsequent labor market spells for the subset of microentrepreneurs for which I observe more than one labor market spell. Necessity entrepreneurs 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 5 p.p. more likely to transition into wage employment. Opportunity entrepreneurs in turn are substantially more likely to come from, and transition into, inactivity.

Table 17 shows the result of regressing dummy variables indicating whether a worker is observed in a given labor market status on a subsistence self-employment dummy interacted with a tenure variable and additional controls. Consistent with Table 5, the coefficient associated with transitions into unemployment and wage employment is positive and statistically significant for workers with short tenures. Table 17 shows that necessity entrepreneurship is not associated with smaller self-employment persistence, but Table 4 does show that they have shorter business tenures. These results compliment the findings of Herreño and Ocampo

	Non-subsistence	Necessity
Where do they come from		
inactive	29.4%	20.1%
unemployed	4.5%	9.3%
wage earner	66.1%	70.5%
Where do they go		
inactive	29.6%	20.8%
unemployed	5.2%	9.5%
wage earner	65.2%	69.7%

Table 5. Previous and subsequent job market spells

(2023), who show that agents that are less able to smooth consumption while unemployed, such as households without secondary earnings or that do not receive remittances, are more likely to transition into self-employment from unemployment. For the US, Gaillard and Kankanamge (2023) exploit variation in unemployment insurance duration and generosity and show that increases in UI generosity decrease self-employment inflows for eligible individuals.

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

$$\omega^W_{i,t+1} - \omega^S_{i,t} = \alpha \mathbb{1}^N_i + X_i\beta + \varepsilon_i,$$

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

The results from this exercise are presented in Table 6, 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 α are positive and statistically significant across all specifications; column 5 shows that the estimate is 12% for the most detailed exercise. Similar results hold when using total earnings instead of hourly wages, or when looking into the income changes of agents switching from wage employment into self-employment (see Table 18 in Appendix 6). 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 entrepreneurs, 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.

	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 6. Income changes of switchers, $S \to W$

3 A Model of Self-insurance through Self-employment

At its core, the model is a two sector model of entrepreneurship as in Quadrini (2000) expanded to incorporate bi-dimensional skill as in Allub and Erosa (2019) and search frictions in the style of Ljungqvist and Sargent (2008). A key feature of the model is that, consistent

with the empirical section, individuals will be able to self-insure against unemployment risk through microentrepreneurship. I use the model to quantify the aggregate importance of self-employment as insurance, and to study the introduction of UI.

Environment, Preferences and Demographics

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

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

where I abstract from non-pecuniary benefits associated with occupational choice. Agents are heterogeneous in their degree of impatience: I assume discount factors β are uniformly drawn at birth from a discrete set B and remain constant throughout agents' lifespans[10]. 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[11].

Technology

Production takes place in two sectors: modern and traditional. The modern sector consists of a representative firm hiring capital and labor and producing the single good with a constant returns to scale production function. The traditional sector is composed by entrepreneurs who are heterogeneous in their entrepreneurial ability and their wealth, and that operate strictly concave technologies subject to collateral constraints. The modern/traditional distinction is common in the macro-development literature (Lagakos 2016; Midrigan and Xu 2014), 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.

[10]The reason to incorporate the perpetual youth framework is to ensure the existence of a stationary wealth distribution in models with preference heterogeneity (Krueger, Mitman, and Perri 2016).

[11]Government expenditure g is kept constant across counterfactuals that alter revenue

The modern sector firm maximizes the following objective:

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

Input prices are given by $(r + s_k)$ and w, where r is the interest-free rate, s_k the capital 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 entrepreneurs. Payroll tax τ 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, traditional sector entrepreneurs 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: $k \leq \lambda a$, for $\lambda \geq 1$[12]. It follows that profits depend on an entrepreneur's wealth. For simplicity, I assume that all microentrepreneurs use the same production technology that requires outside labor[13].

Due to their small scale, traditional sector entrepreneurs avoid government oversight and may evade payroll taxation. This is captured by a sector specific tax rate $\overline{\tau} = \phi\tau$, with $\phi \leq 1$. The assumption that small firms evade government oversight while large firms bear the costs of taxation counts with extensive empirical support (see Table 1, Bachas, Fattal Jaef, and Jensen (2019) and La Porta and Shleifer (2014)). Aggregate demand for labor and capital in the traditional sector is 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 μ^S is the (endogenous) measure of entrepreneurs across the state space.

[12] See Buera, Kaboski, and Shin (2011) for a microfoundation.

[13] Outside labor is important because in Mexico the share of workers in microenterprises is twice the share of workers who are self-employed. Introducing a menu of technologies and installation costs would most likely lead to necessity entrepreneurs adopting the least productive technology. The calibrated model already does a good job at matching their relative performance.

Occupations and Skills

At any given moment in time, agents in this economy may work as wage earners (W), as entrepreneurs in the traditional sector (S, for self-employed), or search from unemployment (U), which I denote as *occupations*. 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, θ_W stands for the worker's endowment of efficiency units of labor, whereas θ_S is her entrepreneurial ability. Abilities may be arbitrarily correlated, and they may differ in their persistence and their volatility, captured by (ρ_W, ρ_S) and (σ_W, σ_S) respectively. Wage earners sell their endowment of efficiency units of labor and receive $w\theta_W$. Entrepreneurs 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[14]. By assumption, all entrepreneurs belong to the traditional sector, while wage earners may sell efficiency units of labor to both traditional sector firms or to the modern sector. Because they receive the same competitive wage, they are indifferent between the two. The absence of a 'formality premium' is consistent with the findings of Pratap and Quintin (2006) and Ulyssea (2018).

The presence of bi-dimensional skill effectively creates a distinction between absolute (a high level of θ_j) and comparative advantage (measured by the ratio $\frac{\theta_j}{\theta_k}$). Allowing for differences between absolute and comparative advantage is necessary to rationalize agents making different occupational choices at all points of 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 entrepreneurs.

Labor Markets

At the beginning of each period, an agent chooses between the occupations that are available to her. Unemployment and entrepreneurship in the traditional sector are always available, but access to wage employment is frictional[15]. More precisely, I introduce labor market frictions in the spirit of the search-island literature (Alvarez and Veracierto 2001; Ljungqvist

[14]Because Mexico does not have UI, in the calibration this number will be close to zero.

[15]McKenzie and Woodruff (2006) document that there is no evidence of barriers to entry among Mexican microentrepreneurs.

and Sargent 2008) by assuming that there is a competitive market for efficiency units of labor, but 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 $s \in \{o, n\}$. When an agent has access to the spot market ($s = o$ for 'job offer'), her occupational choice set consists of all three occupations, $\{W, S, U\}$. Job offers are only valid for one period and cannot be postponed, which implies that agents choosing S or U must search in order to regain access to W in the subsequent period. Workers without access to the spot market, $s = n$ ('no offer'), may only choose between S and U. Note that the labor market friction is one-sided as firms may always buy labor without restrictions.

