Unemployment, Entrepreneurship and Firm Outcomes *

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Abstract

Are there differences between firms created by unemployed individuals relative to otherwise identical employed individuals? The answer is crucial for understanding the impact of policies that promote entrepreneurship among the unemployed. I develop an equilibrium model of entrepreneurship. Different outside options imply the unemployed are more likely to start firms, but these are smaller and fail more often. I verify these implications using a new administrative Canadian matched owner-employer-employee dataset. I use firm closures to identify random assignments of individuals to unemployment. I find that subsidies for firms started by the unemployed induce a reallocation of resources to low-productivity firms. The mechanism is further tested empirically by verifying that wage workers are more responsive to wages than the unemployed in their decision to start a firm.

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1 Introduction

How does unemployment affect an individual's decision to open a firm and the outcomes of that firm relative to employment? The answer to this question is crucial for understanding the determinants of entrepreneurship, firm dynamics and the appropriate policies to promote job creation.

Across the world, countries have established policies to promote entrepreneurship among the unemployed.[1] Examples include the expenditure of 37.5 million euros by France in 2009 alone, with 40% of new businesses being started by the unemployed (European Commission (2010)). In Germany in 2004, spending on these policies totalled 2.7 billion euros, representing 17.2% of expenditures in active labour market policies (Baumgartner and Caliendo (2007)). In the UK, such a policy has been responsible for the creation of nearly $2,000$ new businesses per month since its reintroduction in 2011 (Burn-Callender (2013)). In Canada in 2012, these policies cost 118 million Canadian dollars, representing 10% of expenditures in active labour market policies (CEIC (2014)).

Although there is a large literature on entrepreneurship and firm dynamics[2], the labour status of the potential entrepreneur has often been overlooked.[3] To analyze these issues, I propose a general equilibrium model of entrepreneurship that allows for different choices by the unemployed and the employed. In the framework, the only difference between the unemployed and wage workers is their outside option. As a result, the unemployed are less selective on which business projects they implement. In equilibrium, this implies that the unemployed are more likely to start a firm but, conditional on doing so, hire fewer workers and are more likely to exit

[1]Policies vary from extended unemployment benefits to direct financial assistance and coaching in the startup process. Examples of such policies are the Back to Work Enterprise Allowance in Ireland and the Self-employment assistance program in the US, both of which allow individuals to keep welfare benefits while they start their own business. A list of policies across Europe, Australia, Canada and the US as well as coverage in the press are available upon request.

[2]Lucas Jr (1978), Holtz-Eakin et al. (1994), Fonseca et al. (2001), Hurst and Lusardi (2004), Cagetti et al. (2006), Quadrini (2000), Beaudry et al. (2011), Hamilton (2000) and Haltiwanger et al. (2013).

[3]The tradition has been to use models in which differences in outcomes arise due to differences in innate entrepreneurial ability of individuals. This paper proposes a framework in which differences in outcomes between unemployed and employed individuals arise in the absence of ex-ante heterogeneity.

entrepreneurship relative to an individual who started a business (implemented a business project) from wage work.

These implications of the model hold in the data. The data being used is composed of the entire universe of tax filers linked to privately owned incorporated firms in Canada. It improves on employer-employee datasets by linking firms to their corresponding owner.[4] This makes it fitting for studies of entrepreneurship. I use firm closures to identify the random assignment of an individual to unemployment (via lay-offs). I find that unemployment doubles the probability of an individual to start a firm relative to somebody that remained working and did not lose their job. Next, I show that among those that entered entrepreneurship, those that entered after a job displacement hire 26% fewer workers and are 30% more likely to exit from firm ownership relative to those that entered directly from wage work.

I then consider an extension of the model that adds congestion externalities in firm hiring to the baseline framework. This allows the job finding rate to become an equilibrium object. This is crucial if we want to understand whether entrepreneurship among the unemployed contributes to job creation. Using this model extension, I evaluate to what extent a policy promoting entrepreneurship among the unemployed achieves the goal of decreasing the unemployment rate.[5] I quantify the impact on the aggregate economy of a policy that redistributes a share of total unemployment insurance (UI) income to those that are unemployed and starting a firm. In my numerical policy counterfactual, 5% of total UI income is redistributed to new entrepreneurs having entered from unemployment. This corresponds to an entrepreneur receiving 30% of her previous UI benefits during the first year of business. This is similar in magnitude to the subsidy program in British Columbia, Canada in which entrepreneurs entering from unemployment receive their full UI

[4]The three most used employer-employee linked datasets, the Longitudinal Employer-Household Dynamics (LEHD) for the US, the Déclaration annuelle de données socials (DADS) for France and the Linked Employer-Employee-Data of the IAB (LIAB) for Germany, all lack information on individual owners of firms. With the exception of registry data from Sweden and Denmark, this is the first dataset to allow the tracking of all linkages between a firm and its employees and owners across time.

[5]The official objective of these policies is to decrease the unemployment rate. Consistent with this stated objective by policy makers, I focus on their impact on productivity and job creation, instead of welfare.

benefits for the first 38 weeks of a business operation.[6]

The result is a 2.14% drop in average firm productivity and only a 1%[7] drop in the unemployment rate. The policy induces the creation of low productivity firms by the unemployed. This increases the share of firms created by the unemployed and decreases the share of firms created by the employed. With a larger mass of firms, the equilibrium cost of labour increases.[8] This induces firms to hire fewer workers. With higher wages, the value of being a worker increases and the value of being a business owner decreases for a given productivity level. As a consequence, the employed become more selective on which business projects to implement which further increases the share of firms created by the unemployed. Since, on average, the unemployed create lower productivity firms, average firm productivity drops. In the quantitative exercise, the employment drop among high productivity firms offsets job gains from firms created with the subsidy. The result is a shift in resources from high productivity firms created by the employed to low productivity firms created by the unemployed.

In the theoretical framework, the unemployed and wage workers are ex-ante identical. In that sense, I investigate the difference between firms created by unemployed and employed individuals that have the same level of innate ability. Although not the focus of this paper, negative selection into unemployment should increase the differences in outcomes between unemployed and employed individuals. As a result, if negative selection were added to the model, the negative impacts of the policy would be amplified. It follows that the policy outcomes here can be thought of as lower bounds.[9]

[6] For a period in which the average provincial unemployment rate is up to 8%, the total duration of unemployment insurance (UI) benefits is a maximum of 40 weeks. This implies that the program in British Columbia allows individuals to receive virtually the entirety of the UI benefits they were eligible for in that year.

[7] this is a 1 percent change not percentage point change.

[8] This increase in the "cost of labour" comes via a tighter market, that makes it harder to find workers, and a rise in wages. The model in the next section abstracts from congestion externalities but they are incorporated in the model used to evaluate policy, with the "cost of labour" for an entrepreneur being affected by the equilibrium wage as well as the tightness in the market.

[9] In the model, I abstract from credit constraints. Since workers are more likely to start higher productivity firms, adding capital and borrowing constraints to the model would imply that, conditional on wealth, workers are more likely to be liquidity constrained relative to the unemployed. Therefore, it is not obvious why the unemployed would be differentially more liquidity constrained

Finally, an additional implication of the theory is that higher wages decrease the entry rate into entrepreneurship of the employed by more than that of the unemployed. Wages represent the opportunity cost of entrepreneurship for the employed but not for the unemployed. As a result, the employed are more responsive to wage variation than the unemployed in their decision to open a firm. With an extension of the theory to a multi-sector environment, I formally derive this additional implication and the Bartik style instrument (Bartik (1993)) used to test it. Using region-wage variation and my instrumental variable strategy for wages, I show that a 1% drop in wages increases the entry rate by 3.2 percentage points for wage workers and has no impact for unemployed individuals.

While there are papers looking at the empirical relationship between unemployment and entrepreneurship (see Donovan (2014), Block and Wagner (2010) and Evans and Leighton (1989)), this is the first paper to evaluate the impact of exogenous variation in unemployment on becoming an employer. Using firm closures, I isolate the impact of unemployment on individual choice from the negative selection associated with unemployment. The closest papers to this one are Von Greiff (2009) and Røed and Skogstrøm (2014), who also use displacement shocks to identify unexpected transitions to unemployment. However, Von Greiff (2009) and Røed and Skogstrøm (2014) include self-employed individuals in their measure of entrepreneurs which for the most part are unincorporated without any employees. Here, on the other hand, by focusing on privately owned incorporated employers, I focus on the type of entrepreneurship that impacts job creation. This is an important and non trivial distinction if we are interested in the effects of entrepreneurship in the macro economy.

Previous papers have investigated the impact of policies that subsidize entrepreneurship among the unemployed (see Caliendo and Künn (2011), Baumgartner and Caliendo (2007) and Hombert et al. (2014)), but the interplay between the decision of the wage worker and the unemployed to open a firm has not been studied before. Here, I show that these margins are important for the crowding out effects

and more misallocated relative to wage workers when it comes to entrepreneurship. This argument is consistent with Karaivanov and Yindok (2015) who find that, although "involuntary" entrepreneurs have lower average wealth, they are less likely to be credit constrained. I leave such an extension for future work.

of the policy via a redistribution of resources from firms created by wage workers towards firms created by the unemployed.

This paper relates to the development literature looking at subsistence entrepreneurship in developing economies. The measure of involuntary entrepreneurship is often ad-hoc, such as self-employed with no employees (Earle and Sakova (2000)) and de Mel et al. (2008)) or education (Poschke (2013)). Here, instead of concentrating on the notion of involuntary entrepreneurship, I focus on the role of involuntary unemployment for entrepreneurial outcomes. Karaivanov and Yindok (2015) also evaluate the importance of involuntary unemployment but concentrate on its interplay with credit frictions in partial equilibrium. Here, instead, I consider a general equilibrium framework without credit frictions. Dinlersoz et al. (2016) also have a model of entry into entrepreneurship by workers and unemployed with credit frictions and labor market frictions. However, they impose an exogenous job finding rate among the nonemployed. In this paper, while with no credit frictions, in the model extension, the job finding rate is determined endogenously by the equilibrium labor market tightness. This seems crucial to evalute the impact on job creation of promoting entrepreneurship among the unemployed. Finally, while for Dinlersoz et al. (2016) differences in firm outcomes between the nonemployed and employed are driven by ex-ante heterogeneity in ability, the model in this paper generates these without ex-ante heterogeneity.

This paper also links to papers showing that firms started in recessions are smaller (Sedláček and Sterk (2017) and Moreira (2015)) by providing microeconomic evidence that laid-off individuals create smaller firms.

The structure of the paper is the following. Section 2 develops the baseline model. Section 3 describes the data and the empirical differences between firms created by the unemployed and wage workers. Section 4 develops the new additional testable implication and presents the results in the data. Section 5 develops the model extension with congestion externalities, explains the parametrization strategy and reports the policy counterfactual result. Section 6 concludes.

2 Model

In this section, I propose a theoretical framework to shed light on the interaction between individual decisions to open a business and the differences in outcomes between firms created by ex-ante homogeneous individuals and the implications for the labour market. In particular, the model generates predictions concerning differences in outcomes between firms created by the unemployed and the employed (hereafter, wage workers). In equilibrium, due to a higher value of being employed, W, relative to being unemployed, U, workers are more selective about which business projects to implement. As a result, despite ex-ante homogeneity among individuals, ex-post, firms created by the unemployed are different from those created by wage workers. In the next section I test these implications in the data. [10] [11]

The population in the economy is of measure 1. At each instant an individual is in one of three states : business ownership, unemployed or employed. The economy can be thought of as being composed of two islands : on one island a Walrasian market exists, with a unique wage that equates the supply and demand of workers. Demand is made up by all the jobs created by the individual business owners on that island. Supply is made up of all individuals on the Walrasian island who do not operate a firm. A second island is composed of the unemployed, who can transition to the Walrasian island by becoming a worker at a fixed exogenous rate, or alternatively, by deciding to operate a business opportunity. [12]

Workers can either be forced to move to the unemployment island by an exogenous shock or decide to operate a business opportunity and become a business owner. Business owners decide at each instant whether or not they should continue to operate their firm or transition to the unemployment island. Business oppor-

[10] An assumption is that there is no market for business opportunities. Wage workers are unable to trade with unemployed individuals opportunities they do not desire.

[11] In the model, I abstract from borrowing constraints to keep the intuition clear and concise. However, in Subsection 3.5 I discuss the interpretation of the empirical findings once we consider borrowing constraints.

[12] This version of the model ignores the general equilibrium effects of the entrepreneurship margin on the rate at which the unemployed can become employed. In the section considering counterfactual policy scenarios, I develop a simple extension of the model that endogenizes this transition rate.

tunities arrive at a constant rate ψ, which is the same for both workers and the unemployed.

2.1 Static Profit Optimization

Let Z be the productivity of the firm, then, define $z \equiv log(Z)$. Conditional on firm survival, at each instant business owners maximize their profits. Production is given by $y = e^z n^\alpha$ where n is the number of employees. The static profit maximization problem for a firm is

$$\pi^*(z) \equiv \max_n e^z n^\alpha - wn. \tag{1}$$

The firm problem above implies

$$\pi^*(z) = (1-\alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} e^{\frac{z}{1-\alpha}}. \tag{2}$$

2.2 Dynamic Problem of the Business Owner

Although the profit maximization problem at any point in time is static, the entrepreneur faces a dynamic problem, which is whether or not they should continue to operate. If the firm is shut down, the individual has to pay a cost of χ and becomes unemployed with value U.

Once firm production starts, Z follows a geometric Brownian Motion with drift $\mu < 0$ and variance parameter σ

$$dZ(t) = (\mu + \frac{\sigma^2}{2})Z(t)dt + \sigma Z(t)d\Omega(t) \tag{3}$$

where $\Omega(t)$ is a standard Brownian Motion. Then,

$$dz(t) = \mu dt + \sigma d\Omega(t). \tag{4}$$

It follows that entrepreneurs face the following optimal stopping problem :

$$rJ(z) = \pi^*(z) + \mu J'(z) + \frac{\sigma^2}{2} J''(z) \quad \text{if} \quad z \geq \hat{z} \tag{5}$$

$$J(z) = U - \chi \quad \text{if} \quad z \leq \hat{z} \tag{6}$$

$$J'(\hat{z}) = 0. \tag{7}$$

Where μ is assumed to be negative, otherwise there would be an accumulation of firms that never exit the market. $\hat{z}$ is the productivity threshold chosen by the entrepreneur below which it is optimal to shut down the firm and exit entrepreneurship.

The cost of shutting down, χ, makes the algebra tractable by guaranteeing that the expressions for the distributions of both types are of the same functional form, with the only difference coming from the difference in selection of projects upon entry, $\underline{z}_u$ versus $\underline{z}_w$, and the unemployment to employment transition rate, f, versus the employment to unemployment transition rate, s.

2.3 Problems of the Unemployed and the Wage worker

Once unemployed, an individual receives a flow payment of bw, where $b < 1$ and w is the equilibrium wage. At rate f, the unemployed transitions to the Walrasian island as a wage worker. At exogenous rate ψ a business opportunity is drawn. Business opportunities are drawn from a distribution F. Let F be exponential of shape β.[13] For integrals to be well defined, assume $\beta > \frac{1}{1-\alpha}$ and $\frac{-2\mu}{\sigma^2} > \frac{1}{1-\alpha}$. In equilibrium we must have $W > U$, otherwise the individual would choose to remain on the unemployment island and markets would not clear on the Walrasian island. This is a direct consequence of the assumption that individuals at any moment can choose not to work.

If the productivity of the potential firm is sufficiently high, the individual makes the choice to become a business owner and receives $J(z)$. It follows the value

[13] Note that F is defined over $z \equiv log(Z)$, as such, assuming F is exponential is equivalent to defining a distribution G from which individuals draw from defined over Z with G being Pareto of scale 1 and shape β.

function of the unemployed individual can be written as

$$rU = bw + f(W - U) + \psi \int_{\underline{z}_u} (J(z) - U)dF(z) \tag{8}$$

where $\underline{z}_u$ is the threshold productivity above which the unemployed individual decides to implement the business project.[14]

Once employed, an individual receives flow payment w, the equilibrium wage. At exogenous rate s, the person transitions onto the unemployment island and receives value U. At rate ψ, the same as for the unemployed, a business opportunity is drawn. If the opportunity is sufficiently productive, in other words, if z is high enough, the wage worker enters business ownership with value $J(z)$. The value function of the employed can be written as

$$rW = w + s(U - W) + \psi \int_{\underline{z}_w} (J(z) - W)dF(z) \tag{9}$$

where $\underline{z}_w$ is the threshold productivity above which the working individual decides to implement the business project.[15] $\underline{z}_u$ and $\underline{z}_w$ are defined by

$$J(\underline{z}_u) = U \tag{10}$$

$$J(\underline{z}_w) = W. \tag{11}$$

The rate and distribution from which unemployed and employed workers receive business opportunities are the same. If they were allowed to be different, given the closer contact of wage workers with the labour market and currently operating firms, the arrival rate would be higher and the distribution shifted to the right for the employed. This would only reinforce the predictions of the model that firms created by employed individuals should last longer and hire more.[16]

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[14]The event in which the unemployed individual obtains a job and a business opportunity simultaneously is measure zero.

[15]The event in which the worker is placed on the unemployment island and receives an opportunity simultaneously is measure zero.

[16]This choice of a similar distribution and rate of arrival of business projects is also motivated by the fact that when taking the model to the data, we explicitly control for the characteristics of the previous employer of the individual which controls partially for any learning mechanisms.

2.4 Market Clearing

Let η be the measure of business owners in the population, u the measure of unemployed and $n(z, w)$ the optimal number of employees for a business owner with a firm of productivity z facing wage w. Then market clearing is determined by

$$(1 - u - \eta) = \int n(z, w)\Lambda(z)dz. \tag{12}$$

The equilibrium wage is linked to the average marginal product of labor as this is in turn linked to the distribution of projects implemented, $\Lambda(z)$.

In frameworks such as these, where all jobs are being created by firms operated by individuals of that economy, demand and supply are tightly linked beyond the price mechanism. Supply and demand are jointly determined by individuals' choices over which side of the market to operate in. This is due to the fact that both job creators and workers come from the same pool. It follows that, beyond the general equilibrium price effect, anything that affects the supply of labor, directly affects labor demand and vice versa, since they are co-determined by the individual's decision to open a business or not.