The evolution of labor market state s depends on agents' choices. Agents with $s = o$ that choose to work as wage earners receive a new job offer next period ($s' = o$) with probability ξ^W and lose access to the spot market ($s' = n$) 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 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 $\xi^U e$ ($\xi^S e$). It is useful to think of ξ^U as being higher than ξ; this will be an outcome of the calibration procedure. Wage earners optimally set $e = 0$. Note that the described law of motion for s implies that access to the spot labor market *tomorrow* does not depend on access *today* above and beyond the role that s plays in determining occupational choice.

Value functions

The agent's problem is illustrated in Figure 3. At the beginning of each period agents observe the realization of their skills θ and labor market state s, choose one of the available occupations, and then make consumption, savings and search decisions. As previously described, occupations available tomorrow are a function of agents' occupational choice and search effort in the current period. We may write the agent's value function as follows[16]:

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

Here, $v^j(\theta, a)$ represents the *occupation-specific* value function associated with occupation j. Shocks $\varepsilon = (\varepsilon^W, \varepsilon^S, \varepsilon^U)$ are distributed iid Gumbel(β_ε); their purpose is to smooth possible kinks in the value functions due to the presence of discrete choices (Iskhakov et al. 2017).

[16] All value and policy functions depend on the discount factor β, that I omit for clarity of exposition.

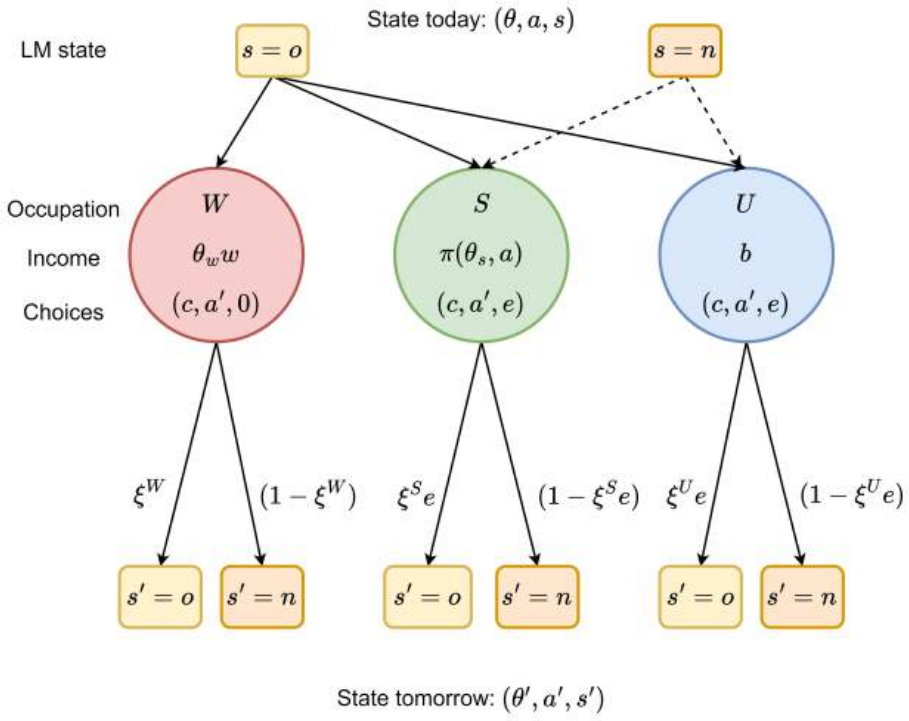


Figure 3. Agent's Problem

All value functions depend on β which varies across agents; this dependence is omitted for clarity. Occupation value functions are given by:

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

for wage earners (W), and

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

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

for entrepreneurs (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 ξ^j parameters, which represent the probability of receiving a job offer when exerting full effort ($e = 1$) in each occupation. As discussed above, workers' earnings depend on their occupation, skills, and in the case of entrepreneurs, their wealth, due to the presence of collateral constraints.

The assumption that job offers expire each period implies that the probability of receiving a job offer tomorrow is entirely a function of occupational choice and search effort today. In consequence, s is irrelevant for consumption, savings and search decisions after accounting for occupational choice. In other words, two agents with states (θ, a, o) and (θ, a, n) that choose the same occupation solve exactly the same problem, and thus, will behave symmetrically. This is the reason why occupation value functions $v^j(\theta, a)$ do not depend on s.

Government

The government simply collects revenue through the payroll tax τ 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:

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

The second term in the RHS corresponds to the revenue from accidental bequests.

Equilibrium

For a given government policy (τ, 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 agents across each occupation (μ^W, μ^S, μ^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 $\mu = \mu^W + \mu^S + \mu^U$.

4. The government budget is balanced.

5. Measures (μ^W, μ^S, μ^U) comply with

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

Different Channels of Insurance

The framework presented in this section features three margins of adjustment that individuals may use in response to adverse shocks: precautionary savings, search effort and occupational choice. Importantly, workers may adjust all three margins in response to changes in the environment. This section details how I define and measure necessity and opportunity entrepreneurship within the model, and briefly discusses optimal search behavior.

A Simple Taxonomy of Entrepreneurs

Consistent with the classification used in the empirical section, the model provides a straightforward way of classifying *entrants into self-employment* based on whether their occupational choice is driven by comparative advantage or due to job loss. This is formalized in the following definition.

Definition 3.1. An agent is an *opportunity entrepreneur* if, at the moment of entry into S, $\left(v^S + \varepsilon^S\right) > \left(v^W + \varepsilon^W\right)$, and a *necessity (or subsistence) entrepreneur* otherwise.

Definition 3.1 implies that $s = n$ is necessary to become a necessity entrepreneur, because otherwise individuals would choose W. That is, and consistent with the classification used in the empirical analysis, necessity entrepreneurs are those who start firms when wage employment is not available and self-employment is preferred over unemployment. The former may happen if the higher search efficiency while in unemployment, 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 agents 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.

As in the previous section, Definition 3.1 is static, focusing on the reason for entry, while comparative advantage and business performance evolve dynamically with skill shocks and

asset accumulation. This classification of entrepreneurs, when combined with their distinct characteristics and behaviors, generate different cross-sectional distributions for each type which I can contrast with the data.

Optimal Search Effort

The following proposition is useful to develop intuition regarding optimal search behavior.

Proposition 3.2. *Optimal search effort in occupation j, when interior, is increasing in ξ^j and in the difference between the expected value of having and not having an offer next period, represented by $\mathbb{E}_{\theta,\varepsilon}\left[V(\theta', a', o, \varepsilon') - V(\theta', a', n, \varepsilon')\right]$.*

Proposition 3.2 states that search effort is increasing in search efficiency. In particular, if $\xi^S < \xi^U$ and earnings in U are low relative to those in S, self-employed agents will search less than comparable unemployed agents, which delays their reemployment. It also highlights that policies affecting occupations' relative returns will impact search effort as well as occupational choice. For example, increases in b will not only lead to more agents selecting into U, but also to reduced search effort among the unemployed.