2.5 Equilibrium Measure of Unemployed Individuals

To close the model, we need the law of motion of the measure of unemployed in the economy, which is given by

$$\dot{u} = s(1 - u - \eta) - fu - \psi(1 - F(\underline{z}_u))u + E \tag{13}$$

and the law of motion of the measure of firms/business owners,

$$\dot{\eta} = \psi(1 - F(\underline{z}_u))u + \psi(1 - F(\underline{z}_w))(1 - u - \eta) - E \tag{14}$$

where u is the measure of unemployed individuals, η the measure of business owners and E the measure of individuals exiting business ownership. Setting equations

13 and 14 to zero and replacing the expression for E in equation 13 gives

$$u = \frac{(s + \psi(1 - F(\underline{z}_w)))(1 - \eta)}{f + s + \psi(1 - F(\underline{z}_w))}. \tag{15}$$

2.6 Characterizing the Equilibrium

Proposition 1 *The solution to the firm's optimal stopping problem implies*

$$J(z) = \frac{B}{r - \frac{\mu}{1-\alpha} - \frac{\sigma^2}{2}(\frac{1}{1-\alpha})^2}(e^{\frac{z}{1-\alpha}} + \frac{1}{a(1-\alpha)}e^{-a(z-\hat{z})+\frac{\hat{z}}{1-\alpha}}) \tag{16}$$

where

$$B \equiv (1-\alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \tag{17}$$

$$a = \frac{\mu + \sqrt{\mu^2 + 2r\sigma^2}}{\sigma^2} > 0. \tag{18}$$

Unsurprisingly, the value function of the business owner $J(z)$ is increasing in productivity for the range of values for which the business operates $z \in [\hat{z}, \infty[$. [17] Let $\Lambda^w(z)$ denote the measure of business owners operating a business project of productivity z that were employed when they received the current business opportunity. Let $\Lambda^u(z)$ be the measure of business owners operating a business project of productivity z that were unemployed at the moment they received the current business opportunity.[18]

[17] To see this note that

$$\frac{\partial^2 J(z)}{\partial z^2} = C(\frac{1}{1-\alpha})(\frac{e^{\frac{z}{1-\alpha}}}{1-\alpha} + ae^{-a(z-\hat{z})+\frac{\hat{z}}{1-\alpha}}) > 0 \tag{19}$$

and for $z = \hat{z}$

$$\frac{\partial J(z)}{\partial z} = 0. \tag{20}$$

This implies for $z \geq \hat{z}$,

$$\frac{\partial J(z)}{\partial z} \geq 0. \tag{21}$$

[18] In other words, this is equivalent to saying that $\Lambda^w(z)$ and $\Lambda^u(z)$ are defined such that

$$\int_{\hat{z}} \Lambda^u(z)dz + \int_{\hat{z}} \Lambda^w(z)dz + u + e = 1 \tag{22}$$

Proposition 2 *For all $i \in \{u, w\}$, the measure of business owners running a firm of productivity z is given by*

- *For $z \in [\hat{z}, \underline{z}_i]$*

$$\Lambda^i(z) = \Lambda^i_1(z) = \frac{M^i}{-\mu}(1 - e^{\frac{2\mu}{\sigma^2}(z-\hat{z})}) \tag{23}$$

- *For $z \in]\underline{z}_i, \infty[$*

$$\Lambda^i(z) = \Lambda^i_2(z) = \frac{\beta M^i \frac{\sigma^2}{-2\mu} e^{\frac{2\mu}{\sigma^2}(z-\underline{z}_i)}}{(\mu + \frac{\sigma^2\beta}{2})} - \frac{M^i}{-\mu} e^{\frac{2\mu}{\sigma^2}(z-\hat{z})} - \frac{M^i e^{-\beta z}}{e^{-\beta \underline{z}_i}(\mu + \frac{\sigma^2}{2}\beta)} \tag{24}$$

where

$$M^i = \psi u e^{-\beta \underline{z}_u} \quad \textit{if} \quad i = u \tag{25}$$

$$M^i = \psi(1 - u - \eta) e^{-\beta \underline{z}_w} \quad \textit{if} \quad i = w. \tag{26}$$

Corollary 2.1 *The measure of business owners, η, and the fraction that were unemployed when they entered entrepreneurship, $\frac{\eta^u}{\eta}$, are given by*

$$\eta = \frac{\psi(1-\eta)}{s + f + \psi e^{-\beta \underline{z}_w}}[A_u(s + \psi e^{-\beta \underline{z}_w}) e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}] \tag{27}$$

$$\frac{\eta^u}{\eta} = \frac{A_u(s + \psi e^{-\beta \underline{z}_w}) e^{-\beta \underline{z}_u}}{A_u(s + \psi e^{-\beta \underline{z}_w}) e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}} \tag{28}$$

where

$$A_i = [\frac{1 + \beta(\underline{z}_i - \hat{z})}{-\mu\beta}] \quad \textit{for} \quad i \in \{u, w\}. \tag{29}$$

We are now ready to define a Stationary competitive equilibrium.

Definition 1 *A Stationary competitive equilibrium is defined by $\underline{z}_u, \underline{z}_w, w, \eta, \eta^u, \Lambda^u(z), \Lambda^w(z), u$ such that*

where e is the measure of workers.

- $W > U$
- $J(\underline{z}_w) = W$
- $J(\underline{z}_u) = U$
- $J(\hat{z}) = J(\underline{z}_u) - \chi$
- *The expression for $J(z)$ is given by Proposition 1*
- *The expression for $\Lambda^u(z)$ and $\Lambda^w(z)$ are given by Proposition 2*
- *u is given by*
$$u = \frac{(s + \psi(1 - F(\underline{z}_w)))(1 - \eta)}{f + s + \psi(1 - F(\underline{z}_w))} \tag{30}$$
- *η and η^u are defined by Corollary 2.1*
-
$$w = \alpha[\frac{1}{(1 - u - \eta)}(\int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda^u(z)dz + \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda^w(z)dz)]^{1-\alpha} \tag{31}$$

The first condition states that the value of being an employed worker is higher than the value of unemployment. Otherwise, no individual would ever choose to transition to wage work and markets would not clear. The second and third conditions guarantee that individuals' decisions to open a business are optimal and the last condition comes from market clearing.

Now I turn to examining the key proposition arising from the model, which generates the patterns documented in the data. It states that in equilibrium, wage workers are more selective about which business opportunities to implement. The necessary and sufficient condition for it to hold is simply that the income received while unemployed is lower than that received while employed. Were it not the case, the equilibrium would not exist as markets would not clear.

Proposition 3 *In equilibrium, $\underline{z}_w > \underline{z}_u \Leftrightarrow b < 1$*

The following corollaries result from the difference in selection on business projects between unemployed and wage workers.

Corollary 3.1 *In equilibrium, businesses created by employed workers have a lower exit rate than those created by unemployed individuals.*

Corollary 3.1 results from business owners exiting at the same threshold while having different levels of selection in the entry into business creation.

Corollary 3.2 *In equilibrium, businesses created by employed workers have a higher firm size and larger profits relative to those created by unemployed individuals.*

Corollary 3.2 is a direct consequence of the fact that both profits and firm size are monotonically increasing in productivity.

Corollary 3.3 *In equilibrium, the entry rate into business ownership of unemployed individuals is higher than that of employed workers.*

Finally, as it is often the case with selection mechanisms, an increased average productivity is associated with a lower entry rate.

The theory predicts that even when we compare ex-ante identical individuals, we should observe differences in outcomes for entrepreneurs that were unemployed when they opened their firm versus those that were working. In the next section I test Corollaries $3.1 - 3.3$.

3 Empirical Section

3.1 Data and Measurement

The data used for the empirical analysis is the Canadian Employer-Employee Dynamics Database (CEEDD). It contains the entire universe of Canadian tax filers, and privately owned incorporated firms. The dataset links employees to firms and firms to their corresponding owners across space and time. This is achieved by linking individual tax information (T1 files, individual tax returns), with linked employer-employee information (T4 files)[19] and firm ownership and structure in-

[19] According to Canadian law, each employer must file a T4 file for each of her employees. The equivalent in the US is the W-2, Wage and Tax Statement. In this form, the employer identifies herself, identifies the employee and reports the labour earnings of the employee.

formation (T2 files).[20] The data is annual and is available from 2001 to 2010. This constitutes an advantage relative to employer-employee firm population data from the US, which does not allow the researcher to identify the owners of the firm.

The data is annual with information on all employers and any businesses an individual owned in a given year. Using this database, I can examine the characteristics of both the business owner and the firm. I concentrate on firms that contribute to job creation by hiring employees. This is done by focusing on employers instead of self-employed individuals.

Business owners are identified as individuals present in the schedule 50 files from the T2 that have employees. Wage workers are identified as those who are not entrepreneurs and report a positive employment income on their T4. I use the information in the T1 files to control for characteristics such as gender, age and marital status. For more information on the data see the Data Appendix.

The linkage between each firm and its corresponding owner is only available for privately owned incorporated firms. Incorporated firms have two key characteristics which correspond closely to how economists typically think about firms : limited liability and separate legal identity. Furthermore, there is a growing literature showing that incorporated firms tend to be larger and that they are more likely to contribute to aggregate employment.[21] There is also evidence that there is little transition from unincorporated to incorporated status.[22] These facts, highlight

[20]T2 forms are the Canadian Corporate Income Tax forms. In the T2 files there is the schedule 50 in which each corporation must list all owners with at least 10% of ownership. This allows me to link each firm to individual entrepreneurs. The equivalent in the US to the schedule 50 of the T2 form is the schedule G of 1120 form (Corporate Income Tax Form in the US)

[21]Glover and Short (2010) document that incorporated entrepreneurs operate larger businesses, accumulate more wealth, and are on average more productive than unincorporated entrepreneurs. Chandler (1977) and Harris (2000) argue that over time the incorporated business structure was created with the explicit goal of fostering investment in large, long gestation, innovative and risky activities.

[22]Levine and Rubinstein (2017) show that there is little transition from unincorporated to incorporated status. They also show that the observed earnings increase for incorporated business owners does not take place before opening the business, indicating that incorporation is not just a result of higher earnings, rather, people choose the firm structure based on their planned business activity. The authors demonstrate how the often cited puzzle, that entrepreneurs earn less than they would have as salaried workers, is no longer true once we consider incorporated business owners. Together with other patterns of income dynamics and observable characteristics of owners, the authors highlight how incorporated businesses are closer to firms in traditional macro models.

how incorporated firms with employees are the most appropriate measure of firms to consider if we are interested in the interplay between entrepreneurship and the aggregate economy.[23]

For the remainder of the paper, the empirical definition of an entrepreneur is an owner and founder of a privately owned incorporated firm with employees.

3.2 Identification

3.2.1 Exogeneity in the state of Unemployment

To verify differences in firms exclusively due to differences in outside options, we need to focus on episodes of random assignment of an individual to unemployment. The question then is how to identify these involuntary transitions to unemployment in the data. One possibility is to identify those unemployed based on whether they received any unemployment insurance during the year. However, such an approach faces endogeneity issues since those who do not expect to be unemployed for long will not take up the benefits. An alternative would be to consider individuals that did not work for the entire year, but that would restrict the analysis to individuals with low labour market attachment.

Instead, I follow an approach inspired in the literature on the effect on employment and earnings of mass layoffs and plant closures.[24] In particular, I identify laid-off individuals as those that lose their job due to a firm closure. Namely, I consider individuals who worked for a firm last year that does not exist this year. In particular, I consider the outcome at year t for individuals that in year $t-1$ were working for a firm that at year t no longer exists (displaced, from hereafter) relative to outcomes for individuals that at $t-1$ worked for a firm that continued to operate

[23] Another reason to focus on incorporated firms with employees is Canadian corporte law. In Canada there are significant tax advantages for incorporating as a higher earner. So to exclude from my analysis high-earning workers that incorporate exclusively due to tax purposes, I focus on incorporated firms with employees.

[24] In the seminal papers of Jacobson et al. (1993) and Couch and Placzek (2010), the authors document significant drops in earnings for displaced workers. Farber (2017) and Song and von Wachter (2014) complement these results by further documenting the drop in employment probability after displacement.

at year t (employed, from hereafter).[25]

These displaced individuals are almost certainly involuntarily in that state. Focusing on the involuntarily out of work is an added benefit. Even if I could see all the unemployed in the data, I would be worried about using them since some are people who quit their job in order to begin the steps of opening their firm. For the remainder of the paper I refer to the individuals, for which their employer shut down, as displaced/laid off workers and those that did not have their employer shut down, as employed workers.[26]

Note that among the individuals that were employed by a firm that still exists this year, we have both individuals that remained employed since last year as well as individuals that had spells of unemployment of less than a year. In other words, the employed workers group is contaminated by individuals that were fired and had unemployment spells of less than a year. These individuals are likely to be negatively selected in overall ability relative to displaced individuals. To resolve this issue, I use within-individual variation when testing the model predictions. This is done by estimating fixed effects regressions.[27]

This implies that I will be comparing between moments when the individual was displaced to moments when the individual remained employed. This is a valid source of variation if displacement shocks due to firm closure are random over the life cycle.[28] We might be worried that individuals are laid off when they were already in a downward trend in income.[29] To verify this is not a concern, I consider

[25]Individuals tagged as displaced are those that were displaced at some point between years $t-1$ and t. Since I am looking at outcomes at year t this means I am looking at individuals that necessarily had less than 1 year of unemployment.

[26]This choice of identifying displaced workers is also a result of having only annual frequency data. Since I cannot observe spells smaller than 1 year of unemployment, I adopt the strategy of using firm closures to proxy for individuals that are unemployed for exogenous reasons for less than 1 year.

[27]Readers interested in the results without fixed effects can refer to section I of the Appendix.

[28]This is equivalent to the parallel trend restriction for validity of difference in difference estimators.

[29]This issue would arise if worker-specific productivity is time varying and firms shut down because many of their workers got hit by a low worker-specific productivity shock.

a individual fixed effect specification of a distributed lag framework:

$$\begin{aligned} ln(y_{i,t}) &= \gamma_1 \mathbb{1}\{\text{Prev U}\}_{i,t-3} + \gamma_2 \mathbb{1}\{\text{Prev U}\}_{i,t-2} + \gamma_3 \mathbb{1}\{\text{Prev U}\}_{i,t-1} \\ &+ \gamma_4 \mathbb{1}\{\text{Prev U}\}_{i,t} + \gamma_5 \mathbb{1}\{\text{Prev U}\}_{i,t+2} + \gamma_6 \mathbb{1}\{\text{Prev U}\}_{i,t+3} + u_i + v_{i,t} \end{aligned} \tag{32}$$

where $\mathbb{1}\{\text{Prev U}\}_{i,t+j}$ is a dummy taking value 1 if the individual was displaced at year $t+j$ and $ln(y_{i,t})$ is total taxable income at year t. [30]

As is standard in the literature on mass layoffs[31], I consider a specification using individual fixed effects, represented by u_i. The use of individual fixed effects implies the variation being used for identification is within individual. This means that the coefficients are being identified by individuals that are displaced at least once in the dataset. The advantage of using within individual variation is that the effect is well-identified. However, we might wonder how these individuals differ relative to the overall population. In terms of observables, individuals that are ever displaced are 6% less likely to be married, on average 2 years younger and earn 20% less income relative to the overall population of 25 to 55 year old men in the dataset. This is the same variation that I use when looking at differences in entry rates into entrepreneurship between displaced and non displaced individuals.

These differences are consistent with individuals that are ever displaced being negatively selected in ability relative to the overall population. It follows that for external validity, we need the differences in outcomes between displaced and non displaced to not depend on ability.[32]

The coefficients on γ_5 and γ_6 tell us whether future displacement shocks have an effect on the current value of income. If there are no pre-trend differences between the moment the individual gets displaced or not we should expect $\gamma_5 \approx 0$ and

[30] I do not consider $j = 1$ because in the data a displacement shock at $t+1$ means the shock happens somewhere in the interval $[t, t+1]$. In particular, if we see a firm in t and that firm is no longer present at $t+1$, it is unclear if the firm died at t or at $t+1$. For that reason we might expect to see lower t income for the individuals tagged as displaced at $t+1$, since for certain cases individuals will have been displaced at t.

[31] Jacobson et al. (1993), Couch and Placzek (2010), Song and von Wachter (2014) and Farber (2017).

[32] Note that this does not preclude ability from having a level effect on outcomes. Instead, we need that ability does not differentially affect the entry rate into entrepreneurship between displaced and non displaced individuals.

$\gamma_6 \approx 0$. Finally, coefficients γ_1, γ_2 and γ_3 serve to inform us if the shock has a persistent effect on income. [33]

Table 1: Tests for Randomness of displacement shock

Dependant Variable	$ln(y_{i,t})$
$\mathbb{1}\{\text{Prev U}\}_{i,t+3}$	0.008
	(0.0036)
$\mathbb{1}\{\text{Prev U}\}_{i,t+2}$	0.009
	(0.0040)
$\mathbb{1}\{\text{Prev U}\}_{i,t}$	-0.047
	(0.0044)
$\mathbb{1}\{\text{Prev U}\}_{i,t-1}$	-0.022
	(0.0044)
$\mathbb{1}\{\text{Prev U}\}_{i,t-2}$	-0.020
	(0.0038)
$\mathbb{1}\{\text{Prev U}\}_{i,t-3}$	-0.016
	(0.0034)
Observations	1691010

Notes: Fixed effects regressions to check randommess of displacement shock.$\mathbb{1}\{\text{Prev U}\}_{i,t+j}$ is a dummy taking value 1 if the individual was displaced at year $t+j$ and 0 otherwise. The dependant variable, $ln(y_{i,t})$, is total taxable income at year t. Only includes men 25 to 54 years old. Standard errors are clustered at the individual level.

The results in Table 1 indicate that displacement shocks two years in the future are associated to a 0.9% ($\gamma_2 = 0.009$) larger present annual income. Similarly, displacement shocks three years in the future are associated to a 0.8% ($\gamma_3 = 0.008$)

[33] The results are robust to including year dummies and controls for age, marital status, province of residence and characteristics of the previous employer (industry and number of employees). The result for this alternative specification is available upon request from the author.

larger present annual income. These differences are small indicating that these shocks are not associated to particular moments in a person's life with unusually high or low income. It is worth noting that significance is likely coming from the large sample size which makes even such small coefficients significant. As a result, these numbers are interpreted as precisely estimated zeros. Finally, Table 1 also tells us that beyond the contemporaneous negative effect on total income, -4.7%, displacement shocks also leave a lasting effect on income in the following years, -2.2% one year later, -2% two years later and -1.6% three years later, which is consistent with the literature on displacement.

3.3 Descriptive Statistics

Next, I go over summary statistics of the data used in the main regressions. The firms used in the analysis are on average young (≈ 2 years old). This is due to the fact that firms used in our analysis must be observable in their first year of operation. They are also on average small (≈ 6 employees). However, the average hides variation in firm size as seen by the standard deviation of 19. As is common in firm datasets, the firm distribution is such that the majority of firms are small but there are a few extremely large firms that account for most of employment. Now focusing on the summary statistics for individuals, the two groups of interest (employed and displaced) have similar average ages (38.48 vs 37.23, respectively). They both seem to have a tendency to be married (58.13% for the employed versus 50.08% for the displaced) and work for large employers (employer size of 233.938 for the employed versus 301.1932 for the displaced). These high employer size averages indicate that most individuals in the dataset are employed by large firms, despite the fact that the majority of firms are small. For a detailed table with average, standard deviation and number of observations for these variables please refer to Section A of the Appendix.

3.4 Main Empirical Results

In this section I verify that the differences in entry and performance of businesses created by laid-off versus employed workers are consistent with the predictions of the theory. The analysis focuses on men between 25 and 54 years of age. Consistent with the model, my two measures of performance are firm number of employees (hereafter, firm size) and the exit rate for entrepreneurs.[34]

The first outcome of interest is differences in the likelihood of opening a firm when an individual is laid off (via firm closure) relative to when working. Let $d_{i,t}$ denote the choice of an individual who does not own a firm. This variable takes value 1 if the individual chooses to open a firm, and 0 otherwise.

Using a fixed-effects linear probability specification, the probability of an individual choosing to open a firm is a function of owner demographic characteristics $X_{i,t}$ (age group dummies, gender, marital status and province of residence), characteristics of the previous employer, $L_{i,t}$ (industry and number of employees), dummies in the current year, T_t, whether the individual was displaced or not prior to entering entrepreneurship, $\mathbb{1}\{\text{Prev U}\}_{i,t}$, and unobserved characteristics η_i :

$$d_{i,t} = \beta_{3,1} + X_{i,t}\gamma_{3,1} + L_{i,t}\gamma_{3,2} + \beta_{3,2}\mathbb{1}\{\text{Prev U}\}_{i,t} + T_t\gamma_{3,4} + \eta_i + \nu_{i,t}. \quad (33)$$

$\beta_{3,2}$ in the equation above represents the difference in the probability of entering entrepreneurship for displaced versus working individuals. The prediction of the model is that $\beta_{3,2} > 0$. Regressions in Table 2 include men 25 to 54 years old that in the prior year, $t-1$, were working for a firm that in the current year, t, was destroyed (were laid off at some point in between $t-1$ and t) and individuals that in $t-1$ were working for a firm that continued to operate in t (were employed between $t-1$ and t). Table 2 shows that when individuals are displaced ($\mathbb{1}\{\text{Prev U}\}_{i,t} = 1$), they are 93% more likely to start a firm.[35] In particular, the results imply that the entry probability into firm ownership doubles when an individual is displaced via firm closure.[36] Column 1 shows the results for the baseline specification, Column 2

[34]This choice of sampling restrictions is made to narrow my focus on individuals with relatively high labour force attachment. All results in this section are robust to using both men and women aged 18 to 65 years old.

[35]These results are consistent with the findings of Evans and Leighton (1989), which state that the unemployed are more likely to become self-employed.

[36]The number of observations in the entry regression is not the same as in Table 8 of summary statistics for individuals, because in the regression I exclude individuals that started a firm by buying a share in an already existing firm.

and Column 3 show the results are robust to excluding individuals that in the prior year were already incorporated without employees and individuals that in the prior year had some unincorporated self-employment income.

Table 2: Entry Probability

	Baseline	Robust 1	Robust 2
$\mathbb{1}\{\text{Prev U}\}_{i,t}$	0.0054	0.0054	0.005
	(0.0002)	(0.0003)	(0.0002)
Ratio of probabilities	1.93	1.93	1.93
Baseline Entry Probability	0.0058	0.0058	0.0058
Fixed Effects	Yes	Yes	Yes
Exclude if prior year incorporated	No	Yes	No
Exclude if prior year self-emp income> 0	No	No	Yes
Observations	15,928,932	15,873,979	15,658,403

Notes: Fixed effects regressions of the indicator for entry into firm ownership on the dummy indicating if the individual was laid off ($\mathbb{1}\{\text{Prev U}\}_{i,t}$). Other controls include age-group dummies, and dummies for marital status, province of residence, current year, 2-digit industry of prior employer, as well as the log number of employees working for the previous employer. Includes men aged 25 to 54 years old. Column 2 excludes individuals that in the last year were already incorporated and Column 3 excludes individuals that in the prior year had positive self-employment income.

Next, I proceed to looking at the differences in outcomes between the firms created upon layoff relative to those created by the employed. To do so, I make use of the subset of individuals used in the estimation of Table 2 that enter entrepreneurship. Furthermore, due to individual fixed effects, these regressions estimating the effect of displacement on entrepreneurial outcomes make use of individuals that had at least two spells of entrepreneurship in the data. Effectively, this means the sample being used for identification is a selected sample relative to the overall population. However, the selection of the sample used for identification is not a concern, as long as the difference in entrepreneurial outcomes following displacement or employment is the same between the selected sample and that of the overall population. I have verified whether this sample is selected in terms of any observables. I found that relative to the overall population of men 25 to 54 year olds, on average, income is 24% higher and individuals are 14% more likely to be married. Hence, these look observationally closer to high ability individuals. It follows that if differences in outcomes between displaced and non displaced does not vary with ability then external validity is preserved. [37]

The first entrepreneurial outcome of interest is the number of employees hired by firms created by employed workers compared to the number of employees by firms created by the displaced. The sample used for estimation in this case are all men 25 to 54 years old that among those used for estimation in Table 2 entered entrepreneurship.[38] In other words, these regressions include business owners that in the prior year to starting their firm, $s-1$, were working for a firm that in the following year, s, was destroyed (were laid off at some point in between $s-1$ and s) and individuals that in the prior year to starting their firm, $s-1$, were working for a firm that continued to operate in the following year, s (were employed between $s-1$ and s). To account for observable characteristics, I control for the business owner's age, marital status, industry, province of residence, the year the business started and a quadratic in the age of the business. To control for the possibility of learning from the previous employer, I control for the number of employees and the industry of the previous employer.[39]

Denote by $y_{i,t}$ the number of employees of a firm owned by individual i in period t. This variable can be expressed as a function of firm characteristics, observable characteristics of the owner, including whether the owner was laid off when the firm was started, and unobservable factors. Consider the following specification :

$$log(y_{i,t}) = \beta_{1,1} + M_{i,t}\gamma_{1,1} + X_{i,t}\gamma_{1,2} + L_{i,t}\gamma_{1,3} + \beta_{1,2}\mathbb{1}\{\text{Prev U}\}_{i,s} + T_t\gamma_{1,4} + u_i + \epsilon_{i,t} \tag{34}$$

[37] If we think that the difference in outcomes when displaced versus employed is smaller for high ability individuals, then the results are a lower bound to the real differences.

[38] In other words, the control group for this estimation is the subset of the control group in the entry probability estimation that entered entrepreneurship.

[39] If firms created by the employed are better than those created by the unemployed, as employees learn from their previous employer, we should expect a close relationship between firm size and industry of the previous employer and the size and industry of the current firm of the entrepreneur.

where $M_{i,t}$ are characteristics of the firm (firm age, start year and industry), $X_{i,t}$ is a matrix containing all observable characteristics of the owner (age group dummies, gender, marital status and province of residence), $L_{i,t}$ are characteristics of the individual's last employer (industry and number of employees), T_t are year dummies, u_i is the set of unobservable individual characteristics affecting firm performance such as innate ability and $\mathbb{1}\{\text{Prev U}\}_{i,s}$ is a dummy indicating if the individual was laid off when the business was started. This equation is estimated using a linear fixed effects regression. $\beta_{1,2}$ gives us the estimated difference in number of employees between firms created by laid-off individuals versus those created by employed workers. The prediction of the model is that $\beta_{1,2} < 0$.

Table 3: Log number of employees

	Baseline	Control for local shocks
$\mathbb{1}\{\text{Prev U}\}_{i,s}$	-0.257	-0.256
	(0.042)	(0.042)
Fixed Effects	Yes	Yes
Interaction of region year dummies	No	Yes
Observations	450,502	450,502

Notes: Fixed effects regressions of log number of employees in the firm on a dummy indicating if the business was started by an individual who was laid off ($\mathbb{1}\{\text{Prev U}\}_{i,s}$). Other controls include age-group dummies, and dummies for marital status, province of residence, start year of business, current year, 2-digit industry, 2-digit industry of prior employer, as well as the log number of employees working for the previous employer. Includes men aged 25 to 54 years old.

Table 3 shows that firms created by individuals when they have been displaced ($\mathbb{1}\{\text{Prev U}\}_{i,s} = 1$) tend to be around 25% smaller relative to firms created by the same individuals when they are working. Column 1 shows results for the baseline specification. One concern is that the results are being driven by aggregate demand effects. In particular, if a large firm in a small city closed down then this might drive the entire city to recession. The displaced individuals that start a firm would exhbit poor business performance due to the low aggregate demand in the city. To verify this effect is not driving the results, in Column 2, I control for each economic region and year pair.[40]

The second measure of differences in firm performance is business survival. Let $z_{i,t}$ denote the choice of an entrepreneur which takes value 1 if the individual chooses to exit firm ownership and 0 otherwise. The sample used for estimation in this case are all men 25 to 54 years old that among those used for estimation in Table 2 entered entrepreneurship.[41] In other words, these regressions include business owners that in the prior year to starting their firm, $s-1$, were working for a firm that in the following year, s, was destroyed (were laid off at some point in between $s-1$ and s) and individuals that in the prior year to starting their firm, $s-1$, were working for a firm that continued to operate in the following year, s (were employed between $s-1$ and s).

Using a fixed-effects linear probability framework, the choice of an entrepreneur to exit entrepreneurship is a function of owner demographic characteristics, $X_{i,t}$, characteristics of the firm, $M_{i,t}$, characteristics of the previous employer, $L_{i,t}$, current year, T_t, whether the owner was displaced or not prior to entering entrepreneurship, $\mathbb{1}\{\text{Prev U}\}_{i,s}$ and unobserved characteristics ζ_i : [42]

$$z_{i,t} = \beta_{2,1} + M_{i,t}\gamma_{2,1} + X_{i,t}\gamma_{2,2} + L_{i,t}\gamma_{2,3} + \beta_{2,2}\mathbb{1}\{\text{Prev U}\}_{i,s} + T_t\gamma_{2,4} + \zeta_i + \upsilon_{i,t}. \quad (35)$$

$\beta_{2,2}$ in the equation above represents the difference in the probability of exiting entrepreneurship for business owners that were displaced by firm closure when they started their business. The prediction of the model is that $\beta_{2,2} > 0$.

[40] The results are also robust to including dummies for the interaction between each industry and year pair.

[41] In other words, the control group for this estimation is the subset of the control group in the entry probability estimation that entered entrepreneurship.

[42] The definition of matrices $X_{i,t}$, $M_{i,t}$, $L_{i,t}$ and $T_{i,t}$ are the same as in the previous regression.

Table 4: Exit Probability

	Baseline	Control for local shocks
$\mathbb{1}\{\text{Prev U}\}_{i,s}$	0.017	0.017
	(0.007)	(0.0065)
Baseline Exit Probability	0.055	0.055
Ratio of probabilities	1.3	1.3
Fixed Effects	Yes	Yes
Interaction of region year dummies	No	Yes
Observations	341,214	341,214

Notes: Fixed effects regressions of the indicator for entrepreneurship exit on a dummy indicating if current business was started by the individual when laid off ($\mathbb{1}\{\text{Prev U}\}_{i,s}$). Other controls include age-group dummies, and dummies for marital status, province of residence, start year of business, current year, 2-digit industry, 2-digit industry of prior employer, as well as the log number of employees working for the previous employer. Includes men aged 25 to 54 years old.

Table 4 shows that firm ownership spells end sooner when the individual was displaced when the firm was started ($\mathbb{1}\{\text{Prev U}\}_{i,s} = 1$).[43] In particular, it implies that the exit rate out of entrepreneurship for individuals that were displaced when they started the business is 30% larger.[44] Column 1 shows the results for the baseline specification. Once more, there is the concern is that the results are being driven by aggregate demand effects. The closing down of a large firm in a small city might push many individuals to entrepreneurship. These individuals in turn will perform poorly due to the low aggregate demand of the city. To verify this effect is not driving the results, in Column 2, I control for each economic region and year pair.[45]

[43] The number of observations is smaller for the regression of the exit of entrepreneurs because in that case I need at least two lags of the current observation to include it in the regressions. Consider the example of a firm that exited after its first year. To include the owner i of the firm in year t, we must see her for the current period t, the period prior, $t-1$, to determine she was an entrepreneur before and the period before that, $t-2$, to see if she started her business after involuntary loss of work or not. For the firm size regression, on the other hand, all that is required is to observe the individual in the current period t and in the previous period, $t-1$, to see if the firm was started following an episode of firm closure.

[44] 30% just comes from $0.017/0.055$.

[45] The results are also robust to including dummies for the interaction between each industry and year pair.

and column 2 shows the results when we add controls for each pair of economic region and year to control for aggregate shocks at the local labor market level.

The patterns documented in the data are consistent with the predictions of the model in the previous section :

- when laid off, conditional on opening a firm, an individual hires 25.7% fewer workers relative to when opening a firm while employed
- when laid off, conditional on opening a firm, an individual is 30% more likely to exit firm ownership, relative to when opening a firm while employed
- being laid off doubles the probability of opening a firm for an individual.

3.5 Alternative mechanisms

The theoretical model is purposely tractable to keep the intuition clear and concise. However, there are other economic mechanisms affecting entrepreneurship in real life not present in the model. In this subsection, I discuss how the empirical results can be interpreted once I consider these additional economic mechanisms.

One alternative story for the empirical findings is that, if firms created after a lay-off tend to be the first firms an individual creates, the results might be capturing learning-by-doing. In particular, individuals might be learning how to be an entrepreneur when they start a firm after a lay-off, subsequently, upon entering from employment they create more productive firms. In Section C of the Appendix, I show that the differences in size and exit rate persist once I control for an individual's total years in the sample as a business owner before the current entrepreneur spell.[46] These results are evidence that learning-by-doing cannot explain the differences in firms created by an individual when laid off, relative to when working for somebody else.[47]

Another alternative mechanism to consider are borrowing constraints. One possibility is that borrowing constraints are present primarily at the extensive margin.

[46]The exact controls I use are discussed in the Appendix.

[47]This is not to say that learning-by-doing does not play a role in a firm's outcomes. This only highlights that it cannot explain the differences in firms created by individuals after a lay-off versus while working for somebody else.

In the absence of any other mechanism, if the unemployed are more likely to suffer from these constraints, we expect the unemployed to be less likely to start firms relative to wage workers. Since what is present in the data is exactly the opposite, the difference in entry rates estimated in the empirical section can be interpreted as a lower bound to the true difference.

Alternatively, borrowing constraints could matter most at the intensive margin. In particular, they might restrict the entrepreneur from achieving their optimal firm size. In this case, due to lower wealth, conditional on a productivity level z, unemployed would be more liquidity constrained than a worker. However, since workers are more likely to start high productivity firms, unconditional on z, but conditional on wealth, workers would be more liquidity constrained relative to the unemployed. The intuition is that, since workers choose higher z on average, they would have a larger demand for capital relative to the unemployed. Therefore, it is not obvious why the unemployed would be differentially more liquidity constrained relative to wage workers when it comes to entrepreneurship. This argument is consistent with Karaivanov and Yindok (2015) who find that, although "involuntary" entrepreneurs have lower average wealth, they are less likely to be credit constrained.[48] These findings are consistent with workers being more liquidity constrained, which implies the estimated differences in firm size and exit are lower bounds to their true values.

4 Additional Model Implication

In this section I present an additional implication of my theoretical model. It is formally derived from an extension of the baseline model to a multi-sector economy.[49] Details of this extension are provided in the Appendix. This implication is closely linked to the differential selection between unemployed and wage workers.

[48] The authors define "involuntary" entrepreneurs as those entering when not having access to the labor market, very similar to the the idea of entering from unemployment.

[49] This additional testable implication can also be derived using the baseline model without multiple sectors and is available upon request from the author. The main added value of the multiple sector framework is to derive a valid instrument for wages to test the prediction.

Proposition 4 *An increase in the wage decreases the entry rate into entrepreneurship among the wage workers by more than that of the unemployed.*[50]

To understand the different channels through which wages affect the selection into entrepreneurship, let us consider two economies, one with larger wages relative to the other. A higher economy-wide wage w increases the cost of hiring other workers, decreasing the incentives to open a firm for both working and laid off-individuals. This translates into higher selection among both laid-off and working individuals. But for a worker, a higher wage also represents a higher opportunity cost of entrepreneurship.[51] As a result, the worker's response to the higher wage is larger than that of a laid-off individual. This differential selection response translates into a differential in entry rate responses to wage changes.

In the Appendix, I show that from the model extension with multiple sectors I can derive the following expression for the entry rate into entrepreneurship in an economy c for wage workers w and the unemployed u.

Corollary 4.1 *The average entry rate for wage workers in an economy* c*,* $ER_{c,w}$ *and that of unemployed individuals* $ER_{c,u}$ *can be expressed as*

$$ER_{c,w} = \beta_{0,w} + \beta_{1,w} log(w_c) + \upsilon_{c,w} \quad \textit{for wage workers} \tag{36}$$

$$ER_{c,u} = \beta_{0,u} + \beta_{1,u} log(w_c) + \upsilon_{c,u} \quad \textit{for unemployed individuals} \tag{37}$$

Combining both into one specification gives

$$ER_{c,n,t} = \alpha_0 + \beta_1 log(w_{c,t}) + \beta_2 \mathbb{1}\{\text{Prev U}\}_{c,t,n} log(w_{c,t}) + \alpha_2 \mathbb{1}\{\text{Prev U}\}_{c,t,n} + \mu_{c,t} \tag{38}$$

where $n = 1$ if the individual is laid off and $n = 0$ if working and $\mathbb{1}\{\text{Prev U}\}_{c,t,n}$ is an indicator for $n = 1$ or $n = 0$. I have added the time subscripts since the data is over different years. The prediction of the theory is that $\beta_1 < 0$ and $\beta_2 > 0$.

[50]See Section D of Appendix for proof of Proposition.

[51]This effect of the wage is also present for the unemployed due to the non-zero probability of transitioning to wage work. But this effect for the unemployed is discounted and so, is weaker.

4.1 Identification

For my identification strategy, I use variation across different local labour markets within the national economy. Individuals belong to a local labour market based on their economic regions of residence.[52] The strategy is to then verify if the entry rate into entrepreneurship in a particular region c, in year t responds differently to wages for unemployed versus employed individuals.[53]

In practice, there might be reasons to believe that certain regions have a more pro-business attitude across all years. As a result, the entry rate in these regions should be higher for all years, pushing up labour demand and raising wages. This region specific time-invariant component would create a positive correlation between the entry rate and wages. To address this concern I include region dummies, $\mathbb{1}\{c\}$. Similarly, there might be years in which the Canadian economy was doing well and entry into entrepreneurship was high, pushing wages higher, which would again bias our results. To address these concerns I include year dummies, $\mathbb{1}\{t\}$. And finally, there might be years in which, due to government policy, it was particularly more advantageous to start a firm as a worker than as a laid-off individual. This would bias the difference in responses between the two groups to a similar wage movement. To control for that variation, I include year dummies interacted with the dummy $\mathbb{1}\{\text{Prev U}\}_{c,t,n}$, indicating whether or not referring to laid off or wage workers. My final specification is

$$\begin{aligned} ER_{c,t,n} &= \xi_0 + \xi_1 log(w_{c,t}) + \xi_2 log(w_{c,t})\mathbb{1}\{\text{Prev U}\}_{c,t,n} \\ &\quad + \xi_3 \mathbb{1}\{\text{Prev U}\}_{i,t} + \mathbb{1}\{c\}\xi_4 + \mathbb{1}\{t\}\xi_5 + \mathbb{1}\{t\}\cdot\mathbb{1}\{\text{Prev U}\}_{c,t,n}\xi_6 + \epsilon_{c,t,n} \qquad (39) \end{aligned}$$

where $\mathbb{1}\{c\}$ are dummies for regions and $\mathbb{1}\{t\}$ are dummies for years. The theory predicts that $\xi_1 < 0$ and $\xi_2 > 0$.

Using the Frisch-Waugh-Lovell Theorem, we know that the estimates of ξ_1 and

[52] Economic regions in Canada correspond closely to commuting zones in the US : there are 76 in total.

[53] Cells for which the number of displaced or employed workers of privately incorporated firms in a given economic region year pair is smaller than 20 observations are excluded from the analysis.