4 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 entrepreneurs. 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 calibrations 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 (ρ_W, ρ_S), and the variance-covariance matrix of innovations ϵ, fully characterized by their standard deviation and correlation (σ_W, σ_S and ρ_{WS}). Details on the numerical solution of the agent's problem can be found in Appendix 6.

Externally calibrated parameters

Table 7 summarizes the choices with respect to the externally calibrated parameters. I set $\alpha = 0.35$, and the value of depreciation δ_k to match a yearly depreciation rate of 6%. To set a value for the collateral constraint λ, 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 entrepreneurs 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. For simplicity, I also calibrate externally the value of the autocorrelation of innovations to working and entrepreneurial skill (ρ_{ws}) to 0.33, following Allub and Erosa (2019) who estimate this value for a related entrepreneurship model featuring small firms and bi-dimensional skill for Brazil.

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 ξ^S, ξ^U and χ are identified. Indeed, the first order condition with respect to search effort implies that search effort in occupation j is determined by the ratio (ξ^j/χ), 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 $\xi^W = 0.97$, which implies a job destruction rate of 0.03, close to the rates estimated by Meghir, Narita, and Robin (2015) for Brazil. Consistent with the absence of unemployment insurance, I set $\tau_l = 0$ and $b = w \times 10^{-5}$.

Internally calibrated parameters

The internal calibration consists of choosing the values of 11 parameters to minimize the distance between 11 model-implied moments and their data counterparts. Although each individual moment is jointly determined by all 11 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 η determine the relative size of the modern sector and the share of the population that chooses entrepreneurship. In the model, relative sector size is determined

Parameter		Value
p	Probability of death	$(4 \times 100)^{-1}$
α	Capital share	0.35
δ_k	Depreciation rate (annual)	0.06
ρ_{ws}	Correlation of skill shocks	0.33
λ	Collateral constraint	1.1
$(1-\xi^W)$	Job destruction rate	0.03
ξ^U	Offer arrival rate from U	0.8
b	Unemployment income	$w \times 10^{-5}$
τ	Payroll tax	0.0
β_ε	Shift parameter, taste shocks	10^{-3}

Table 7. Externally Calibrated Parameters

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)[17]. In turn, η targets the self-employment share (s), which is 24.5%. Second, parameters determining the evolution of skills, $(\sigma_W, \rho_W, \sigma_S, \rho_S)$, are chosen to match the cross-sectional dispersion and the (quarterly) autocorrelation of log-earnings, which I compute from the ENOE after controlling for education, age and gender effects. These values are respectively 0.51 and 0.56 for wage earners and 0.87 and 0.53 for entrepreneurs.

The search disutility parameters χ and ϕ 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, ξ^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 $(S \to W)$

[17] 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 $w_T/(w_M + w_T) = 0.27$.

quarterly transition rates given by 51% and 21% respectively.

For preference heterogeneity I follow Carroll et al. (2017) and assume that discount factors β are drawn from a set B consisting of a discretized uniform distribution $U[\bar{\beta}-\epsilon, \bar{\beta}+\epsilon]$; β can take 5 possible values. In the calibration, I choose $\bar{\beta}$ to target a capital-output ratio of 2.18, which I der following Greenwood, Sanchez, and Wang (2013). I choose ϵ to match 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 its 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.

Results and validation

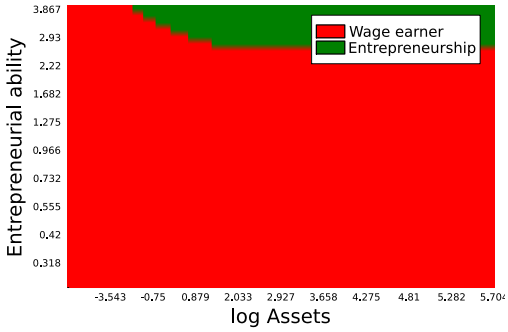
Tables 8 and 9 present the estimated parameter values and the model fit to the targeted moments resulting from the calibration exercise. The estimated model provides a good fit to the data. Some of the calibrated parameters merit some discussion. First, search efficiency from self-employment ξ^S is 25% smaller than search efficiency for the unemployed, ξ^U. This result is in line with that of Herreño and Ocampo (2023) who find a 37% difference, and qualitatively consistent with the findings of Jackson (2022), who shows that engaging in gig work delays reemployment. Martinez, Puentes, and Ruiz-Tagle (2018) provide experimental evidence showing that grants for microentrepreneurs make them less likely to transition into wage employment, and that this causes a drop in labor earnings. The values of χ and ϕ are relatively large, which imply that the disutility of search is low for low effort levels but substantial when effort is high. Figure 4c shows that search effort is mostly interior and consistent with the characterization of Proposition 3.2. In particular, search effort is higher in unemployment, a consequence of its higher search efficiency.

The calibration also outputs a small value for the decreasing returns to scale parameter η relative to the literature of firm dynamics in developing countries, where η ranges between 0.65 and 0.85 (Arellano, Bai, and Zhang 2012; Midrigan and Xu 2014). To the best of my knowledge, this is the first paper to calibrate a value for η specifically targeting the aggregate importance of the microenterprise sector of the economy. This sector is comprised of a large mass of small firms, which the model may only achieve with strongly decreasing returns to scale: higher values of η would increase the size of firms created by entrepreneurs, which

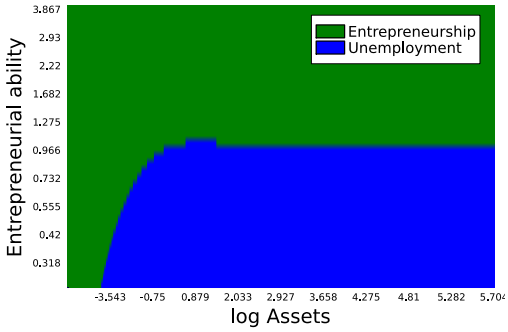
Parameter		**Value**
A_M	Modern sector productivity	0.74
η	Decreasing returns	0.42
σ_w^2	Variance of skill innovations, W	0.19
ρ_w	Autocorrelation of skill innovations, W	0.55
σ_s^2	Variance of skill innovations, S	0.45
ρ_s	Autocorrelation of skill innovations, S	0.70
ξ^S	Job offer arrival rate, S	0.57
χ	Search cost, intercept	7.2
ϕ	Search cost, convexity	7.2
$\overline{\beta}$	Discount factor midpoint	0.96
ϵ	Discount factor dispersion	0.035
g	Government expenditure	0.048

Note: Government expenditure equals revenue from accidental bequests.

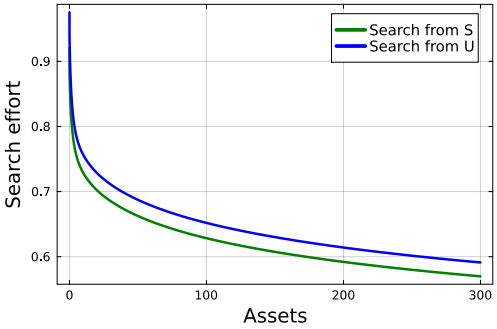
Table 8. Internally Calibrated Parameters



(a) Occupational Map, $s = o$



(b) Occupational Map, $s = n$



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

Figure 4. Occupational Maps and Search Effort

significantly worsens the model's capability to match both the relative labor demand of the modern sector and the share of entrepreneurs s.