ξ_2 are the same as those obtained from the specification

$$\widehat{ER}_{c,t,n} = \xi_0 + \xi_1 \widehat{log(w_{c,t})} + \xi_2 log(w_{c,t})\widehat{\mathbb{1}\{\text{Prev U}\}}_{c,t,n} + nu_{c,t} \tag{40}$$

where $\widehat{x} = x - (\hat{\xi}_3 \mathbb{1}\{\text{Prev U}\}_{c,t,n} + \mathbb{1}\{\text{Prev U}\}_{c,t,n} \cdot \mathbb{1}\{t\}\hat{\xi}_4 + \mathbb{1}\{c\}\hat{\xi}_5 + \mathbb{1}\{t\}\hat{\xi}_6)$ and $(\hat{\xi}_3,\hat{\xi}_4, \hat{\xi}_5,\hat{\xi}_6)$ are obtained by regressing x on $\mathbb{1}\{\text{Prev U}\}_{c,t,n}$, $\mathbb{1}\{\text{Prev U}\}_{c,t,n} \cdot \mathbb{1}\{t\}$, $\mathbb{1}\{c\}$ and $\mathbb{1}\{t\}$. For region level wages, it amounts to correcting for region and year specific averages :

$$\widehat{w}_{c,t} = w_{c,t} - \sum_{t}^{T} w_{c,t} - \sum_{c}^{C} w_{c,t}. \tag{41}$$

This result highlights how identification comes from comparing wage growth across regions.

4.2 Exogeneity

Despite the use of these additional dummies in regions and years to clean up the variation being used, there is still reason to expect that OLS estimates are biased. This is due to the presence of region-year specific demand shocks in the error term. We expect an OLS specification to be biased by a positive relationship between wages and the entry rate into entrepreneurship.[54]

To address this problem, I use an instrumental variable strategy that exploits the variation in wages due to differences in industrial composition across cities. The instrument I use was first proposed by Beaudry et al. (2012).[55] In particular, the instrument for $log(w_{c,t})$ is

$$IV_{c,t} = \sum_{\forall i} \kappa_{c,i,1} log(w_{i,t}^N) \tag{42}$$

where i stands for industry, $\kappa_{c,i,1}$ is the first sample year employment share of industry i in region c and $log(w_{i,t}^N)$ is the wage for industry i at the national level at

[54]Demand shocks are understood here as any shocks that induce more job creation by firms. One example is a TFP shock.

[55]The authors derive the instrument from a model in which industry spillovers arise via Nash bargaining over wages.

year t. This term is correlated to $w_{c,t}$ due to across city variation in industrial composition.[56] The intuition is that regions with a higher concentration of high-paying industries in the past have larger region-wide wages.[57]

The instrument relies on the traditional assumptions used for Bartik instruments. It requires region-wide demand shocks to be uncorrelated with the industrial composition of the region in the first year of the sample.[58] One concern is allowing for mobility of individuals across regions. Section E of the Appendix shows how allowing for imperfect mobility across regions does not change our empirical specification.

4.3 Results

Column 1 of Table 5 indicates that when we ignore endogeneity, we get a positive relationship between wages and the entry rate for both employed (0.002) and laid-off individuals ($0.002 + 0.016$) as predicted by the theory. This is consistent with the intuition that the endogeneity is being caused by demand shocks. Looking at the IV results in column 2 of Table 5, we see that the positive relationship between wages and the entry rate into entrepreneurship goes from positive to negative for the employed (0.002 to -0.032) and from positive to zero for the unemployed (0.018 to -$0.032 + 0.032$). The results in column 2 indicate that the entry rate into entrepreneurship of wage workers is more responsive to wages (3.2 percentage points increase for a 1% increase in wages) than the entry rate into entrepreneurship of the unemployed (no impact of wages). This differential is due to the role of wages as an opportunity cost to entrepreneurship for wage workers. Finally, note that the first stage is strong as indicated by the F-statistic in column 2, row 6.

[56] Variation in the vector of $\kappa_{c,i,1}$.

[57] See Section F of the Appendix for full details on how this instrument and the main explanatory variable of interest, $w_{c,t}$, are constructed in the data.

[58] See Section D of Appendix for formal conditions on the model structure to guarantee validity of the instrument.

Table 5: Additional Implication Results

	OLS	IV
$log(w_{c,t})$	0.002	-0.032
	(0.0077)	(0.016)
$log(w_{c,t}) \cdot \mathbb{1}\{\text{Prev U}\}_{c,t,n}$	0.016	0.032
	(0.0044)	(0.005)
City Dummies	Yes	Yes
Year Dummies	Yes	Yes
Year Dummies X $\mathbb{1}\{\text{Prev U}\}_{c,t,n}$	Yes	Yes
Kleibergen-Paap rk Wald F Statistic		100.92
Observations	1357	1357

Notes: Linear regression with $ER_{c,n,t}$, the entry rate into firm ownership, as dependent variable. The main explanatory variables are $log(w_{c,t})$, log of wages at the city c and year t level, and $log(w_{c,t}) \cdot \mathbb{1}\{\text{Prev U}\}_{c,t,n}$, the interaction between $log(w_{c,t})$ and $\mathbb{1}\{\text{Prev U}\}_{c,t,n}$, an indicator taking value 1 if referring to the laid off and 0 if referring to employed individuals.

5 Policy Counterfactuals

In this section I evaluate the impact on job creation of a policy that promotes entrepreneurship among the unemployed. This is done by transferring a share of total unemployment insurance income in the economy to unemployed individuals that start businesses.

The theoretical framework does not model explicit frictions that rationalize policies promoting entrepreneurship. One way of generating welfare gains from these policies is to introduce liquidity constraints associated with startup costs. Such an addition would limit the tractability of the model, without adding to the main message of the paper, that policies subsidizing the unemployed affect the allocation of resources across firms. For this reason, I leave such an extension for future work and take as given that governments implement these policies. I focus on the impact that these policies have on the selection margins of the unemployed and wage worker as well as the resulting effect on the firm productivity distribution and on job creation.

Until now, the model has disregarded the general equilibrium effects of the entrepreneurship margin on the job finding rate, which has been assumed exogenous and equal to f. Yet, to understand the impact of a policy on the unemployment rate, it is crucial to allow the job finding rate to be an equilibrium object. For this reason, I propose a simple extension of the benchmark model presented in Section 2 which allows for the entrepreneurship margin to affect the job finding probability via general equilibrium. This is done by adding congestion externalities to the model.

A tractable way to do that is to assume that firms managed by an entrepreneur do not directly hire labour. Instead, they buy an intermediate good y. This intermediate good is produced with labour in a one-to-one fashion.[59] The entrepreneur takes the price of the intermediate good ρ as given and proceeds as before, deciding how many intermediate goods to use (static problem) and when to stop producing (dynamic problem). The only difference is that entrepreneurs, instead of hiring labour directly, buy intermediate goods y from intermediate goods producers that face search frictions.[60]

I assume the existence of a large set of intermediate goods producers, each of which can decide to post a vacancy at any point in time.[61] The flow cost of posting a vacancy for intermediate goods producers is a fraction c of the equilibrium wage w. When an intermediate goods producer finds a worker, it begins production and obtains a flow return of $\rho - w$. Job vacancies and unemployed workers match according to a constant returns to scale matching function given by $Kv^{\gamma}u^{1-\gamma}$, where u is the measure of unemployed and v the measure of vacancies. The rate at which the unemployed find jobs is given by $p(\theta)$ where $\theta \equiv \frac{v}{u}$. The value function of the

[59] One can think of that as an intermediate sector that must transform workers so they can be employed by the entrepreneurs. The intermediate good is then just "transformed labour".

[60] This way of introducing search frictions follows closely Beaudry et al. (2018), who also include search frictions in a model of entrepreneurship using an intermediate goods sector.

[61] This means that for the intermediate goods sector, firms do not come from the same pool as workers, the unemployed and entrepreneurs.

unemployed, U, is now defined by

$$rU = bw + p(\theta)(W - U) + \psi \int_{\underline{z}_u} (J(z) - U) dF(z). \tag{43}$$

Let s be the rate at which matches exogenously break up, then the value function of the worker, W, is as before. Wages are determined by Nash Bargaining,

$$\phi(W - U) = (1 - \phi)(F - V) \tag{44}$$

where F is the value of a filled vacancy and V of an unfilled vacancy in the intermediate sector. The price of intermediate goods ρ is determined by market clearing

$$(1 - u - \eta) = \int_{\hat{z}} n(z, \rho) \Lambda(z) dz \tag{45}$$

where η is the measure of entrepreneurs, $n(z, \rho)$ the optimal number of intermediate goods to hire for a firm of productivity z facing price ρ, and $\Lambda(z)$ is the measure of firms of productivity z. The full solution of this extension is in Supplemental Appendix II.

5.1 Parametrization Strategy

I make use of the my full population adminstrative data to choose the model parameters. I consider an annual frequency. r is set to 4.5%. α, the curvature of the production function of the entrepreneur, is equal to the aggregate labour share, and, as such, is set to $\frac{2}{3}$. Remember the matching function is of the form $m(u, v) = K u^{\gamma} v^{1-\gamma}$. I follow Shimer (2005) in setting γ equal to 0.72. Still following Shimer (2005), I set ϕ, the Nash Bargaining parameter, equal to γ. The rate at which workers transition to unemployment s is taken from Hobijn and Şahin (2009).[62] For the cost of posting a vacancy, I note that as in Shimer (2005), the model allows a normalization. From the free entry condition and the expressions

[62] The authors estimate the rate at which employed individuals transition to non-work for twenty-seven OECD countries, including Canada.

for the value of an unfilled and a filled vacancy I arrive at[63] :

$$\frac{cw}{q(\theta)} = \frac{\rho - w}{r + s} \Rightarrow \theta = \left(\frac{cw(r+s)}{(\rho - w)K}\right)^{-\frac{1}{\gamma}} \tag{46}$$

Equation 46 implies that doubling c and multiplying k by a factor of $2^{1-\gamma}$ divides θ by half and doubles the rate at which intermediate good firms contact workers, $q(\theta)$, but does not affect the rate at which workers find jobs, $p(\theta)$. It follows that we can normalize θ. I follow Shimer (2005) and choose c so as to normalize θ to 1. Table 12 in section H of the Appendix contains the results for an alternative calibration in which I follow Hagedorn and Manovskii (2008) in setting the cost of posting a vacancy to 4.5% of the equilibrium wage, $c = 0.045$. The results are robust to this alternative calibration. There is a large literature proposing different values for b and different ways to identify it.[64] For the main calibration, I chose a mid-value between the values proposed by the literature of $b = 0.6$. To verify the main results are not sensitive to this choice I consider alternative calibrations where I change the value of b. In Table 11 of the Appendix I show the results for different replacement rate values, b.[65]

For μ and σ, the parameters governing the evolution of productivity of entrepreneur owned firms, I use the average growth rate in firm size conditional on positive growth and the tail parameter of the ergodic size distribution. In Section G of the Appendix I state and prove the formal theorem relating these moments.

Finally, to make the model consistent with the patterns in the data, I choose β, the shape parameter of the exogenous distribution individuals draw opportunities from, $F(z)$, χ, the cost of shutting down and K, the scale parameter of the matching function, to match the differences in the entry rate between the unemployed

[63] See Supplemental Appendix II for expressions

[64] See Mortensen and Nagypal (2007), Hall and Milgrom (2008), Costain and Reiter (2008), Pissarides (2009), Chodorow-Reich and Karabarbounis (2016).

[65] Changes in b do not alter the main conclusion of the paper. For varying b, the effect of the subsidy policy on average firm productivity $E[z]$ varies from -0.9% to -3.43%. The effect on the unemployment rates (in percent change) varies from -0.004% to -2.23%. It follows that all the main conclusions from the baseline calibrations continue to hold for different b values. Interestingly, the drop in average firm productivity, $E[z]$ is increasing in the replacement rate, b. The reason is that for low enough b, almost all unemployed are already entering entrepreneurship. As a result, a policy to subsidize entry into entrepreneurship has close to no effect on the unemployed if b is small.

and workers and the differences in size and exit between the firms created by both groups. In other words, I chose β, χ and K to match the results in Regression Tables 2, 3 and 4.

The calibration delivers a value of χ of 0.268, which represents a cost equivalent to 6% of average firm revenue. This is consistent with World Bank data (Ease of Doing Business Statistics) for which the cost of resolving firm insolvency for Canada is estimated at 7% of the debtor's estate. Finally, ψ is shown to not matter in the impact for the policy in the economy. In Table 10 of Section H of the Appendix I show that the results are robust to changing the values for ψ. In the baseline calibration I choose $\psi = 24$, corresponding to an average arrival time for business projects of $\frac{1}{2}$ a month. See Table 14 in the Appendix for a complete list of parameter and sources/targets used.

5.2 Policy Analysis

In this section I use the quantative version of the model with search frictions and one of the baseline model to evaluate the impact of a policy that subsidizes entry into entrepreneurship among the unemployed. The calibration for the baseline model follows the calibration described for the model extension with the only additional caveat that the rate at which the unemployed become workers (f) is set to match the job finding rate in the model extension and is kept at that same value once I evaluate the impact of policy.

I consider a policy that takes 5% of total unemployment insurance (UI) income and redistributes it to any unemployed individual that makes the decision to start a firm. The entrepreneurship subsidy policy corresponds to entrepreneurs that were unemployed when starting their firm receiving 30% of their previously received UI benefits during their first year of business. This is less than, but comparable in magnitude to, the subsidy program in British Columbia in which entrepreneurs entering from unemployment remain eligible to their full UI benefits for the first 38 weeks of operating the business.[66]

[66]For the year 2016, given an average unemployment rate below 8%, residents of the province were entitled to a maximum of 40 weeks of employment insurance. This means that an unemployed that applied to receive the subsidy is entitled as an entrepreneur to virtually the entirety of the benefits

In Table 6 Column 1 we see that the effect of the policy in the benchmark model is a drop in average firm productivity , $E(z)$ (-3%)), a small drop in the unemployment rate (-1%, **percent change**) and an increase in wages (1.29%). Despite the relative lack of movement in the unemployment rate, there is an important change in the composition of firms. This reallocation can be seen with the change in the number of jobs created by wage workers, (-6.39%), and of jobs in firms started by the unemployed, (14.49%). The new equilibrium is one in which more resources are being used by firms created by the unemployed (low productivity) at the expense of less being used by firms created by wage workers (high productivity). Consistent with this, the average firm exit rate increases.

The subsidy policy makes entrepreneurship relatively more attractive to the unemployed. Hence, their level of selectivity decreases, prompting a rise in the mass of firms in the economy (via more low productivity firms). The increase in low productivity firms decreases average firm productivity. The rise in the number of firms increases labour demand which in turns puts upward pressure on wages. The rise in wages decreases the value of being an entrepreneur and increases the value of being a wage worker. As a result of these two forces, the wage worker becomes more selective on which business projects to implement.[67] This further increases the share of firms created by the unemployed.

they were entitled as unemployed in British Columbia, Canada.

[67] Note that for the wage worker all that has changed in the world with the policy is that wages are higher. In the new equilibrium with the policy the value of being an entrepreneur is higher for the unemployed and lower for the wage worker.

Table 6: Policy outcomes

	Benchmark	Extension
	(1)	(2)
$\Delta E[z]$	-3%	-2.14%
Δ Unemployment Rate (percent change)	-1%	-1.11%
Δ Wage	1.29%	0.65%
Δ Labor Market Tightness (θ)	–	2.35%
Δ Jobs by Firms created by Unemployed	14.49%	7.12%
Δ Jobs by Firms created by Workers	-6.39%	-7.1%
Δ Average Firm Exit Rate (percent change)	55.42%	36.37%

Notes: Outcome of policies that make a share of total UI benefits income conditional on the unemployed opening a firm. $\Delta E[z]$ is the percentage change in the average firm productivity, Δ Jobs by firms created by workers is the percentage change in the measure of jobs associated to firms created by wage workers, Δ Unemployment is the percentage change in the unemployment rate. The policy takes 5% of total unemployment insurance (UI) income and redistributes it to any unemployed individual that makes the decision to start a firm. The entrepreneurship subsidy policy corresponds to entrepreneurs that were unemployed when starting their firm receiving 30% of their previously received UI benefits during their first year of business.

In Table 6 Column 2 we see that the effect of the policy in the model extension is almost identical for average firm productivity, $E(z)$ (-2.14%) and unemployment (-1.11%, **percent change**). The key difference in the mechanism lies in the response of wages to the shock and its contribution to the general equilibrium effect, 1.29% wage increase for the benchmark model versus 0.65% for the model extension.

After the drop in selectivity among the unemployed and the corresponding increase in the number of firms, the price of intermediate good increases. This prompts more intermediate good firms to post vacancies, which in turn increases labour market tightness.

The increase in labour market tightness has a direct and indirect general equilibrium effect. The direct effect is to increase the job finding rate, making wage work more attractive relative to entrepreneurship. Together with the increase in the price of intermediate goods, it increases workers' selectivity. The indirect effect is the rise in the worker's threat point during wage bargaining. As a result, workers bargain higher wages, further increasing the value of wage work relative to entrepreneurship. The indirect effect complements the direct effect further increasing worker selectivity.

Since wages are determined via Nash Bargaining rather than supply and demand the responsiveness of wages is smaller in the model extension with search frictions. But the total effect on aggregates ends up being similar because with search frictions the model gets one more margin of adjustment, labor market tightness. In contrast, for the benchmark model, all of the general equilibrium adjustment can only happen via prices. The implication is a much smaller wage increase in the model with search frictions.

Note that, despite the increase in job finding rate in the model extension and its absence in the benchmark, both models deliver a same change in the unemployment rate. This is achieved by a larger inflow into the pool of unemployed in the model extension relative to the benchmark model. This happens via a larger increase in the firm failure rate in the model extension (55.42%) relative to the benchmark model (36.37%).

Brief discussion and conclusion

I conclude that, in the context of my model, the policy has close to no impact on the unemployment rate while decreasing average firm productivity and reallocating resources from high to low productivity firms. The results also highlight the importance of general equilibrium effects. In particular, the channel of these general equilibrium effects will depend on the labor market structure. Note that, although I abstract from negative selection into unemployment on worker ability, adding this margin would only strengthen the results presented here. [68]

Some caveats are in order. The policy experiment is done looking at steady state outcomes. An interesting question is how the effect of the policy in the economy changes with the business cycle. Intuitively, it is not obvious whether the effect of the policy is larger or smaller during recessions. At one hand, during recessions, the pool of unemployed is higher. This increases the pool of individuals affected by the policy. At the other hand, during recessions, the unemployed are more desperate to leave unemployment. This would mean the unemployed are more likely to start firms, indicating that the selection is already pretty low among them. This decreases the degree to which entry among the unemployed could response to the policy.

6 Conclusion

I study the differences between firms created by unemployed individuals relative to otherwise identical employed individuals. I show that these differences are important for our understanding of job creation policies that promote entrepreneurship among the unemployed.

I develop a general equilibrium model of endogenous business ownership. In this framework, the only difference between unemployed and employed individuals is their outside option. In equilibrium, due to poorer outside options, the unemployed are more likely to open a firm, but conditional on doing so, generate smaller firms that shut down sooner. I test these implications using a novel confidential dataset with the universe of Canadian tax filers. I use firm closures to identify random assignments of an individual to unemployment. I find that unemployment induces a doubling of the probability to start a business, and conditional on doing so, an individual hires 26% fewer workers and is 30% more likely to exit entrepreneurship. Finally, I use the data facts to discipline a numerical version of the model. I evaluate the impact of a policy that subsidizes entry into entrepreneurship among the unemployed. The result is a drop in average productivity despite little movement in the unemployment rate. Furthermore, the policy induces the creation of low productivity firms that crowd out resources from high productivity firms.

[68] This is conditional on worker and entrepreneurial ability being positively correlated.

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A For Online Publication - Data Appendix

In this section I describe the components of the dataset being used. The construction of the data was done by Statistics Canada and not by the author.

The dataset is a combination of information from three types of tax forms in Canada. The first is the T1 form, which is just the individual tax return form.[69] From there, we get demographic information, age and marital status, total annual income of the individual and total labour earnings of the individual. The second is the T4 form. This is a form that every employer must file for each of its employees.[70] These files give us information for each individual the firms for which they worked for and their labour earnings in that tax year. The final tax files come from the schedule 50 of the T2 form. According to Canadian law, incorporated firms must list all owners that have at least 10% ownership. These files allow me to link each firm to individual entrepreneurs.[71] Together these files allow me to link each individual to a firm they are working on or to a firm they own.

The last step is matching all these incorporated firms to firms present in the Longitudinal Employment Analysis Program (LEAP) Dataset. This dataset contains the entire universe of firms with employees in Canada, whether incorporated or not. From this dataset, I get a measure of the number of employees for each firm (ALU, average labour unit). The matching with the LEAP dataset allows us to construct a time consistent firm identifier that takes into account mergers and splitting of a same firm in multiple ones.[72]

Next I present more detailed summary statistics on both the firms and individuals used in our estimation. Table 7 gives the summary statistics for firms operated

[69] The equivalent in the United States is the 1040A form.

[70] The equivalent in the US is the W-2, Wage and Tax Statement.

[71] The equivalent in the US to the schedule 50 of the T2 form is the schedule G of 1120 form (Corporate Income Tax Form in the US). The only difference is that under US law, a corporation only needs to list owners that own at least 20% of the firm.

[72] To identify a same firm the LEAP dataset uses a strategy entitled "labour tracking". If a firm A splits into firm B and firm C but continues to do the exact same business as before, the method marks firms B and C with the identifier of firm A, since firm B and C together have the same industry and workforce as A. This is important since for all purposes, nothing has changed except for the official naming of the company that now are two firms, even though the owners and employees are the same. For more details see the Statistics Canada website.

by the entrepreneurs in the data. Each observation is an entrepreneur operating an incorporated firm with employees in a given period of time. Looking at the first row, we see that the firms used in our analysis are on average young (≈ 2 years old). This is due to the fact that firms used in our analysis must be observable in their first year of operation. Then, looking at the second column, it is clear that the firms used in the analysis are on average small (≈ 6 employees). However, the average hides variation in firm size as seen by the standard deviation of 19. As is common in firm datasets, the firm distribution is such that the majority of firms are small but there are a few extremely large firms that account for most of employment.

Table 7: Summary Statistics Firms

	Mean	Std Dev	Number obs
Firm Age (in years)	2.0753	1.9777	$450,502$
Number of Employees	5.8736	19.4214	$450,502$

Notes: Summary statistics for privately owned incorporated firms with employees for which first year of operation is observable in the sample. Each observation is an entrepreneur with a firm in a given year. Includes only male entrepreneurs between 25 to 54 years of age.

In Table 8, I report summary statistics for individuals that last year worked for an employer that no longer operates in the current year (laid-off workers) and those who remain employed (not laid-off). Each observation is an individual in a given year. The first two rows report statistics for age (38.48 versus 37.23) and marriage rates (0.58 versus 0.51). In the third row, I report the average size of the last year employer for these individuals (laid-off, 233 versus not laid-off, 301). The averages for both groups indicate that most individuals in the dataset are employed by large firms despite the fact that the majority of firms are small (See Table 7).

Table 8: Summary Statistics Individuals

	Employed			Laid off		
	Mean	Std Dev	# obs	Mean	Std Dev	# obs
Age	38.48	8.55	$15,651,346$	37.23	8.5074	$284,807$
Married	0.5813	0.4933	$15,651,346$	0.5080	0.4999	$284,807$
Employer size	233.938	875.8583	$15,651,346$	301.1932	868.9306	$284,807$

Notes: Summary statistics for individuals that last year worked for a privately owned incorporated firm that this year shut down (laid off) and this year did not (not laid off). Includes only men between 25 to 54 years of age. Age is the age of the individual, marital status is a dummy taking value 1 if the individual is married and 0 otherwise. Employer size is the number of employees of the employer of the individual. Married is a dummy taking value 1 if individuals are married.

B For Online Publication - Proofs Benchmark Model

For proofs and characterization of model with multiple sectors see Supplemental Appendix to the paper.

Proof of Proposition 1.

We know that $J(z)$ is equal to U, $\forall z \leq \hat{z}$. We need to find the value of $J(z)$ for $z \geq \hat{z}$.

Define

$$B \equiv (1-\alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \tag{47}$$

Guess that $J(z)$ will be of the form $Ce^{\frac{z}{1-\alpha}} + Ge^{-az}$ for $z \geq \hat{z}$. Imposing the $J'(\hat{z}) = 0$ condition

$$aGe^{-a\hat{z}_i} = C(\frac{1}{1-\alpha})e^{\frac{1}{1-\alpha}\hat{z}_i} \tag{48}$$

$$G = \frac{C}{a(1-\alpha)} e^{\hat{z}_i(\frac{1}{1-\alpha}+a)} \tag{49}$$

Then

$$rCe^{\frac{z}{1-\alpha}} + rGe^{-az} = Be^{\frac{z}{1-\alpha}} + \frac{\mu}{1-\alpha}Ce^{\frac{z}{1-\alpha}} - \mu Gae^{-az} + \frac{\sigma^2}{2}(\frac{1}{1-\alpha})^2 Ce^{\frac{z}{1-\alpha}} + \frac{\sigma^2}{2}Ga^2e^{-az} \tag{50}$$

Then solving gives C defined by

$$rC = B + \frac{\mu}{1-\alpha}C + \frac{\sigma^2}{2}(\frac{1}{1-\alpha})^2 C \tag{51}$$

$$C = \frac{B}{r - \frac{\mu}{1-\alpha} - \frac{\sigma^2}{2}\frac{1}{(1-\alpha)^2}} \tag{52}$$

and a defined by (condition to guarantee $rG = -\mu Ga + \frac{\sigma^2}{2}Ga^2$)

$$r = -\mu a + \frac{\sigma^2}{2}a^2 \tag{53}$$

Choosing the positive root[73]

$$a = \frac{\mu + \sqrt{\mu^2 + 2r\sigma^2}}{\sigma^2} > 0 \tag{57}$$

[73] Choosing the positive root makes sense, or else for parameters values that satisfy $|a| > \frac{1}{1-\alpha}$

$$\lim_{z\to\infty} J(z) = -\infty \tag{54}$$

to see this first note that

$$\frac{\partial J(z)}{\partial z} = C(\frac{1}{1-\alpha})(e^{\frac{z}{1-\alpha}} - e^{-a(z-\hat{z})+\frac{\hat{z}}{1-\alpha}}) \tag{55}$$

It follows that if $a < 0$ and $|a| > \frac{1}{1-\alpha}$, $\exists z_o$, s.t.: $\forall z > z_o$

$$\frac{\partial J(z)}{\partial z} < 0 \quad \forall z > z_o \tag{56}$$

Which then implies

$$J(z) = C(e^{\frac{z}{1-\alpha}} + \frac{1}{a(1-\alpha)}e^{-a(z-\hat{z})+\frac{\hat{z}}{1-\alpha}}) \tag{58}$$

$$J(z) = \frac{B}{r - \frac{\mu}{1-\alpha} - \frac{\sigma^2}{2}(\frac{1}{1-\alpha})^2}(e^{\frac{z}{1-\alpha}} + \frac{1}{(1-\alpha)}e^{-a(z-\hat{z})+\theta\hat{z}}) \tag{59}$$

Proof of Proposition 2.

Solving generic KFE. The solution below is the same for both types of business owners (i.e., $i = u, w$)

Let $\hat{z}$ be the point at which firms exit and $\underline{z}_i$ the point in which firms enter, with $\underline{z}_i > \hat{z}$. Let $\Lambda(z)$ denote the endogenous pdf and M the measure of entrants. For type u ($i = u$), M is equal to $\psi u e^{-\beta \underline{z}_u}$ and for type w ($i = w$) M is equal to $\psi(1-u-\eta)e^{-\beta \underline{z}_w}$

Finally, let for $[\underline{z}_i, \infty[$

$$\Lambda^i(z) = \Lambda^i_2(z) \tag{60}$$

and for $]\hat{z}, \underline{z}_i]$

$$\Lambda^i(z) = \Lambda^i_1(z) \tag{61}$$

Then for $[\underline{z}_i, \infty[$

$$\frac{\partial \Lambda^i_2(z)}{\partial t} = -\mu \frac{\partial \Lambda^i_2(z)}{\partial z} + \frac{\sigma^2}{2}\frac{\partial^2 \Lambda^i_2(z)}{\partial z^2} + M^i \frac{\beta e^{-\beta z}}{e^{-\beta \underline{z}_i}} = 0 \tag{62}$$

for $]\hat{z}, \underline{z}_i]$

$$\frac{\partial \Lambda^i_1(z)}{\partial t} = -\mu \frac{\partial \Lambda^i_1(z)}{\partial z} + \frac{\sigma^2}{2}\frac{\partial^2 \Lambda^i_1(z)}{\partial z^2} = 0 \tag{63}$$

The four boundary conditions are

1. $\int_{\underline{z}_i}^{\infty} \Lambda^i(z)dz < \infty$

2. $\Lambda^i_1(\underline{z}_i) = \Lambda^i_2(\underline{z}_i)$

3. $\frac{\partial \Lambda^i_1(\underline{z}_i)}{\partial z} = \frac{\partial \Lambda^i_2(\underline{z}_i)}{\partial z}$

4. $\Lambda_1^i(\hat{z}) = 0$

Guess

$$\Lambda_1^i(z) = k_1^1 + k_2^1 e^{\frac{2\mu}{\sigma^2} z} \tag{64}$$

and

$$\Lambda_2^i(z) = k_1^2 + k_2^2 e^{\frac{2\mu}{\sigma^2} z} - \frac{M^i e^{-\beta z}}{e^{-\beta \underline{z}_i}(\mu + \frac{\sigma^2}{2}\beta)} \tag{65}$$

From $\int_{\underline{z}_i}^{\infty} \Lambda^i(z) dz < \infty$ we get

$$k_1^2 = 0 \tag{66}$$

From $\Lambda_1^i(\underline{z}_i) = \Lambda_2^i(\underline{z}_i)$ we get

$$k_2^2 = \frac{M^i}{\mu + \frac{\sigma^2}{2}\beta} e^{\frac{-2\mu}{\sigma^2} \underline{z}_i} + k_1^1 e^{\frac{-2\mu}{\sigma^2} \underline{z}_i} + k_2^1 \tag{67}$$

From$\frac{\partial \Lambda_1^i(\underline{z}_i)}{\partial z} = \frac{\partial \Lambda_2^i(\underline{z}_i)}{\partial z}$ we get

$$k_2^2 = k_2^1 - \frac{\beta M^i \frac{\sigma^2}{2\mu} e^{\frac{-2\mu}{\sigma^2} \underline{z}_i}}{(\mu + \frac{\sigma^2 \beta}{2})} \tag{68}$$

Equating equations (67) and (68)

$$k_1^1 = \frac{-M^i}{\mu} \tag{69}$$

This implies

$$\Lambda_1^i(z) = \frac{M^i}{-\mu} + k_2^1 e^{\frac{2\mu}{\sigma^2} z} \tag{70}$$

Now using $\Lambda_1^i(\hat{z}) = 0$ we get

$$k_2^1 = \frac{M^i}{\mu} e^{\frac{-2\mu}{\sigma^2} \hat{z}} \tag{71}$$

It follows

$$\Lambda_1^i(z) = \frac{M^i}{-\mu}(1 - e^{\frac{2\mu}{\sigma^2}(z-\hat{z})}) \tag{72}$$

and

$$k_2^2 = \frac{M^i}{\mu}e^{\frac{-2\mu}{\sigma^2}\hat{z}} - \frac{\beta M^i \frac{\sigma^2}{2\mu}e^{\frac{-2\mu}{\sigma^2}\underline{z}_i}}{(\mu + \frac{\sigma^2}{2}\beta)} \tag{73}$$

which implies

$$\Lambda_2^i(z) = \frac{\beta M^i \frac{\sigma^2}{-2\mu}e^{\frac{2\mu}{\sigma^2}(z-\underline{z}_i)}}{(\mu + \frac{\sigma^2\beta}{2})} - \frac{M^i}{-\mu}e^{\frac{2\mu}{\sigma^2}(z-\hat{z})} - \frac{M^i e^{-\beta z}}{e^{-\beta \underline{z}_i}(\mu + \frac{\sigma^2}{2}\beta)} \tag{74}$$

Proof of Corollary 2.1.

It then follows

$$\eta^i = \int_{\hat{z}}^{\underline{z}_i} \Lambda_1^i(z)dz + \int_{\underline{z}_i}^{\infty} \Lambda_2^i(z)dz \tag{75}$$

Note that

$$\int_{\underline{z}_i} \Lambda_2^i(z)dz = \frac{-M^i\sigma^2}{2\mu^2}e^{\frac{2\mu}{\sigma^2}(\underline{z}_i-\hat{z})} + \frac{\beta M^i(\frac{\sigma^2}{2\mu})^2}{\mu + \frac{\sigma^2}{2}\beta} - \frac{M^i}{\mu\beta + \frac{\sigma^2}{2}\beta^2} \tag{76}$$

and

$$\int_{\hat{z}}^{\underline{z}_i} \Lambda_1^i(z)dz = \frac{M^i}{-\mu}[\underline{z}_i - \hat{z} + \frac{\sigma^2}{-2\mu}(e^{\frac{2\mu}{\sigma^2}(\underline{z}_i-\hat{z})} - 1)] \tag{77}$$

Which then implies

$$\eta^i = \frac{M^i}{\mu + \frac{\sigma^2\beta}{2}}[\beta(\frac{\sigma^2}{2\mu})^2 - \frac{1}{\beta}] + \frac{M^i}{-\mu}(\underline{z}_i - \hat{z}) - \frac{M\sigma^2}{2\mu^2} \tag{78}$$

$$\eta^i = \frac{M^i}{\mu + \frac{\sigma^2}{2}\beta}[\beta(\frac{\sigma^2}{2\mu})^2 - \frac{1}{\beta} - \frac{\sigma^2}{2\mu^2}(\mu + \frac{\sigma^2}{2}\beta)] + \frac{M^i}{-\mu}(\underline{z}_i - \hat{z}) \tag{79}$$

$$\eta^i = \frac{M^i}{\mu + \frac{\sigma^2}{2}\beta}[\frac{\beta\sigma^4}{4\mu^2} - \frac{1}{\beta} - \frac{\sigma^2}{2\mu} - \frac{\sigma^4\beta}{4\mu^2}] + \frac{M^i}{-\mu}(\underline{z}_i - \hat{z}) \tag{80}$$

$$\eta^i = \frac{M^i}{\mu + \frac{\sigma^2}{2}\beta}[-\frac{\mu + \frac{\sigma^2}{2}\beta}{\mu\beta}] + \frac{M^i}{-\mu}(\underline{z}_i - \hat{z}) \tag{81}$$

$$\eta^i = \frac{M^i}{-\mu\beta} + \frac{M^i}{-\mu}(\underline{z}_i - \hat{z}) = \frac{M^i}{-\mu}[\frac{1 + \beta(\underline{z}_i - \hat{z})}{\beta}] \tag{82}$$

Now using the fact that $M^u = \psi u e^{-\beta \underline{z}_u}$ and $M^w = \psi(1 - u - \eta)e^{-\beta \underline{z}_w}$ we get

$$\eta^u = A_u \psi u e^{-\beta \underline{z}_u} \tag{83}$$

and

$$\eta^w = A_w \psi(1 - u - \eta)e^{-\beta \underline{z}_w} \tag{84}$$

which implies

$$\eta = A_u \psi u e^{-\beta \underline{z}_u} + A_w \psi(1 - u - \eta)e^{-\beta \underline{z}_w} \tag{85}$$

Now using $u = \frac{(s+\psi(1-F(\underline{z}_w)))(1-\eta)}{s+f+\psi(1-F(\underline{z}_w))}$ and $1 - u - \eta = \frac{f(1-\eta)}{s+f+\psi(1-F(\underline{z}_w))}$

$$\eta = \frac{\psi(1-\eta)}{s + f + \psi e^{-\beta \underline{z}_w}}[A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}] \tag{86}$$

$$\eta = \frac{\psi[A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}]}{s + f + \psi e^{-\beta \underline{z}_w} + \psi[A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}]} \tag{87}$$

It follows

$$1 - \eta = \frac{s + f + \psi e^{-\beta \underline{z}_w}}{s + f + \psi e^{-\beta \underline{z}_w} + \psi[A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}]} \tag{88}$$

which implies

$$\eta^u = \frac{A_u(s + \psi e^{-\beta \underline{z}_w})\psi e^{-\beta \underline{z}_u}}{s + f + \psi e^{-\beta \underline{z}_w} + \psi[A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}]} \tag{89}$$

$$\frac{\eta^u}{\eta} = \frac{A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u}}{A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}} \tag{90}$$

Proof of Proposition 3.

In equilibrium $W > U$, otherwise all wage workers would exit wage work to go to the unemployment island and markets would not clear in the Walrasian market. Here I present a formal proof showing that if $b < 1 \Leftrightarrow W > U$. Note that rW and rU can be rewritten as

$$rW = w + f(W - U) + \psi \int (\max(J(z), W) - W) dF(z) \tag{91}$$

$$rU = bw + s(U - W) + \psi \int (\max(J(z), U) - U) dF(z) \tag{92}$$

This implies

$$(r+\psi+f+s)(W-U) = w(1-b)+\psi \int \max(J(z), W) dF(z) - \psi \int \max(J(z), U) dF(z) \tag{93}$$

First prove $b < 1 \Rightarrow W > U$. Using the equation 93 above :

$$\begin{aligned} w(1-b) = \psi(W-U)+(r+f+s)(W-U)-(\psi \int_{\underline{z}_w} J(z)dF(z)+\psi \int^{\underline{z}_w} W dF(z) \\ - \psi \int_{\underline{z}_u} J(z)dF(z) - \psi \int^{\underline{z}_u} U dF(z)) + \psi \int^{\underline{z}_u} W dF(z) - \psi \int^{\underline{z}_u} W dF(z) \end{aligned} \tag{94}$$

$$\begin{aligned} 0 < w(1-b) = \psi(W-U)+(r+f+s)(W-U)+\psi \int_{\underline{z}_u}^{\underline{z}_w} (J(z)-W)dF(z) - \psi \int^{\underline{z}_u} (W-U)dF(z) \\ < (r+f+s)(W-U) + \psi(W-U) - \psi(W-U)F(\underline{z}_u) \end{aligned} \tag{95}$$

where the last inequality follows from the fact that $J(z) < W$ for $\underline{z}_u < z < \underline{z}_w$. It follows that $b < 1 \Rightarrow W > U$.

Now to prove that $W > U \Rightarrow b < 1$ start by

$$w(1-b) = \psi(W-U)+(r+f+s)(W-U)+\psi\int_{\underline{z}_u}^{\underline{z}_w}(J(z)-W)dF(z)-\psi\int^{\underline{z}_u}(W-U)dF(z)$$
$$+\psi\int_{\underline{z}_u}^{\underline{z}_w}UdF(z)-\psi\int_{\underline{z}_u}^{\underline{z}_w}UdF(z) \quad (96)$$

$$w(1-b) = \psi(W-U)+(r+f+s)(W-U)+\psi\int_{\underline{z}_u}^{\underline{z}_w}(J(z)-U)dF(z)-\psi\int^{\underline{z}_u}(W-U)dF(z)$$
$$-\int_{\underline{z}_u}^{\underline{z}_w}(W-U) \quad (97)$$

$$w(1-b) = \psi(W-U)+(r+f+s)(W-U)+\psi\int_{\underline{z}_u}^{\underline{z}_w}(J(z)-U)dF(z)-\psi\int^{\underline{z}_w}(W-U)dF(z) \quad (98)$$

$$w(1-b) = \psi(W-U)(1-F(\underline{z}_w))+(r+f+s)(W-U)+\psi\int_{\underline{z}_u}^{\underline{z}_w}(J(z)-U)dF(z) \quad (99)$$

Note that $J(z) > U$ for $\underline{z}_u < z < \underline{z}_w$, which implies $W > U \Rightarrow b < 1$. It follows that $b < 1 \Leftrightarrow W > U$.