The calibrated values of $\bar{\beta}$ and ϵ are 0.95 and 0.04, which implies that the quarterly discount factors in the economy range from 0.92 to 0.98[18]. The model underestimates the degree of consumption inequality in the data by around 23% (Table 9). This is a significant improvement over the calibrated model without preference heterogeneity, which underestimates consumption inequality by more than 50%. The degree of preference heterogeneity implied by the calibration is an order of magnitude larger than the one used by Krueger, Mitman, and Perri (2016) and Carroll et al. (2017) for the US. A few reasons can explain this difference. First, the model has a smaller skill persistence (in the calibration this is pinned down by the autocorrelation of earnings). Second, a major contributor to increasing inequality in Krueger, Mitman, and Perri (2016) is the presence of relatively generous unemployment insurance and retirement benefits, which are precisely the type of social insurance programs that developing countries lack. Indeed, unemployment insurance reduces the precautionary savings motive, while social security reduces the incentives to save for retirement. In the absence of these forces, a high value of ϵ is necessary to achieve a degree

[18]The most patient type has an annual discount factor of 0.92, the same as in Buera, Kaboski, and Shin (2011).

of consumption inequality as in the data.

Validation: Necessity entrepreneurs. The model is able to replicate several of the stylized facts on necessity entrepreneurs described in the previous section (see Table 10). First, in the model 13% of the self-employed are necessity entrepreneurs, close to the 14.5% we observe in the data. As documented in the empirical section, necessity entrepreneurs operate smaller, less profitable firms. Their average capital stock is 47% of that of non-subsistence entrepreneurs, slightly smaller than in the data which is 60%. Relative profits are smaller in the model at 44% versus 77% in the data.

Moment	**Data**	**Model**
$L_M/(L_M + L_T)$	0.73	0.74
Share of entrepreneurs s	0.25	0.22
Dispersion of log wages	0.51	0.54
Autocorrelation of log wages	0.56	0.56
Dispersion of log profits	0.87	0.94
Autocorrelation of log profits	0.53	0.58
Unemployment rate u	0.045	0.041
$U \to W$ transition rate	0.59	0.60
$S \to W$ transition rate	0.21	0.21
Capital to GDP ratio	2.18	1.8
Standard deviation of consumption	0.53	0.42

Table 9. Model fit, targeted moments

Figures 4a and 4b are useful to understand how the model replicates these features. They illustrate occupational choice for an agent with a fixed wage employment productivity (θ_W) for different values of states (θ_S, a, s). When $s = o$ only productive and wealthy enough agents willingly select into traditional sector entrepreneurship; the wealth threshold necessary for agents to start firms is decreasing in θ_S as a consequence of the collateral constraint. In turn, when $s = n$, even relatively unproductive 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 4b shows how the ability threshold to become an entrepreneur is indeed decreasing in wealth for relatively poor agents (Herreño

and Ocampo 2023). This drives relatively unproductive agents into microentrepreneurship, and generates a larger share of small and unprofitable firms. Finally, the collateral constraint generates the decreasing portion of the blue area in Figure 4b: because profits are increasing in wealth, wealthy enough agents prefer to search from self-employment. Because entrepreneur's production function exhibits strongly decreasing returns to scale, this effect is relatively small.

	Data	**Model**
Necessity Entrepreneurship		
Necessity entrepreneurship	0.15	0.13
Relative capital stock	0.60	0.47
Relative profits	0.77	0.44
Firm Size Distribution		
$K_M/(K_M + K_T)$	0.75	0.84
K_{25}	0.74	2.79
K_{50}	3.85	6.14
K_{75}	15.13	12.35

Table 10. Untargeted Moments

Validation: Firm size distribution. The capital distribution of small firms implied by the calibration fits the data reasonably well (see Table 10). The median capital stock, expressed relative to the median wage of the economy, is 6.1 in the model and 3.85 in the data; the model underestimates the dispersion of capital stocks, with an interquartile range of 9.6 versus 14.4 in the data. The model also does a good job at replicating the (untargeted) share of aggregate capital in the modern sector (84% in the model versus 75% in the data).
Validation: Labor market flows. Table 19 in Appendix 6 shows that the model also does a good job at matching the (untargeted) labor market flows across occupations[19]. In particular, it closely matches wage employment and unemployment outflows. The model underestimates self-employment persistence by 10%, and overestimates self-employment to unemployment flows. This smaller degree of self-employment persistence may be explained by the lack of an intensive labor supply decision: workers in S are not allowed to spend half their time searching from U, and thus, must exit S altogether in order to benefit from the higher search efficiency.

[19]These are 6 independent targets of which 2 were targeted in the calibration.

5 Counterfactual Analysis

This section studies the aggregate consequences of self-insurance through self-employment. I perform two separate exercises. First, and to quantify the aggregate importance of the mechanism, I compare the outcomes of the calibrated model with those of a counterfactual without necessity entrepreneurship. Next, I explore the introduction of unemployment insurance.

I describe what are the welfare measures that I use to compare across different counterfactuals. For aggregate welfare I use the utilitarian welfare change of a newborn cohort similar to Krueger, Mitman, and Perri (2016):

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

for $\mathbb{V} = \int \mathbb{E}_\varepsilon\left(V(\theta, a, s, \varepsilon; \beta)\right) d\mu_0(\theta, a, \beta)$, $\tilde{\mathbb{V}}$ analogously defined, and where μ_0 is the distribution over the state space of a newborn cohort. When evaluating welfare changes across different subsets of the population, I follow Krusell, Mukoyama, and Şahin (2010) and compute the consumption equivalent change φ required to make each agent indifferent between staying in benchmark economy with a modified consumption stream $c(1+\varphi)$ or moving to a counterfactual environment. Consumption equivalent change φ depends on the agent's individual state and is given by:

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

I compute the average value of φ for each individual and average it across various subgroups, using the weights derived from the stationary distribution of the benchmark economy.

Eliminating Necessity Entrepreneurship

How effective is self-employment as a form of insurance against unemployment risk? And does its role as insurance have meaningful aggregate consequences? To address these questions, I perform a thought experiment in which I compare the outcomes of the model with that of a counterfactual world where self-employment cannot be used to avoid unemployment. This exercise is better understood as an attempt to quantify the aggregate and welfare consequences of self-insurance through self-employment rather than simulating a realistic policy counterfactual.

In principle, the aggregate effects of necessity entrepreneurship are ambiguous. On one hand, self-insurance through self-employment might increase output and welfare by enabling

otherwise jobless individuals to produce and better smooth their consumption, especially for the poor. However, improved consumption smoothing may weaken the precautionary savings motive, leading to a reduction in the aggregate capital stock, which in turn lowers output and wages. In addition, necessity self-employment leads to a larger mass of workers in the low search efficiency occupation, which might reduce the reallocation of talent into the salaried sector, decreasing productivity. In consequence, understanding the aggregate effect of necessity entrepreneurship on productivity and welfare requires a quantitative evaluation.