The result that $\underline{z}_w > \underline{z}_u$ then just follows.

Proof of Corollary 3.1.

Note that in steady state the flow of exiting firms of each type is equal to M^i.[74] Letting ER^i denote Exit Rate for type i, we have

$$(ER^i)^{-1} = [\frac{1+\beta(\underline{z}_i-\hat{z})}{-\mu\beta}] \quad (100)$$

$$(ER^w)^{-1} > (ER^u)^{-1} \Rightarrow ER^u > ER^w \quad (101)$$

where the first inequality follows from $\underline{z}_w > \underline{z}_u$

It follows that in equilibrium the exit rate is higher for firms of type u.

[74] In steady state, the flow of firms exiting a group has to be equal to the flow entering.

Proof of Corollary 3.2.

The expression for optimal firm size is given by

$$n(z,w) = (\frac{\alpha}{w})^{\frac{1}{1-\alpha}} e^{\frac{z}{1-\alpha}} \tag{102}$$

It follows average size for type i, where $i \in \{u, w\}$

$$\int_{\hat{z}} n(z,w) \frac{\Lambda^i(z)}{\eta^i} dz = (\frac{\alpha}{w})^{\frac{1}{1-\alpha}} \frac{M^i}{\eta^i} \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda^i(z)}{M^i} dz \tag{103}$$

Note that

$$\frac{\Lambda^i(z)}{M^i} \quad \text{does not depend on } M^i \tag{104}$$

Now concentrate on the term

$$\int_{\hat{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda^i(z)}{M^i} dz = \int_{\hat{z}}^{\underline{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda_1^i(z)}{M^i} dz + \int_{\underline{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda_2^i(z)}{M^i} dz \tag{105}$$

Taking derivative with respect to $\underline{z}_i$ gives

$$\frac{\partial \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda^i(z)}{M^i} dz}{\partial \underline{z}_i} = \frac{e^{\frac{\underline{z}_i}{1-\alpha}}}{M^i} (\Lambda_1^i(\underline{z}_i) - \Lambda_2^i(\underline{z}_i)) + \int_{\hat{z}}^{\underline{z}_i} \frac{e^{\frac{z}{1-\alpha}}}{M^i} \frac{\partial \Lambda_1^i(z)}{\partial \underline{z}_i} dz + \int_{\underline{z}_i} \frac{e^{\frac{z}{1-\alpha}}}{M^i} \frac{\partial \Lambda_2^i(z)}{\partial \underline{z}_i} dz \tag{106}$$

Using the expressions for $\Lambda_1^i(z)$ and $\Lambda_2^i(z)$ note that

$$(\Lambda_1^i(\underline{z}_i) - \Lambda_2^i(\underline{z}_i)) = [\frac{1}{-\mu} + \frac{-\beta \frac{\sigma^2}{-2\mu} + 1}{\mu + \frac{\sigma^2}{2}\beta}] = [\frac{1}{-\mu} - \frac{(\mu + \frac{\sigma^2}{2}\beta)}{-\mu(\mu + \frac{\sigma^2}{2}\beta)}] = 0 \tag{107}$$

and that

$$\frac{\partial \Lambda_1^i(z)}{\partial \underline{z}} = 0 \tag{108}$$

Replacing this back in equation (106)

$$\frac{\partial \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda^i(z)}{M^i} dz}{\partial \underline{z}_i} = \int_{\underline{z}_i} \frac{e^{\frac{z}{1-\alpha}}}{M^i} \frac{\partial \Lambda_2^i(z)}{\partial \underline{z}_i} dz = \int_{\underline{z}_i} e^{\frac{z}{1-\alpha}} \frac{\beta[e^{\frac{2\mu}{\sigma^2}(z-\underline{z}_i)} - e^{-\beta(z-\underline{z}_i)}]}{\mu + \frac{\sigma^2}{2}\beta} dz \tag{109}$$

$$= \frac{\beta(1-\alpha)}{\mu + \frac{\sigma^2}{2}\beta}((\frac{-\sigma^2(1-\alpha)}{2\mu(1-\alpha)+\sigma^2}) - \frac{(1-\alpha)}{\beta(1-\alpha)-1})e^{\frac{z_i}{1-\alpha}} \tag{110}$$

$$= \frac{\beta(1-\alpha)}{\mu + \frac{\sigma^2\beta}{2}}[\frac{-2(1-\alpha)^2[\mu + \frac{\sigma^2\beta}{2}]}{(2\mu(1-\alpha)+\sigma^2)(\beta(1-\alpha)-1)}]e^{\frac{z_i}{1-\alpha}} \tag{111}$$

$$= \frac{2\beta(1-\alpha)^3}{(-(2\mu(1-\alpha)+\sigma^2))(\beta(1-\alpha)-1)}e^{\frac{z_i}{1-\alpha}} > 0 \tag{112}$$

The positive sign follows from the assumption that $-\mu > \frac{\sigma^2}{2(1-\alpha)}$

Finally, to complete the proof note that

$$\frac{M^i}{\eta^i} = (ER)^{-1} \quad \text{where } ER \text{ stands for Exit Rate} \tag{113}$$

With the proof that the Exit Rate is higher for type I individuals than type II, it follows that

$$\frac{M^w}{\eta^w} > \frac{M^u}{\eta^u} \tag{114}$$

Then letting $E[n]_i$ denote average size for type i. With abuse of notation let $\Lambda^i(z, \underline{z}_j)$ represent the function $\Lambda^i(z)$ replacing $\underline{z}_i$ by $\underline{z}_j$, similarly for the measure $\eta^i(\underline{z}_j)$. Then using $\underline{z}_w > \underline{z}_u$,

$$\begin{aligned} E[n]_w &= \int_{\hat{z}} n(z,w)\frac{\Lambda^w(z,\underline{z}_w)}{\eta^w(\underline{z}_w)}dz > \int_{\hat{z}} n(z,w)\frac{\Lambda^w(z,\underline{z}_u)}{\eta^w(\underline{z}_u)}dz \\ &= (\frac{\alpha}{w})^{\frac{1}{1-\alpha}}\frac{M^w}{\eta^w(\underline{z}_u)}\int_{\hat{z}} e^{\frac{\rho z}{1-\rho}}\frac{\Lambda^w(z,\underline{z}_u)}{M^w}dz > \int_{\hat{z}} n(z,w)\frac{\Lambda^u(z,\underline{z}_u)}{\eta^u(\underline{z}_u)}dz = E[n]_u \end{aligned} \tag{115}$$

where the first inequality follows from

$$\frac{\partial \int_{\hat{z}} e^{\frac{\rho z}{1-\rho}}\frac{\Lambda^i(z)}{M^i}dz}{\partial \underline{z}_i} > 0 \tag{116}$$

and the second from

$$\frac{M^w}{\eta^w} > \frac{M^u}{\eta^u} \tag{117}$$

Now to see the result for profits note that

$$E[\pi]_i = (1-\alpha)(\frac{w}{\alpha})E[n]_i \tag{118}$$

Proof of Corollary 3.3.

$\underline{z}_w > \underline{z}_u \Rightarrow \psi(1-F(\underline{z}_u)) > \psi(1-F(\underline{z}_w))$.

C For Online Publication - Controlling for learning by doing mechanism

In this section, I show that the differences in size and exit rate between firms created by an individual when laid off relative to working for somebody else cannot be explained by a learning by doing story. In particular, one concern is that these differences might be driven by individuals first starting a firm when laid off, during which they acquire entrepreneurial skills. After that experience, upon entering during wage work, individuals would generate more productive firms due to their accumulated experience as an entrepreneur. To show that such mechanism cannot rationalize the differences in size and exit rate, I rerun the benchmark regressions with additional controls for the total experience an individual had accumulated as a business owner upon starting the current firm. The control I use is a quadratic in total years I observe the individual as an entrepreneur prior to this current firm spell interacted with dummies for current year. The interaction with years is to control for the fact that the value of entrepreneurial skills might vary with the business cycle.

Table 9: Controlling for learning by doing

Dependant variable	Log # employees	Dummy for exit
$\mathbb{1}\{\text{Prev U}\}_{i,s}$	-0.2894 (0.0419)	0.013 (0.0069)
Fixed Effects	Yes	Yes
Controls for entrepreneurial experience	Yes	Yes
Ratio of probabilities	Not Applicable	1.24
Baseline Exit Probability	0.055	0.055
Observations	450,502	341,241

Notes: Column (1) reports results for fixed effects regression of log number of employees of current business on dummy indicating if the current business was started by the individual when laid off ($\mathbb{1}\{\text{Prev U}\}_{i,s}$). Column (2) reports results for fixed effect regression of exit dummy (taking value 1 if individual exits firm ownership and 0 otherwise) on ($\mathbb{1}\{\text{Prev U}\}_{i,s}$). Other controls include dummies in age groups, marital status, province of residence, year business started, current year, 2 digit NAICS industry code for current business, 2 digit NAICS industry code for the last employer, log number of employees for the last employer and total years individuals observed as a business owner prior to current entrepreneur spell interacted with current year. Only includes men 25 to 54 years old.

D For Online Publication - Model with multiple sectors and testable prediction

D.1 Model description

The baseline theoretical framework is useful in its clarity to understand exactly how the selection mechanism operates. But in reality an economy is composed of different sectors each with a different labour productivity and wage. Since for each sector the opportunity cost of entering entrepreneurship is different, this has implications for individual decisions to open a business. Furthermore, the model with multiple sectors is useful in motivating the instrument I choose when I test the additional prediction of the theory.

With this in mind I consider a small extension of the previous framework, in which now there are C economies each with I industries an individual can work on. What characterizes an industry is the amount of efficiency units a worker is endowed with. All workers in each economy c have the same endowment of efficiency units across industries. Entrepreneurs in this scenario choose the optimal amount of efficiency units to hire and pay a same wage per efficiency unit across industries. Conditional on transitioning to the working island as a worker, the unemployed transition to work at industry i at rate Ω_i. It follows the problem of the unemployed individual can be summarized by

$$rU^c = bw_c\zeta_c + f(\sum_{\forall i}\Omega_i W_i^c - U^c) + \psi\int_{\underline{z}_u^c}(\sum_{\forall i}\Omega_i J^c(z) - U^c)dF(z) \tag{119}$$

where w_c is the unique equilibrium wage, ζ_c is an economy-wide efficiency unit for workers in economy c, $bw_c\zeta_c$ is the income of the unemployed individual, W_i^c is the value of being a worker at industry i at economy c. Note that since the value of unemployment U^c and the wage per efficiency unit w^c are the same across industries in a same economy c, then, conditional on z, every entrepreneur is indifferent over which industry to operate in. With this in mind, I consider an equilibrium in which the transition rate of an entrepreneur to industry i is also given by rate Ω_i. The value function for a worker in industry $i \in I$ is given by

$$rW_i^c = w_c\nu_{c,i}\zeta_c + s(U^c - W_i^c) + \psi\int_{\underline{z}_{w,i}^c}(\sum_{\forall i}\Omega_i J^c(z) - W_i^c)dF(z) \tag{120}$$

where $\nu_{c,i}$ is the relative amount of efficiency units a worker is endowed for industry i at economy c and ζ_c is the economy-wide efficiency unit endowment for workers in economy c, where $E[log(\zeta)] \equiv \sum_i \Omega_i log(\zeta) = K$ is time invariant. Let $\sum_i \Omega_i log(\nu_{c,i}) = 0$. Now define the economy level wage as w_c and the average industry, economy level wage as $w_{c,i} \equiv w_c\nu_{c,i}$.

In equilibrium,

$$J^c(\underline{z}^c_{w,i}) = W^c_i \quad \text{and} \quad J^c(\underline{z}^c_u) = U^c \tag{121}$$

As in the previous theoretical framework we get the result of differences in performance between firms created by employed versus unemployed individuals.[75]

Proposition 5 *In a multi-sector model of endogenous entrepreneurship, firms created by employed individuals have on average more employees, higher profits and lower exit rates. Furthermore, unemployed individuals are more likely to enter entrepreneurship relative to workers of all industries.*

The Proposition below highlights a prediction that lies at the heart of the selection mechanism.

Proposition 6

$$log(\underline{z}^c_{w,i}) = \xi^w_0 + \xi^w_1 log(w_{c,i}) + \xi^w_2 log(w_c) + \xi^w_3 log(\epsilon_{c.i}) + \xi^{w_c}_4 log(\zeta_c) \tag{122}$$

$$log(\underline{z}^c_u) = \xi^u_0 + \xi^u_1 log(w_c) + \xi^u_4 log(\zeta_c) \tag{123}$$

where $\xi^u_1 > 0, \xi^w_1 > 0$ *and* $\xi^w_2 > 0$*, furthermore, let* $E[\underline{z}^c_{w,i}]$ *be the average threshold productivity for wage workers across industries in economy* c *then*

$$E(log(\underline{z}^c_{w,i})) = \xi^w_0 + \Lambda^w log(w_c) + \xi^w_3 log(\zeta_c) \tag{124}$$

where $\Lambda^w = \xi^w_1 + \xi^w_2 > \xi^u_1$

The corollary below formally relates the entry rate into firm ownership of both wage workers and laid off individuals to region-wide wages.

Corollary 6.1 *The average entry rate for wage workers in an economy/region* c*,* $ER_{c,w}$ *and that of unemployed individuals* $ER_{c,u}$ *can both be expressed as*

$$ER_{c,w} = \beta_{0,w} + \beta_{1,w} log(w_c) + \upsilon_{c,w} \quad \textit{for employed workers} \tag{125}$$

[75] See Supplemental Appendix I for full characterization of the model with multiple sectors.

where υ_w is linear function of $log(\zeta)$

$$ER_{c,u} = \beta_{0,u} + \beta_{1,u} log(w_c) + \upsilon_{c,u} \quad \textit{for not working individuals} \tag{126}$$

where υ_u is linear function of $log(\zeta)$ and $\beta_{1,w} < \beta_{1,u} \leq 0$.

Now combining both into one specification we get

$$ER_{c,n,t} = \alpha_0 + \beta_1 log(w_{c,t}) + \beta_2 \mathbb{1}\{\text{Prev U}\}_{c,t,n} log(w_{c,t}) + \alpha_2 \mathbb{1}\{\text{Prev U}\}_{c,t,n} + \mu_{c,t} \tag{127}$$

where μ_c is a function of $log(\zeta_c)$, $n = 1$ if the individual is involuntarily unemployed and $n = 0$ if he is working and $\mathbb{1}\{\text{Prev U}\}_{c,t,n}$ is an indicator for whether the individual was involuntarily unemployed $n = 1$ or was working $n = 0$. I have added the time subscripts since the data is over different time periods. The prediction of the theory is that $\beta_1 < 0$ and $\beta_2 > 0$.

The following theorem gives a linearized expression for past industrial composition as a function of the shocks in the model that will be useful in the discussion of the validity of the instrument.

Proposition 7

$$\kappa_{c,i,1} = \frac{\Omega_i \Gamma_0}{\Gamma_0 + \Gamma_2 K} + \frac{\Omega_i \Gamma_1}{\Gamma_0 + \Gamma_2 K} log(\nu_{c,i,1}) + \frac{\Omega_i \Gamma_2}{\Gamma_0 + \Gamma_2 K} log(\zeta_{c,1}) \tag{128}$$

From the discussion on identification we concluded that the level of variation being used is that of changes across regions. It follows that, using the result of Proposition 7, for consistency we need

$$\text{plim}_{C,I\to\infty} \frac{1}{C}\frac{1}{I}\sum_{c=1}^{C} \widehat{log(\zeta_{c,t})} \sum_{\forall i} log(w_{i,t}^N)\left(\frac{\Omega_i \Gamma_0}{\Gamma_0 + \Gamma_2 K} + \frac{\Omega_i \Gamma_1}{\Gamma_0 + \Gamma_2 K} log(\nu_{c,i,1}) + \frac{\Omega_i \Gamma_2}{\Gamma_0 + \Gamma_2 K} log(\zeta_{c,1})\right) \tag{129}$$

where c stands for region, i for industry, C for total number of cities and I total number of industries.

$$= \text{plim}_{I\to\infty}\frac{1}{I}\sum_{\forall i} log(w^N_{i,t})\Omega_i \text{plim}_{C\to\infty}\frac{1}{C}\sum_{c=1}^{C}(\frac{\Gamma_0}{\Gamma_0+\Gamma_2 K}+\frac{\Gamma_1}{\Gamma_0+\Gamma_2 K}log(\nu_{c,i,1})$$
$$+\frac{\Gamma_2}{\Gamma_0+\Gamma_2 K}log(\zeta_{c,1}))\widehat{log(\zeta_{c,t})}. \quad (130)$$

In other words, the validity of the instrument is guaranteed as long as

1. $\widehat{log(\zeta_{c,t})}$ is uncorrelated with $log(\zeta_{c,1})$.

2. The distribution of $log(\nu_{c,i,1})$ is uncorrelated with $\widehat{log(\zeta_{c,t})}$.

The first requirement is that region-wide comparative advantage in labour efficiency $log(\zeta)$ follows a process of the form

$$log(\zeta_{c,t}) = \gamma_c + \gamma_t + \sigma_{c,t} \quad (131)$$

where $\sigma_{c,t} = \sum_{j=2}^{t} \nu_{i,j}$, with $\nu_{i,t}$ iid. This amounts to having the component of region-wide comparative advantage that varies across cities and time ($\sigma_{c,t}$) to be limited in its serial correlation. It must be that eventually past shocks to $\sigma_{c,t}$ no longer influence its current value.[76] Note that this is a much weaker restriction than imposing $log(\sigma_{c,t})$ to be independent across time and even weaker to assuming $log(\zeta_{c,t})$ is independent across time.

Intuitively, the second condition states that for validity of the instrument we need the first year industry comparative advantage distribution of a region to be uncorrelated with region-wide demand shocks at the current period. In other words, the fact that a city had a comparative advantage in a particular industry initially should not impact later in the future the region-wide demand shock it receives.

D.2 Proofs

Proof of Proposition 5.

[76]This property is typical but not limited to moving average processes.

See Proofs of Corollary 11.1, 11.2, 11.3 in Supplemental Appendix I.

Proof of Proposition 6.

I log linearize $(\underline{z}_u, \underline{z}_{w,i}, \hat{z}, w, w_i, \zeta, \epsilon_i)$ around $(log(z^*), log(z^*), log(z^*), w^*, w^*, log(1), log(1))$ for the expressions of the value function of the unemployed individual rU and for the employed individual rW. Starting by rU

$$r\gamma_0 + r\gamma_1 log(\underline{z}_u) + r\gamma_2 log(\hat{z}) = \phi_0^u + \phi_1^u log(w) + \phi_2^u log(\zeta) + \\ f(\gamma_1 \sum_{\forall i} \Omega_i log(\underline{z}_{w,i})) - f\gamma_1 log(\underline{z}_u) + \alpha_0 - \alpha_1 log(\underline{z}_u) - \alpha_2 log(\hat{z}) \quad (132)$$

Now using

$$\frac{r}{a} \approx 0 \Rightarrow r\gamma_2 \approx 0 \quad \text{and} \quad \frac{a+\theta}{a+\beta} \approx 0 \Rightarrow \alpha_2 \approx 0 \quad (133)$$

Rearranging gives

$$log(\underline{z}_u) = \frac{\phi_0^u + \alpha_0}{(r+f)\gamma_1 + \alpha_1} + \frac{\phi_1^u log(w)}{(r+f)\gamma_1 + \alpha_1} + \frac{f\gamma_1}{(r+f)\gamma_1 + \alpha_1} \sum_{\forall i} \Omega_i log(\underline{z}_{w,i}) + \frac{\phi_2^u log(\zeta)}{(r+f)\gamma_1 + \alpha_1} \quad (134)$$

Doing the same procedure for rW and rearranging gives

$$log(\underline{z}_{w,i}) = \frac{\phi_0^w + \alpha_0}{(r+s)\gamma_1 + \alpha_1} + \frac{\phi_1^w log(w_i)}{(r+s)\gamma_1 + \alpha_1} + \frac{s\gamma_1 log(\underline{z}_u)}{(r+s)\gamma_1 + \alpha_1} + \frac{\phi_3^w log(\zeta)}{(r+s)\gamma_1 + \alpha_1} \quad (135)$$

Now using equation (135) to sum over all $log(\underline{z}_{w,i})$ gives[77]

$$\sum_{\forall i} \Omega_i log(\underline{z}_{w,i}) = A_1 + \frac{\sum_{\forall i} \Omega_i \phi_1^w ln(w_i)}{(r+s)\gamma_1 + \alpha_1} + \frac{s\gamma_1 log(\underline{z}_u)}{(r+s)\gamma_1 + \alpha_1} \quad (136)$$

[77] Remember that $E[log(\nu_{c,i})] \equiv \sum_{\forall i} \Omega_i log(\nu_{c,i}) = 0$ and $\sum_{\forall i} \Omega_i log(\zeta) = K$ (constant)

Now replace this sum back in equation (134) to get

$$log(\underline{z}_u) = \frac{\phi_0^u + \alpha_0}{(r+f)\gamma_1 + \alpha_1} + \frac{\phi_1^u log(w)}{(r+f)\gamma_1 + \alpha_1} + \frac{f\gamma_1\phi_1^w ln(w)}{((r+s)\gamma_1 + \alpha_1)((r+f)\gamma_1 + \alpha_1)}$$
$$+ \frac{f\gamma_1 s\gamma_1}{((r+s)\gamma_1 + \alpha_1)((r+f)\gamma_1 + \alpha_1)} log(\underline{z}_u) + \frac{A_1 f\gamma_1}{(r+f)\gamma_1 + \alpha_1} + \frac{\phi_2^u log(\zeta)}{(r+f)\gamma_1 + \alpha_1} \tag{137}$$

Rearranging gives

$$log(\underline{z}_u) = \xi_0^u + \frac{(\phi_1^u((r+s)\gamma_1 + \alpha_1) + f\gamma_1\phi_1^w)}{((r+f+s)\gamma_1 + \alpha_1)(r\gamma_1 + \alpha_1)} log(w) + \xi_2^u log(\zeta) \tag{138}$$

$$log(\underline{z}_u) = \xi_0^u + \xi_1^u ln(w) + \xi_2^u log(\zeta) \tag{139}$$

Now replace this final expression of $log(\underline{z}_u)$ into $log(\underline{z}_{w,i})$ to get

$$log(\underline{z}_{w,i}) = \xi_0^w + \frac{\phi_1^w ln(w_i)}{(r+s)\gamma_1 + \alpha_1} + \frac{s\gamma_1(\phi_1^u((r+s)\gamma_1 + \alpha_1) + f\gamma_1\phi_1^w)}{((r+s)\gamma_1 + \alpha_1)[((r+f+s)\gamma_1 + \alpha_1)(r\gamma_1 + \alpha_1)]} ln(w)$$
$$+ \frac{s\gamma_1\xi_2^u log(\zeta)}{(r+s)\gamma_1 + \alpha_1} + \frac{\phi_3^w log(\zeta)}{(r+s)\gamma_1 + \alpha_1} \tag{140}$$

$$log(\underline{z}_{w,i}) = \xi_0^w + \xi_1^w ln(w_i) + \xi_2^w ln(w) + \xi_3^w log(\zeta) \tag{141}$$

Now taking an average over all industries gives[78]

$$E_i(log(\underline{z}_{w,i})) \equiv \sum_{\forall i} \Omega_i log(\underline{z}_{w,i}) = \xi_0^w + (\xi_1^w + \xi_2^w) ln(w) + \xi_3^w log(\zeta) \tag{142}$$

Finally, note that

$$\phi_1^w > \phi_1^u \Rightarrow (\phi_1^w - \phi_1^u)(r\gamma_1 + s\gamma_1 + \alpha_1) + f\gamma_1\phi_1^w - f\gamma_1\phi_1^w > 0 \tag{143}$$

Passing $-f\gamma_1\phi_1^w - \phi_1^u(r\gamma_1 + s\gamma_1 + \alpha_1)$ to the other side, dividing both sides by

[78]Using the fact that $\sum_{\forall i} log(\nu_{c,i}) = 0$

$(r\gamma_1 + f\gamma_1 + \alpha_1 + s\gamma_1)((r+s)\gamma_1 + \alpha_1)$, and using the fact that $\frac{(r\gamma_1+\alpha_1)}{(r\gamma_1+\alpha_1)} = 1$

$$\Rightarrow \frac{\phi_1^w}{(r+s)\gamma_1 + \alpha_1} > \frac{(r\gamma_1 + \alpha_1)(\phi_1^u((r+s)\gamma_1 + \alpha_1) + f\gamma_1\phi_1^w)}{((r+s)\gamma_1 + \alpha_1)((r+f+s)\gamma_1 + \alpha_1)(r\gamma_1 + \alpha_1)} \quad (144)$$

Now add $\frac{s\gamma_1(\phi_1^u((r+s)\gamma_1+\alpha_1)+f\gamma_1\phi_1^w)}{((r+s)\gamma_1+\alpha_1)[((r+f)\gamma_1+\alpha_1)(r\gamma_1+\alpha_1)+s\gamma_1(r\gamma_1+\alpha_1)]}$ to both sides

$$\Rightarrow (\xi_1^w + \xi_2^w) \equiv \frac{\phi_1^w}{(r+s)\gamma_1 + \alpha_1} + \frac{s\gamma_1(\phi_1^u((r+s)\gamma_1 + \alpha_1) + f\gamma_1\phi_1^w)}{((r+s)\gamma_1 + \alpha_1)[((r+f+s)\gamma_1 + \alpha_1)(r\gamma_1 + \alpha_1)]}$$
$$> \frac{\phi_1^u((r+s)\gamma_1 + \alpha_1) + f\gamma_1\phi_1^w}{((r+f+s)\gamma_1 + \alpha_1)(r\gamma_1 + \alpha_1)} \equiv \xi_1^u \quad (145)$$

Proof of Proposition 7.

In the supplemental appendix I show that equilibrium employment at an industry (E_i) is

$$E_{i,c,1} = \frac{f\Omega_i u_{c,1}}{\psi(1 - F(\underline{z}_{w,i,c,1})) + s}, \quad \forall i \in I. \quad (146)$$

Then $\kappa_{c,i,1}$ is equal to

$$\kappa_{c,i,1} \equiv \frac{E_{i,c,1}}{E_{c,1}} = \Omega_i(\psi(1 - F(\underline{z}_{w,i,c,1})) + s)^{-1}(\sum_j \Omega_j(\psi(1 - F(\underline{z}_{w,j,c,1})) + s)^{-1})^{-1} \quad (147)$$

Now linearize $(\psi(1 - F(\underline{z}_{w,i,c,1})) + s)^{-1}$ with respect to $log(\underline{z}_{w,i,c,1})$ to get

$$\kappa_{c,i,1} = \Omega_i(\rho_0 + \rho_1 log(\underline{z}_{w,i,c,1}))(\sum_j \Omega_j(\rho_0 + \rho_1 log(\underline{z}_{w,j,c,1})))^{-1} \quad (148)$$

Now remember that $log(\underline{z}_{w,i,c,1})$ can be written as a function of $log(w_{c,1})$, $log(w_{c,i,1})$ and $log(\zeta_{c,1})$. Furthermore from market clearing we can linearize both $log(w_{c,1})$ and $log(w_{c,i,1})$ with respect to $log(\zeta_{c,1})$ and $log(\nu_{c,i,1})$ around $(K, 0)$.[79] Then replacing

[79]Remember that $\sum_{\forall i} \Omega_i log(\nu_{c,i,1}) = 0$ and $\sum_{\forall i} \Omega_i \zeta_{c,t} = K$

$log(\underline{z}_{w,j,c,1})$ by its expression with only $log(\nu_{i,c,1})$ and $log(\zeta_{c,1})$ we get

$$\kappa_{c,i,1} = \frac{\Omega_i(\Gamma_0 + \Gamma_1 log(\nu_{c,i,1}) + \Gamma_2 log(\zeta_{c,1}))}{(\sum_j \Omega_j(\Gamma_0 + \Gamma_1 log(\nu_{c,i,1}) + \Gamma_2 log(\zeta_{c,1})))} \tag{149}$$

Now using $\sum_j \Omega_j log(\nu_{c,i,1}) = 0$ and $\sum_j \Omega_j log(\zeta_{c,1}) = K, \forall t$ gives the result.

E For Online Publication - Robustness of Testable Prediction to allow for Worker Mobility

In this Appendix section I discuss the implications of allowing for mobility of unemployed individuals across local labour markets. Let μ_1 represent the rate at which the unemployed has the opportunity to change local labour market. When doing so the individual chooses the city (economic region) that gives the highest utility. It follows that the problem of the unemployed at region c can be rewritten as

$$(r+\mu_1)U^{c,t} = bw_{c,t} + \psi \int_{\underline{z}_u^{c,t}} (\sum_{\forall i} \Omega_i J^{c,t}(z) - U^{c,t}) dF(z) + \mu_1 \max_c U^{c,t} + f(\sum_{\forall i} \Omega_i W_i^{c,t} - U^{c,t}) \tag{150}$$

Note that the term $\max_c U^{c,t}$ is a city invariant time effect. It follows that after linearizing we get the same expressions for $\underline{z}_u$ and $\underline{z}_w$ as a function of wages w as in Section D of the Appendix except now with an additional constant for $\underline{z}_u$. As a result the empirical specification for testing the model is unchanged.

F For Online Publication - Details on Instrument and Wage Measure

In this section I describe how I construct my economic region/year wage measure $log(w_{c,t})$ and the instrument used in the wage regression $\sum_{\forall i} \kappa_{c,i,1} log(w_{i,t}^N)$. The definition of local labour market is always an economic region, and the industry category used is always 3 digit NAICS industry classifications. Below let p denote individual p in the sample.

For each year t I run the following regression :

$$log(\text{annual worker earnings})_{p,t} = X_{p,t}\gamma_{4,1} + \sum_{\forall y} \gamma_{4,y} \mathbb{1}\{year = y\} + \sum_{\forall c} \gamma_{4,c} \mathbb{1}\{region = c\} + \sum_{\forall y} \sum_{\forall c} \gamma_{4,c,y} \mathbb{1}\{region = c \cap year = y\} + \epsilon_{i,t}$$

where $X_{p,t}$ are dummies in age, gender, country of birth and 3 digit NAICS industry code. The wage measure is

$$log(w_{c,t}) = \sum_{\forall y} \hat{\gamma}_{4,y} \mathbb{1}\{year = y\} + \sum_{\forall c} \hat{\gamma}_{4,c} \mathbb{1}\{region = c\} + \sum_{\forall y} \sum_{\forall c} \hat{\gamma}_{4,c,y} \mathbb{1}\{region = c \quad \cap \quad year = y\}$$

Now for constructing the instrument I first estimate the national industry premia for each industry $log(w^N_{i,t})$. For each year t I run the following regression :

$$log(\text{annual worker earnings})_{p,t} = Z_{p,t}\gamma_{5,1} + \sum_{\forall y} \gamma_{5,y} \mathbb{1}\{year = y\} + \sum_{\forall I} \gamma_{5,I} \mathbb{1}\{industry = I\} + \sum_{\forall y} \sum_{\forall I} \gamma_{5,I,y} \mathbb{1}\{industry = I \cap year = y\} + \epsilon_{i,t}$$

where $Z_{p,t}$ are dummies in age, gender, country of birth and city.

Then the national industry premium is

$$log(w^N_{i,t}) = \sum_{\forall y} \hat{\gamma}_{5,y} \mathbb{1}\{year = y\} + \sum_{\forall I} \hat{\gamma}_{5,I} \mathbb{1}\{industry = I\} + \sum_{\forall y} \sum_{\forall I} \hat{\gamma}_{5,I,y} \mathbb{1}\{industry = I \cap year = y\}$$

Finally, the employment share of a particular industry i, in region c, at the first year of the sample, is calculated as

$$\kappa_{c,i,1} = \frac{\text{Total employment in industry } i \text{ at region } c \text{ at year 2001}}{\text{Total employment at region } c \text{ at year 2001}} \tag{151}$$

G For Online Publication - Proofs Calibration section

In this section I go over the formal theorem that allows me to pin down μ and σ in the data, where μ and σ are the two parameters governing how the productivity of an entrepreneur owned firm evolves once the firm start operating.

Proposition 8 *Let δ be the shape of the size distribution of the entire population of firms, then*

$$E[\Delta log(n_{i,t})|\Delta log(n_{i,t}) > 0] = \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}\lambda(\frac{-\mu}{\sigma}) \quad \textit{and} \quad \frac{-2\mu}{\sigma^2} = \frac{\delta+1}{1-\alpha}$$

where $\lambda(.)$ is the Inverse Mils Ratio.

$E[\Delta log(n_{i,t})|\Delta log(n_{i,t}) > 0]$ and δ are computed using firms of all ages.

Proof of Proposition 8.

Note that the expression for $dz(t)$ can be approximated as

$$z_{i,t} = z_{i,t-1} + \mu + \sigma\epsilon_{i,t} \tag{152}$$

with

$$\epsilon_{i,t} \sim N(0,1) \tag{153}$$

Replacing $z_{i,t}$ by its expression with firm size $n_{i,t}$

$$log(n_{i,t}) = log(n_{i,t-1}) + \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}\epsilon_{i,t} \tag{154}$$

It follows

$$\Delta log(n_{i,t}) = \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}\epsilon_{i,t} \tag{155}$$

Now let m be $E[\Delta log(n_{i,t})|\Delta log(n_{i,t})>0]$ it follows,[80]

$$m \equiv E[\Delta log(n_{i,t})|\Delta log(n_{i,t})>0] = \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}E[\epsilon|\Delta log(n_{i,t})>0] \quad (156)$$

$$m \equiv \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}E[\epsilon|\epsilon > \frac{-\mu}{\sigma}] \quad (157)$$

$$m = \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}\lambda(\frac{-\mu}{\sigma}) \quad (158)$$

where $\lambda(.)$ is the Inverse Mils Ratio.

Now note that for large enough z the distribution of type j, where $j \in \{u, w\}$ will be given by[81]

$$\Lambda^j(z) = \Lambda_2^j(z) = e^{\frac{2\mu}{\sigma^2}z}M^j[(\frac{\beta\frac{\sigma^2}{2\mu}e^{\frac{-2\mu\underline{z}_j}{\sigma^2}}}{\mu+\frac{\sigma^2}{2}\beta} - \frac{e^{\frac{-2\mu\hat{z}}{\sigma^2}}}{-\mu}) - \frac{e^{-(\beta+\frac{2\mu}{\sigma^2})z}}{e^{-\beta\underline{z}_j}(\mu+\frac{\sigma^2}{2}\beta)}] \quad (159)$$

Using

$$e^z = n^{1-\alpha}\frac{w}{\alpha} \quad (160)$$

$$\Lambda^j(n(z,w)) = \Lambda_2^j(n(z,w)) = (\frac{w}{\alpha})^{\frac{2\mu}{\sigma^2}}n^{\frac{(1-\alpha)2\mu}{\sigma^2}}M^j[(\frac{\beta\frac{\sigma^2}{2\mu}e^{\frac{-2\mu\underline{z}_j}{\sigma^2}}}{\mu+\frac{\sigma^2}{2}\beta} - \frac{e^{\frac{-2\mu\hat{z}}{\sigma^2}}}{-\mu}) - \frac{n^{-(1-\alpha)(\beta+\frac{2\mu}{\sigma^2})}(\frac{w}{\alpha})^{(\beta+\frac{2\mu}{\sigma^2})}}{e^{-\beta\underline{z}_j}(\mu+\frac{\sigma^2}{2}\beta)}] \quad (161)$$

which implies

$$n^{-\frac{(1-\alpha)2\mu}{\sigma^2}}\Lambda^j(n) = (\frac{w}{\alpha})^{\frac{2\mu}{\sigma^2}}M^j[(\frac{\beta\frac{\sigma^2}{2\mu}e^{\frac{-2\mu\underline{z}_j}{\sigma^2}}}{\mu+\frac{\sigma^2}{2}\beta} - \frac{e^{\frac{-2\mu\hat{z}}{\sigma^2}}}{-\mu}) - \frac{n^{-(1-\alpha)(\beta+\frac{2\mu}{\sigma^2})}(\frac{w}{\alpha})^{(\beta+\frac{2\mu}{\sigma^2})}}{e^{-\beta\underline{z}_j}(\mu+\frac{\sigma^2}{2}\beta)}] \quad (162)$$

[80] Note that taking the unconditional expectation and comparing it to the mean in the data would be wrong since the observed population of firms is a selected group among those that survived, i.e., $log(n) > log(n(\hat{z}, w))$. On the other hand, note that conditional on $log(n_{i,t-1})$ being observed, conditioning on $log(n_{i,t}) > log(n_{i,t-1})$ is stronger than $log(n_{i,t}) > log(n(\hat{z}, w))$. To see this note that $log(n_{i,t-1})$ observed means $log(n_{i,t-1}) > log(n(\hat{z}, w))$. It follows that once I condition on positive growth and adjust the expectation accordingly I don't need to adjust for selection.