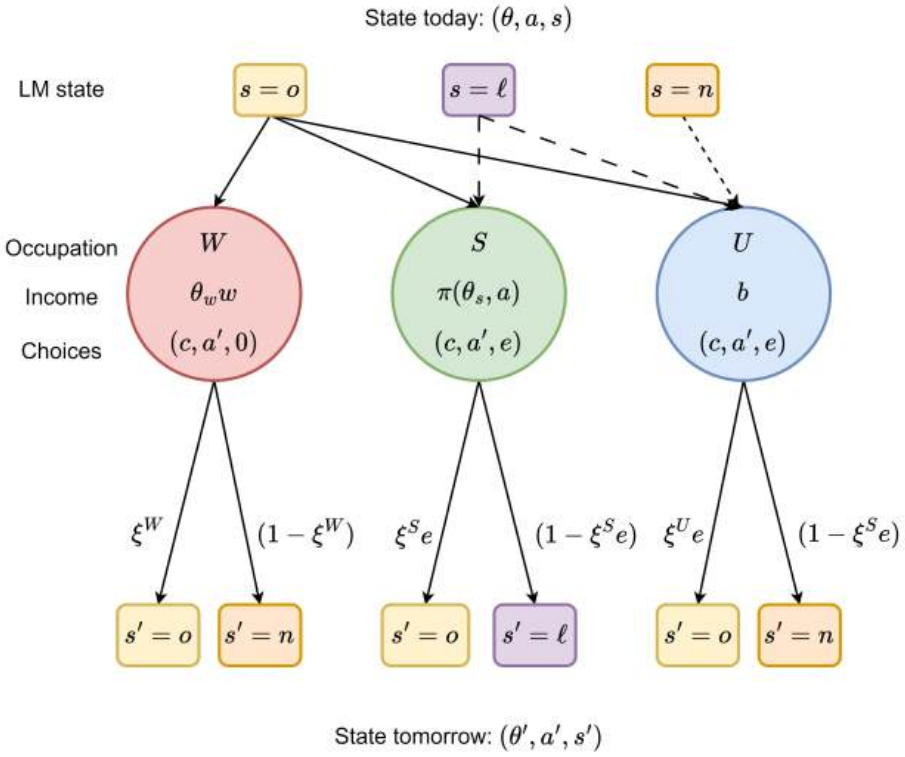


Figure 5. Counterfactual Agent's Problem

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 $s = o$) 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 entrepreneurs shut down their firms by switching occupation, so entrepreneurs with active licenses but no new offers may choose between S and U, which is now represented by a new state value $s = \ell$ (for 'license'). That is, and consistent with the original model,

entrepreneurs 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 $s = n$ ('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; Figure 5 illustrates how agents transition across labor market states in this alternative environment as a function of their choices, and value functions are described in Appendix 6. This alternative environment is identical to the original model except that entry into entrepreneurship is no longer freely available, but can only be accessed when $s = o$. Because W and S are only available *simultaneously*, this effectively eliminates necessity self-employment, as no one ever picks S while preferring W[20].

Table 11 contrasts aggregate outcomes between the benchmark and the counterfactual economy. Eliminating necessity self-employment leads to a 1.2 p.p. increase in unemployment (30%), which is consistent with the literature arguing that the informal sector acts as an 'employment buffer' (Dix-Carneiro, Goldberg, et al. 2024; Dix-Carneiro and Kovak 2019; Ponczek and Ulyssea 2021). Consistent with the elimination of necessity entrepreneurship, most of the increase in unemployment comes from reduced self-employment. Due to a higher precautionary savings motive the capital to output ratio increases slightly. This is accompanied by a 2% drop in traditional sector output, while the modern sector expands by 0.4%. The combined effect of these changes leads to output in the counterfactual economy being 0.74% smaller.

These output losses are accompanied by substantial welfare losses: the utilitarian welfare of an incoming cohort is 1.41% smaller in the counterfactual. To put this number in perspective, the the welfare cost of moving from a zero to a 3% separation rate ($1 - \xi^W$) in the benchmark economy is 3.45%. Without necessity self-employment this number increases to 4.81%, implying that self-insurance through microentrepreneurship reduces the welfare cost of unemployment risk by around 29%. Alternatively, the utilitarian welfare change φ_0 of transitioning from the benchmark to the counterfactual economy is equivalent to increasing the separation rate in the benchmark from 3% to 4.2%, equivalent to a 40% increase in unemployment risk. The losses are larger 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 0.85%, which offsets

[20]Note that in this new environment unemployed individuals that receive positive θ_S shocks must wait until they get an offer to start a firm.

the losses in output caused by restricting entry into entrepreneurship (output is now 0.1% larger). 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 generates welfare losses of 0.65%.

Variable	**Benchmark**	**Counterfactual**	Δ%
	Aggregates		
Wage	1.51	1.51	0.05%
Interest Rate	0.0157	0.0157	-0.17%
Wage earners, w	0.74	0.74	-0.22%
Entrepreneurs, s	0.22	0.21	-4.75%
Unemployed, u	0.041	0.053	29.52%
Output	2.64	2.62	-0.74%
Output (Modern)	1.45	1.45	0.43%
Output (Traditional)	1.19	1.17	-2.14%
Capital to GDP ratio	1.83	1.84	0.64%
TFP (Traditional)	1.54	1.53	-1.12%
	Welfare Changes		
Incoming cohort, φ_0		-1.41	
Wage earners, φ_W		-1.19	
Self-employed, φ_S		-0.97	
Unemployed, φ_U		-1.61	

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

Table 11. Necessity Self-employment and Outcomes

The finding that necessity-driven self-employment enhances welfare underscores the role that microentrepreneurship plays as a substitute for weak social safety nets in developing countries. This has important policy implications, suggesting that stricter enforcement of costly regulations and taxes among microenterprises, which are predominantly informal, could undermine their capacity to compensate for the absence of unemployment insurance. There is strong evidence that firms in developing countries face significantly higher formal entry costs (Djankov et al. 2002), high formal labor costs (Alaimo et al. 2017), and burdensome, time-consuming regulations and legal procedures (Tamkoç and Ventura 2024).

Djankov et al. (2002) estimate that business start up costs in Mexico amount to more than 0.8 times per capita GDP, whereas Alaimo et al. (2017) find that the average non-wage cost of salaried labor increases its cost by 44%. Although this thought experiment is not akin to an increase in enforcement, but rather an artificial restriction on agents' occupational choice sets, it highlights that policies that threaten the economic viability of small and informal microestablishments—such as enforcement—may have unintended negative welfare consequences. Consistent with this idea, Almeida and Carneiro (2012) show that increasing government oversight reduces self-employment and increases non-employment in Brazil. Ponczek and Ulyssea (2021) complement their findings by showing that, in response to Brazil's trade liberalization, the informal economy expanded more in locations with laxer enforcement, whereas locations with stricter enforcement saw larger increases in non-employment.

There is a large body of work suggesting that increasing enforcement among informal firms can increase aggregate productivity[21]. The literature suggests several channels through which this may occur. First, by discouraging informality, higher enforcement may lead to higher capital accumulation either by reducing incentives to remain artificially small or by encouraging formality that improves access to credit (D'Erasmo and Moscoso Boedo 2012; Leal Ordóñez 2014). By eliminating many unproductive informal firms, enforcement reallocates resources to more productive and formal establishments (Dix-Carneiro, Goldberg, et al. 2024; Meghir, Narita, and Robin 2015; Ulyssea 2018). Finally, the exit of informal firms also reduces search exernalities that make formal and productive jobs difficult to find (Meghir, Narita, and Robin 2015). The entirety of this literature ignores the role that self-employment plays as a source of income of last resort, and is thus mute about the consequences that stricter enforcement may have on workers' ability to smooth consumption, which I show to be relevant for welfare. The potential productivity gains from policies that increase enforcement should then be contrasted with the resulting loss in agents' ability to self-insure, noting that these gains and losses may be unevenly distributed across the population.

Finally, I find that necessity self-employment plays an important role in driving labor market dynamics, which are displayed in Table 12. The economy without necessity self-employment exhibits significantly smaller self-employment inflows and outflows. Relative to the benchmark, $W \to S$ decreases by 1 p.p. (14% change), mirrored by an increase in the $W \to U$ flow, which now equals the exogenous separation rate. Transitions out of self-employment decrease by 4.2 p.p. driven almost entirely by smaller self-employment to unemployment flows. In turn, flows from U to S decrease strongly by 9.5 p.p. (69% change), with the U to W rate also falling. Overall, this increases unemployment persistence by 46%.

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

These changes imply that the counterfactual economy exhibits a 12 p.p. smaller job finding rate (17% change), while the job exit rate increases by 0.3 p.p. (9%). These results are complimentary with the findings of Donovan, Lu, and Schoellman (2023), who show that the higher transitions rates observed in developing countries can be explained by higher transitions into and out of self-employment, which could be a consequence of its role as a source of income of last resort. I find that necessity self-employment accounts for a significant proportion of S inflows and outflows, and that it substantially increases the aggregate job finding rate.

Flows	**Benchmark**	**Counterfactual**	Δ%
Job exit rate	0.032	0.035	+9.2%
Job finding rate	0.734	0.611	-16.7%
$W \to W$	0.903	0.901	-0.30%
$W \to S$	0.081	0.069	-14.3%
$W \to U$	0.016	0.030	+91.1%
$S \to W$	0.208	0.200	-3.8%
$S \to S$	0.708	0.750	+6.0%
$S \to U$	0.085	0.050	-40.5%
$U \to W$	0.598	0.569	-4.8%
$U \to S$	0.137	0.042	-69.0%
$U \to U$	0.266	0.389	+46.3%

Note: The job exit and finding rates correspond to aggregate unemployment inflows and outflows respectively.

Table 12. Necessity Self-employment and Labor Market Dynamics

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. 2023). This project introduces an additional concern: the fact that self-employment acts as a *de facto* informal replacement for the social safety net may significantly reduce the welfare gains from publicly funded unemployment insurance.

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 one 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, Espino, and Sánchez (2021)). This would significantly increase the computational burden of the solution algorithm. 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 subject 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, Espino, and Sánchez (2021) study the introduction of the unemployment individual savings account (UISA) system in Mexico, and find that it has no effect on the welfare of low-skilled individuals, who struggle to find and keep formal employment.

To incorporate the challenges imposed by limited state capacity, I assume that the government cannot tax the traditional sector ($\bar{\tau} = 0$ in the model). As discussed previously, this assumption is empirically accurate (see Table 1). This implies that raising revenue reduces the size of the modern sector, which affects relative prices and thus impacts occupations' relative returns. For simplicity, I assume that the government can perfectly target UI benefits, so that neither traditional sector entrepreneurs nor wage earners claim unemployment benefits. This strong assumption allows me to isolate the limitations imposed by the governments' imperfect ability to tax, and the results provide a useful benchmark with which to contrast exercises that allow for imperfect targeting or false claims, as in Bosch and Esteban-Pretel (2015) and Ndiaye et al. (2023).

Table 13 displays the results from introducing UI funded by a 2% payroll tax, which achieves an average replacement rate of approximately 17%. UI causes a strong increase in the unemployment rate of 2.3 p.p.. This is accompanied by a contraction of self-employment (-10.3%), and a slight increase in wage employment. Figure 6 is useful for understanding these results. It shows that the introduction of even moderate levels of unemployment

insurance drastically alters the agents' occupational choice decisions. Previously, the absence of UI led poor agents to opt into self-employment in response to loosing their jobs, whereas now they search from unemployment. This leads to a strong decrease in necessity self-employment, which decreases by 4 p.p.. In addition, because unemployment becomes less costly, agents in both S and U decrease their search effort. The combined effect of these behavioral responses leads to the aforementioned changes in labor market aggregates.

Variable	**Benchmark**	**Counterfactual**	$\Delta\%$
	Aggregates		
Wage	1.51	1.48	-1.95%
Interest Rate	0.016	0.016	-0.04%
Wage earners, w	0.74	0.74	+0.06%
Entrepreneurs, s	0.22	0.20	-10.32%
Unemployed, u	0.041	0.064	+54.55%
Necessity self-employment	0.13	0.093	-28.54%
Output	2.64	2.63	-0.50%
Output (Modern)	1.45	1.44	-0.43%
Output (Traditional)	1.19	1.19	-0.59%
Capital to GDP ratio	1.83	1.82	-0.41%
Consumption dispersion	0.42	0.41	-2.06%
	Welfare Changes		
Incoming cohort, φ_0	0.23		
Wage earners, φ_W	0.20		
Self-employed, φ_S	0.66		
Unemployed, φ_U	1.98		

Table 13. Unemployment Insurance, $\tau = 2\%$

The costs associated with the introduction of distortionary taxation lead to a contraction of the modern sector by 0.43%, while the traditional sector also contracts by 0.59% driven by the smaller mass of microentrepreneurs. Productivty in the traditional sector slightly contracts by 0.47%. Overall, aggregate output contracts by 0.5%.

Table 13 also displays the impact of the policy on welfare. Despite the reduction in

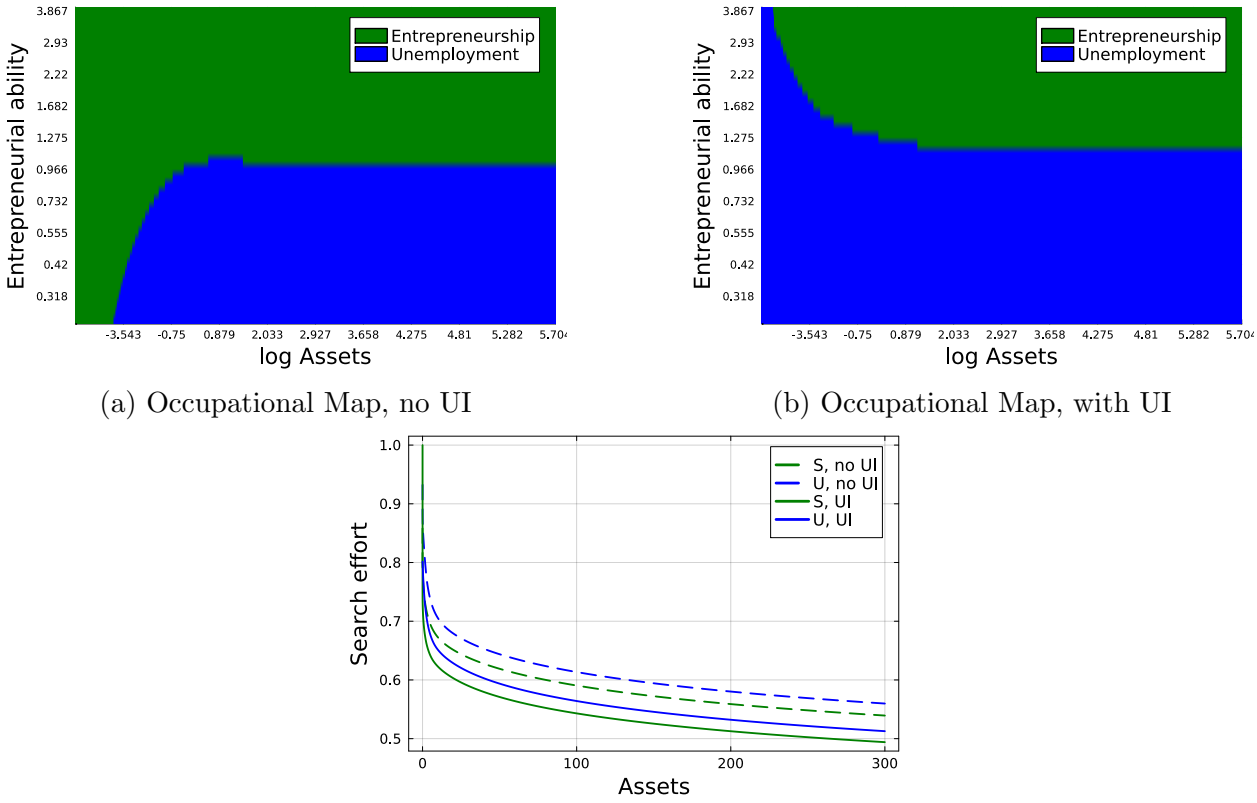
output, the policy increases the welfare of newborn cohorts by 0.23%. Studying welfare equivalent consumption changes is useful to understand how these gains are distributed across different subgroups. Gains are concentrated among the unemployed, whose welfare increases almost 2%, while the self-employed and wage earners experience smaller increases. Figure 7 shows that the introduction of this type of unemployment insurance benefits the entire wealth distribution while at the same time being strongly progressive: the welfare gains for households in the 10th wealth percentile are around four times those of households in the 90th percentile. These findings underscore that governments in middle-income countries can increase welfare and achieve redistribution by providing additional insurance, even if this requires taxes that reduce the size of the modern sector and diminish output.

The literature studying the introduction of unemployment insurance in developing countries has mostly focused on the introduction of contributory, formal-only unemployment insurance systems. Bosch and Esteban-Pretel (2015) use a search and matching framework to study formal-only unemployment insurance in Mexico while allowing unemployment-eligible individuals to claim benefits while working informally. They find that a contribution rate of 4% with a replacement rate of 30% would slightly decrease formal employment while leaving unemployment unchanged. Also for Mexico, Cirelli, Espino, and Sánchez (2021) model the introduction of an UISA system, and find that the optimal scheme would decrease unemployment, increase formal employment and output, but that the overall welfare of low ability individuals would remain unchanged. This latter fact highlights the limits of formal-only unemployment insurance at effectively insuring the subset of workers that are more likely to work in informal arrangements.

One exception is Herreno and Ocampo, who, in an earlier version of their paper, examine the effects of a similar unemployment insurance system and report significantly larger aggregate responses. With comparable benefit levels, they find that unemployment rises by 5.4 percentage points, output decreases by 2.5%, and total factor productivity (TFP) increases by more than 3%. These differences likely stem from contrasting job destruction rates: 3% in my model versus 20% in theirs, which leads to a much higher involuntary outflow from wage employment in their framework.

6 Conclusion

This paper documents that in a sample of Latin American countries, a significant share of microentrepreneurs start their businesses out of necessity, due to an inability to find salaried employment. In Mexico, which has a large microenterprise sector and lacks unemployment insurance, necessity-driven entrepreneurship is more prevalent in areas with higher



(a) Occupational Map, no UI

(b) Occupational Map, with UI

(c) UI reduces search effort

Figure 6. UI and Individual Behavior

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 θ_W fixed at the 50th percentile.

unemployment and weaker labor markets. These entrepreneurs typically run smaller, less profitable businesses with shorter lifespans and experience larger income gains when transitioning to wage employment. This suggests that self-employment acts as a fallback option for those struggling to find jobs.

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 individuals might opt into microentrepreneurship to avoid unemployment. This insurance channel is particularly important for the poor, and drives the creation of relatively small and unproductive firms.

A thought experiment shows that eliminating necessity self-employment leads to higher unemployment and lower welfare. These results underscore that although necessity entrepreneurship drives the creation of less productive microenterprises, it helps to mitigate higher unemployment rates and cushion the welfare losses associated with missing or inad-

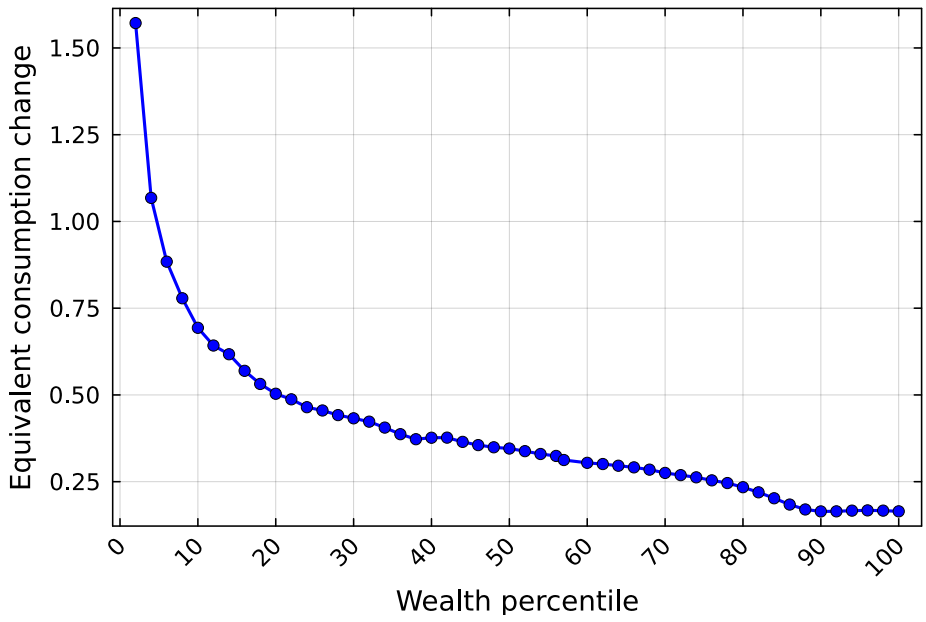


Figure 7. Welfare Changes by Wealth Percentiles

Note: Figure plots the average consumption equivalent change in each wealth group. Wealth groups are pairs of consecutive wealth percentiles.

equate unemployment insurance systems. This has relevant implications for public policy, as enforcing regulations and taxes that threaten the economic viability of microenterprises might hurt workers' ability to self-insure.

In turn, the introduction of a moderate, non-contributory unemployment insurance system financed by a payroll tax on the modern sector sharply reduces necessity entrepreneurship but leads to an increase in unemployment. Despite the distortionary impact of taxing the modern sector and the existing role of microentrepreneurship as an alternative insurance channel, I find that introducing UI is welfare improving.

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Appendix A

Measuring Necessity Self-employment

I describer how I compute necessity self-employment for each of the countries that appear in Table 3. Necessity entrepreneurship for Latin American countries is computed from the small business surveys. 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. I discard agricultural establishments when included in the survey.

All these surveys contain a questions inquiring about the *main* reason for business start up. 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 (both those that classify as necessity or opportunity entrepreneurs) vary with the survey, and in the case of Mexico, with the year.

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 (which makes the number not strictly comparable with what I compute using microenterprise surveys). For the UK, the number comes from Dawson, Henley, and Latreille (2009, Table 1, no jobs available locally). The number is computed using the *United Kingdom Quarterly Labour Force Survey* (QLFS) for years 1999-2001 from self-employed individuals.

Additional Figures and Tables

	Dependent variable:
	Necessity self-employment
Unemployment	0.266^{***}
	(0.077)
City fixed effects	✓
Time fixed effects	✓
Observations	269
R^2	0.605
F Statistic	6.067^{***} (df = 54; 214)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 14. Necessity Entrepreneurship and Unemployment Across Cities

Table 15. Necessity entrepreneurship and Labor Market Flows

	Dependent variable: Necessity self-employment								
	WW	WS	WU	SW	SS	SU	UW	US	UU
Coefficient	-0.182^{**}	0.042	0.243^{***}	-0.014	0.002	0.032	-0.188^{**}	0.030	0.186^{***}
	(0.081)	(0.099)	(0.078)	(0.072)	(0.069)	(0.074)	(0.073)	(0.070)	(0.070)
Observations	223	223	223	223	223	218	223	222	222
R^2	0.606	0.594	0.616	0.594	0.594	0.600	0.609	0.594	0.608

All regressions control for city and time fixed effects.

Industry	Avg. Capital stock	Necessity (%)
Bottom 5		
Entertainment and recreational services	125.81	5.81
Clothing and accessories manufacturing	11.09	6.93
Rental services (except transport equipment)	75.25	7.55
Textile product manufacturing	8.18	8.11
Professional and technical services	29.11	8.19
Top 5		
Street commerce (auto parts)	8.52	21.05
Street commerce (stationery and personal goods)	4.33	22.51
Cleaning and green area services	7.66	28.93
Street car care and washing	0.26	37.23
Waste management	2.27	43.75

Capital stocks relative to the national median wage.

Table 16. Industries Ranked by Share of Necessity Entrepreneurs

	Dependent variable:			
	dummyU	dummyW	dummyS	dummyI
	(1)	(2)	(3)	(4)
N	0.023^{***}	0.028^{*}	-0.015	-0.045^{***}
	(0.005)	(0.015)	(0.018)	(0.010)
N:tenure_cat1-2	-0.029^{***}	-0.032	0.023	0.057^{***}
	(0.007)	(0.021)	(0.026)	(0.014)
N:tenure_cat2-3	-0.025^{***}	-0.019	0.016	0.021
	(0.007)	(0.021)	(0.026)	(0.014)
N:tenure_cat3+	-0.020^{***}	-0.043^{***}	0.035^{*}	0.039^{***}
	(0.005)	(0.016)	(0.020)	(0.011)
Demographic controls	✓	✓	✓	✓
Education controls	✓	✓	✓	✓
Location controls	✓	✓	✓	✓
Time controls	✓	✓	✓	✓
Observations	37,371	37,371	37,371	37,371

Table 17. Necessity Self-employment and Quarterly Flows

	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 of switchers, $W \to S$

Moment	**Data**	**Model**
$W \to W$	0.91	0.90
$W \to S$	0.06	0.08
$W \to U$	0.02	0.016
$S \to W*$	0.21	0.21
$S \to S$	0.78	0.70
$S \to U$	0.02	0.093
$U \to W*$	0.59	0.59
$U \to S$	0.13	0.13
$U \to U$	0.27	0.27

* Targeted in calibration.

Table 19. Model Fit, Labor Market Flows

Appendix B

Numerical Solution

The Agent's Problem

Agents in the model make both discrete and continuous choices (occupation, savings and search effort). A well known feature of dynamic programming problems with discrete and continuous choices is that value functions may not be globally concave, and in consequence, first order conditions are necessary but no longer sufficient. To solve the agent's problem I implement a version of the endogenous grid method (EGM) expanded to account for discrete choices proposed by Iskhakov et al. (2017), that relies on the monotonicity of the asset policy function to discard suboptimal points that nevertheless comply with the first order condition. To determine optimal search effort, I leverage the fact that search costs are additively separable from consumption, and can be characterized analytically using the first order condition for a given guess of the value function. Indeed, the first order condition involving search effort is given by:

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

and thus, conditional on (θ, a') and a guess for the value function we have an analytical expression for search effort in both S and U. Although the presence of an additional continuous variable (search effort) implies that the asset policy function is not necessarily increasing in current wealth, I verify using VFI that this property holds in my environment[22]. The fact that occupation value functions are not a function of labor market state s greatly reduces the computational burden of the procedure.

Counterfactual: Eliminating Necessity Entrepreneurship

This section presents the value functions for the agent's problem in the environment featuring no necessity self-employment described in Figure 5. We may rewrite the new global value function as follows:

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

[22] Hubmer (2018) uses a similar intuition to solve a related model with search effort by adapting the EGM algorithm proposed by Fella (2014).

The occupational value functions for W and U remain the same, and the new value function for S is given by:

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

Like before, agents with $s = o$ may choose between any of the three occupations. In turn, $s = \ell$ represents agents that were previously entrepreneurs and now may choose between continuing with their firms or exiting into U. Agents with $s = n$ are forced to search from U.