[81] More precisely, for $z \geq \max\{\underline{z}_1, \underline{z}_2\}$

Now summing over all j

$$n^{-\frac{(1-\alpha)2\mu}{\sigma^2}}\Lambda(n) = (\frac{w}{\alpha})^{\frac{2\mu}{\sigma^2}} \sum_j M^j [(\frac{\beta\frac{\sigma^2}{2\mu}e^{\frac{-2\mu \underline{z}_j}{\sigma^2}}}{\mu + \frac{\sigma^2}{2}\beta} - \frac{e^{\frac{-2\mu\hat{z}}{\sigma^2}}}{-\mu}) - \frac{n^{-(1-\alpha)(\beta+\frac{2\mu}{\sigma^2})}(\frac{w}{\alpha})^{(\beta+\frac{2\mu}{\sigma^2})}}{e^{-\beta \underline{z}_j}(\mu + \frac{\sigma^2}{2}\beta)}] \tag{163}$$

Now assume $\beta \geq -\frac{2\mu}{\sigma^2}$

$$\lim_{n\to\infty} n^{-\frac{(1-\alpha)2\mu}{\sigma^2}}\Lambda(n) = (\frac{w}{\alpha})^{\frac{2\mu}{\sigma^2}} \sum_j M^j [(\frac{\beta\frac{\sigma^2}{2\mu}e^{\frac{-2\mu \underline{z}_j}{\sigma^2}}}{\mu + \frac{\sigma^2}{2}\beta} - \frac{e^{\frac{-2\mu\hat{z}}{\sigma^2}}}{-\mu})] < \infty \tag{164}$$

It follows that for large enough $n, \Lambda(n)$ decays at speed given by $n^{\frac{2\mu(1-\alpha)}{\sigma^2}}$ $\forall i$. It follows that for a large enough firm size, the firm size distribution will be Pareto of tail parameter x,

$$x = \frac{-2\mu(1-\alpha)}{\sigma^2} - 1 \tag{165}$$

It follows that given x and α, μ and σ can be pinned down by the following two equations

$$\frac{-2\mu}{\sigma^2} = \frac{1+x}{1-\alpha} \tag{166}$$

and

$$E[\Delta log(n_{i,t})|\Delta log(n_{i,t}) > 0] = \frac{\mu}{1-\alpha} + \frac{\sigma}{1-\alpha}\lambda(\frac{-\mu}{\sigma}) \tag{167}$$

where $\lambda(.)$ is the Inverse Mils Ratio. $E[\Delta log(n_{i,t})|\Delta log(n_{i,t}) > 0]$ and x are estimated in the CEED data.

H For Online Publication - Alternative Parametrization

In Table 10 I show that the impact of the policy in the aggregate economy is robust to changing the value of the rate at which individuals receives business projects, ψ.

Table 10: Policy outcomes

	Model Extension - Difference ψ values				
Columns	(1)	(2)	(3)	(4)	(5)
ψ values	6	12	24	36	48
E[arrival time of projects in months]	2	1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$
$\Delta E[z]$	-2.07%	-2.10%	-2.14%	-2.16%	-2.18%
Δ Unemployment Rate (% change)	-1.10%	-1.11%	-1.11%	-1.11%	-1.11%
Δ Wage	0.63%	0.62%	0.61%	0.60%	0.60%
Δ Labor Market Tightness (θ)	2.26%	2.30%	2.35%	2.38%	2.40%
Δ Jobs by Unemployed	7.31%	7.22%	7.12%	7.06%	7.02%
Δ Jobs by Firms created by Workers	-7.15%	-7.13%	-7.10%	-7.08%	-7.07%
Δ Firm Exit Rate (% change)	34.25%	35.27%	36.38%	37.07%	37.58%

Notes: Outcome of policies that make a share of total UI benefits income conditional on the unemployed opening a firm. $\Delta E[z]$ is the percentage change in the average firm productivity, Δ Jobs by workers is the percentage change in the measure of jobs associated to firms created by wage workers, Δ Jobs by unemployed is the percentage change in the measure of jobs associated to firms created by the unemployed, Δ Unemployment is the percentage change in the unemployment rate. Results are shown for different values of ψ. psi is the rate at which individuals receive business projects. E[arrival time of projects] is the expected arrival time of a business project in the economy given the ψ value chosen.

In Table 11 I show that the impact of the policy in the aggregate economy is robust to changing the value of the replacement for the unemployed, b.

Table 11: Policy outcomes

	Model Extension - Different b values					
Columns	(1)	(2)	(3)	(4)	(5)	(6)
b values	0.3	0.4	0.5	0.6	0.7	0.8
$\Delta E[z]$	0.009%	-1.3%	-1.69%	-2.14%	-2.69%	-3.43%
Δ Unemp Rate (% change)	-0.004%	-0.006%	-0.008%	-1.11%	-1.53%	-2.23%
Δ Wage	0.003%	0.43%	0.53%	0.61%	0.64%	0.54%
Δ Market Tightness (θ)	0.005%	0.008%	1.39%	2.35%	4.2%	8.56%
Δ Jobs by Unemp	3.06%	4.29%	5.65%	7.12%	8.67%	10.21%
Δ Jobs by Workers	-3.25%	-4.46%	-5.75%	-7.1%	-8.46%	-9.56%
Δ Firm Exit Rate (% change)	12.54%	18.63%	26.31%	36.38%	50.37%	71.93%

Notes: Outcome of policies that make a share of total UI benefits income conditional on the unemployed opening a firm. $\Delta E[z]$ is the percentage change in the average firm productivity, Δ Jobs by workers is the percentage change in the measure of jobs associated to firms created by wage workers, Δ Jobs by Unemp is the percentage change in the measure of jobs associated to firms created by the unemployed, Δ Unemp Rate is the percentage change in the unemployment rate. Results are shown for different values of replacement rate for the unemployed, b.

Next we go over the impact of the counterfactual policies of subsidizing or taxing unemployed starting a business with an alternative calibration strategy for the cost of posting a vacancy c. I follow Hagedorn and Manovskii (2008) in setting the cost of posting of a vacancy to 4.5% of the equilibrium wage ($c = 0.045$). All other parameters are chosen in the same manner as in the benchmark calibration.

Table 12: Policy outcomes

	Baseline	Robustness - c
	(1)	(2)
UI redistributed to unemployed starting a firm	5%	5%
$\Delta E[z]$	-2.14%	-2.14%
Δ Unemployment Rate (percent change)	-1.11%	-1.11%
Δ Wage	0.61%	0.61%
Δ Labor Market Tightness (θ)	2.35%	2.35%
Δ Jobs by Firms created by Unemployed	7.12%	7.12%
Δ Jobs by Firms created by Workers	-7.1%	-7.1%
Δ Average Firm Exit Rate (percent change)	36.38%	36.38%

Notes: Outcome of policies that make a share of total UI benefits income conditional on the unemployed opening a firm. $\Delta E[z]$ is the percentage change in the average firm productivity, Δ Jobs by firms created by workers is the percentage change in the measure of jobs associated to firms created by wage workers, Δ Unemployment is the percentage change in the unemployment rate. First column presents results for baseline calibration. Second column shows robustness to calibration of the cost of posting a vacancy, c. In particular, I follow Hagedorn and Manovskii (2008) in setting the cost of posting of a vacancy to 4.5% of the equilibrium wage ($c = 0.045$). All other parameters are chosen in the same manner as in the benchmark calibration.

I For Online Publication - Firms created by Laid off versus not Laid-off individuals (without Fixed Effects)

Before proceeding to the results without fixed effects, recall that the baseline group compared to the displaced individuals are all individuals that were employed in the previous year by a firm that in the current year continues to exist. This implies that the group of entrepreneurs tagged as having entered from wage work also includes individuals that were employed in the prior year to opening a firm and had an unemployment spell in between the job and the start of a firm. As a result, this group includes individuals that started a firm after being fired as long as the spell of unemployment was shorter than a year. Individuals who are fired are likely to be a negatively selected group of the population. This negative selection becomes particularly important if individuals fired are more likely to start a firm than individuals that never lost their job.

The result is that, without fixed effects, we capture some of this negative selection that offsets the differences between laid off and employed individuals. Consistent with this concern, the results in Column (1) and (2) of Table 13 indicate that once we do not control for individual fixed effects the differences in firm size between laid off and not laid-off individuals disappears and the difference in exit rates decreases and flips sign.

Table 13: Log number of employees

Dependant variable	log # employees	Exit dummy
	(1)	(2)
$\mathbb{1}\{\text{Prev U}\}_{i,s}$	0.012	-0.0064
	(0.013)	(0.007)
Fixed Effects	No	No
Baseline Exit Probability	0.055	0.055
Ratio of probabilities	Not applicable	0.9
Observations	450,502	341,214

Notes: Column (1) reports results for regression without fixed effects of log number of employees of the current business on a dummy indicating if the current business was started by an individual when laid off ($\mathbb{1}\{\text{Prev U}\}_{i,s}$). Column (2) reports results for regression without fixed effects of dummy for exit (takes value 1 if individual exits entrepreneurship and 0 otherwise) on ($\mathbb{1}\{\text{Prev U}\}_{i,s}$). Regression on Column (2) only includes individuals that last year were running a business. Other controls include dummies in age groups, marital status, province of residence, year business started, current year, 2 digit industry code for current business, 2 digit industry code for the last employer, log number of employees for the last employer. Only includes men 25 to 54 years old. Without fixed effects, we do not control for the fact that the group of not laid-off individuals includes individuals that were fired and are likely to be negatively selected in ability. This negative selection among the individuals that were fired and started a firm offsets the differences between firms created by the employed versus laid off individuals. Standard errors are clustered at the individual level.

J For Online Publication - Parameters table for quantitative implementation

The following table lists the whole set of parameters and the proceedures to chose each parameter value. For details see main body of the paper.

Table 14: Calibration

Parameter	value at annual frequency	Source/Target
β	8.32	$Entry_u/Entry_w$
μ	-0.11	$E[\Delta log(n)\|\Delta log(n) > 0]$ in data
σ	0.186	Shape of size distribution of all firms in data
r	4.5%	
α	2/3	Average aggregate labour share
K	0.4	$E[log(n^w)] - E[log(n^u)]$
s	0.214	Hobijn and Şahin (2009)
b	0.6	Replacement rate for unemployed
χ	0.268	$Exit_u/Exit_w$
c	0.562	Normalize θ to 1 as in Shimer (2005)
ϕ	0.72	Shimer (2005)
γ	0.72	Shimer (2005)
ψ	24	Consider robustness to different values

Notes: Table of calibrated parameters with their respective targets or sources. $Entry_u/Entry_w$ is the ratio of entry rate into entrepreneurship between the unemployed and wage workers. $E[log(n^w)] - E[log(n^u)]$ is the difference in average number of employees between firms created by workers versus the unemployed. $Exit_u/Exit_w$ is the ratio of exit rates out of entrepreneurship between entrepreneurs that were unemployed when they started their business and those that were working when they started their firm.

K For Online Publication - Supplemental Appendix I : Solving for Multi-Industry Economy model.

This section solves for the multi-sector model economy presented in the paper. It starts by the full characterization of the model. Solving the model then allows the proof of differential performance between firms created by not working versus working individuals. (Proposition 5 in Paper)

$$rU = bw\zeta + f(\sum_{\forall j \in I} \Omega_j W_j - U) + \psi \int_{\underline{z}_u} (\sum_{\forall j \in I} \Omega_j J(z) - U) dF(z) \tag{168}$$

$$rW_i = w\nu_i\zeta + s(U - W_i) + \psi \int_{\underline{z}_{w,i}} (\sum_{\forall j \in I} \Omega_j J(z) - W_i) dF(z) \tag{169}$$

where ν_i is the relative efficiency units a worker is endowed for industry i and ζ is an economy-wide efficiency unit endowment, where $E[log(\zeta)] \equiv \sum_i \Omega_i log(\zeta) = K$ is time invariant. Let $\nu_i = \overline{\nu}_i \epsilon_i$, where $\sum\limits_i \Omega_i log(\epsilon_i) = 0$, $\sum\limits_i \Omega_i log(\overline{\nu}_i) = 0$ and $\overline{\nu}$ is time invariant. Now define the economy level wage as w and the average industry level wage as $w_i \equiv w\overline{\nu}_i$.

$$\sum_{\forall j \in I} \Omega_j J(\underline{z}_u) = U \tag{170}$$

$$\sum_{\forall j \in I} \Omega_j J(\underline{z}_{w,i}) = W_i \tag{171}$$

Firm static decision :

$$\pi^*(z) = \max_n zn^\alpha - wn \tag{172}$$

which implies

$$\pi^*(z) = (1-\alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} e^{\frac{z}{1-\alpha}} \tag{173}$$

Once a business starts operating, Z follows a geometric Brownian Motion with drift $\mu < 0$ and variance parameter σ.

$$dZ(t) = (\mu + \frac{\sigma^2}{2})Z(t)dt + \sigma Z(t)d\Omega(t) \tag{174}$$

Where $\Omega(t)$ is a standard Brownian Motion. Then it follows

$$dz(t) = \mu dt + \sigma d\Omega(t) \tag{175}$$

It follows entrepreneurs face the following stopping problem

$$rJ(z) = \pi^*(z) + \mu J'(z) + \frac{\sigma^2}{2}J''(z) \quad \text{if} \quad z \geq \hat{z} \tag{176}$$

$$J(z) = U - \chi \quad \text{if} \quad z \leq \hat{z} \tag{177}$$

$$J'(\hat{z}) = 0 \tag{178}$$

where χ is a cost of shutting down.

μ is assumed to be negative otherwise there would be an accumulation of firms that never exit the market. The cost of shutting down g makes the algebra tractable by guaranteeing the expressions for the distributions of both types will be identical with the only difference coming from the difference in thresholds $\underline{z}_u$ versus $\underline{z}_{w,i}$ and the unemployment to employment transition rate versus the employment to unemployment transition rate, i.e., f and s.

Market Clearing

$$\sum_{\forall i} E_i \zeta \nu_i = \int n(z,w)\Lambda(z)dz \tag{179}$$

Proposition 9 *The solution to the firm's optimal stopping problem implies*

$$J(z) = \frac{B}{r - \frac{\mu}{1-\alpha} - \frac{\sigma^2}{2}\frac{1}{(1-\alpha)^2}}(e^{\frac{z}{1-\alpha}} + \frac{1}{a(1-\alpha)}e^{-a(z-\hat{z})+\frac{\hat{z}}{1-\alpha}}) \tag{180}$$

where

$$B \equiv (1-\alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \tag{181}$$

$$a = \frac{\mu + \sqrt{\mu^2 + 2r\sigma^2}}{\sigma^2} > 0 \tag{182}$$

Not surprisingly, the value function of the business owner is increasing in productivity for the range of values for which the business operates $z \in [\hat{z}, \infty[$. [82]

Let $\Lambda^w_{i,j}(z)$ denote the measure of individuals operating a firm of productivity z in industry j, that were workers in industry i else prior to opening the firm and $\Lambda^u_i(z)$ the measure with productivity z that entered from unemployment into industry i.

Proposition 10 *For all $d \in \{u, w\}$, the measure of business owners of productivity z will be given by,*

- *For $z \in [\hat{z}, \underline{z}_{d,i}]$*

$$\Lambda^d_{i,j}(z) = \Lambda^d_{i,j,1}(z) = \frac{M^d_{i,j}}{-\mu}(1 - e^{\frac{2\mu}{\sigma^2}(z-\hat{z})}) \tag{186}$$

- *For $z \in]\underline{z}_{d,i}, \infty[$*

$$\Lambda^d_{i,j}(z) = \Lambda^d_{i,j,2}(z) = \frac{\beta M^d_{i,j} \frac{\sigma^2}{-2\mu} e^{\frac{2\mu}{\sigma^2}(z-\underline{z}_{d,i})}}{(\mu + \frac{\sigma^2 \beta}{2})} - \frac{M^d_{i,j}}{-\mu} e^{\frac{2\mu}{\sigma^2}(z-\hat{z}_i)} - \frac{M^d_{i,j} e^{-\beta z}}{e^{-\beta \underline{z}_{d,i}}(\mu + \frac{\sigma^2}{2}\beta)} \tag{187}$$

where

$$M^d_{i,j} = \psi \Omega_i u e^{-\beta \underline{z}_u} \quad \textit{if} \quad d = u \tag{188}$$

$$M^d_{i,j} = \psi \Omega_j E_i e^{-\beta \underline{z}_{w,i}} \quad \textit{if} \quad d = w \tag{189}$$

[82] To see this note that

$$\frac{\partial^2 J(z)}{\partial z^2} = C(\frac{1}{1-\alpha})(\frac{e^{\frac{z}{1-\alpha}}}{1-\alpha} + ae^{-a(z-\hat{z})+\frac{\hat{z}}{1-\alpha}}) > 0 \tag{183}$$

and for $z = \hat{z}$

$$\frac{\partial J(z)}{\partial z} = 0. \tag{184}$$

This implies for $z \geq \hat{z}$,

$$\frac{\partial J(z)}{\partial z} \geq 0. \tag{185}$$

We are now ready to define a Stationary competitive equilibrium

Definition 2 *A Stationary competitive equilibrium is defined by a set of* $\underline{z}_u, \underline{z}_{w,i}, w_i, E_i, \eta_i^u, \eta_{i,j}^w, \Lambda_i^u(z)$, $\Lambda_{i,j}^w(z), u$, $\forall (i,j) \in IxI$ *such that*

- $W_i > U, \quad \forall i \in I$
- $\sum_{\forall j \in I} \Omega_j J(\underline{z}_{w,i}) = W_i, \quad \forall i \in I$
- $\sum_{\forall j \in I} \Omega_j J(\underline{z}_u) = U$
- $J(\hat{z}) = U - \chi, \quad \forall i \in I$
- *The expression for* $J(z)$ *is given by Proposition 9*
- *The expression for* $\Lambda_i^u(z)$ *and* $\Lambda_{i,j}^w(z)$ *are given by Proposition 10*
- E_i *is given by*

$$E_i = \frac{f \Omega_i u}{\psi(1 - F(\underline{z}_{w,i})) + s}, \quad \forall i \in I \tag{190}$$

- u *is given by*

$$u = \frac{1}{1 + \psi A_u e^{-\beta \underline{z}_u} + f \sum_{\forall i \in I} \frac{s \Omega_i [1 + A_{w,i}(1 - F(\underline{z}_{w,i}))]}{s + \psi(1 - F(\underline{z}_{w,i}))}} \tag{191}$$

  where

$$A_u = \frac{1 + \beta(\underline{z}_u - \hat{z})}{-\mu\beta} \tag{192}$$

  and

$$A_{w,i} = \frac{1 + \beta(\underline{z}_{w,i} - \hat{z})}{-\mu\beta} \tag{193}$$

- η_j^u *is given by*

$$\eta_j^u = \psi A_u \Omega_j u e^{-\beta \underline{z}_u} \tag{194}$$

- $\Lambda_{i,j}^w(z)$ *is given by*

$$\Lambda_{i,j}^w = \psi A_{w,i} \Omega_j E_i e^{-\beta \underline{z}_{w,i}} \tag{195}$$

- $$w = \alpha[(\frac{1}{\sum_{\forall i} E_i \zeta \nu_i})(\sum_{\forall i} \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda_i^u(z) dz + \sum_{\forall i} \sum_{\forall j} \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda_{i,j}^w(z) dz)]^{1-\alpha} \tag{196}$$

The first condition states that the value of being a wage worker is higher than the value of being unemployed. Otherwise, no individual would ever choose to transition to wage work and markets would not clear. The second and third guarantee that individuals' decisions to open a business are optimal and the last just comes from market clearing.

Next we are ready to go over the main theorem that will subsequently generate all the patterns that were documented in the data. It states that in equilibrium wage workers are more selective on which business opportunities to implement. The necessary and sufficient condition for it is simply that the income received as unemployed is lower than that received as a worker. Note that were it not the case the equilibrium would not exist as markets would not clear.

Proposition 11 *In equilibrium,* $\underline{z}_{w,i} > \underline{z}_u \Leftrightarrow b < 1 \quad \forall i \in I$

The next corollaries are all a result of the difference in selection directly relating to the patterns documented empirically. The first states that businesses created by wage workers have a smaller exit rate. This comes from the combination of all business owners exiting at a same threshold while having different levels of selection upon entry between the two types.

Corollary 11.1 *In equilibrium businesses created by wage workers have a lower exit rate than those created by unemployed*

The next corollary states that firms created by wage workers have higher profits and more employees. This is a direct consequence of the fact that both profits and firm size are monotonically increasing in productivity.[83]

[83] The result that fixing aggregates, the number of employees of a firm matches one to one with productivity is a direct consequence of the absence of frictions in the hiring and firing process of firms.

Corollary 11.2 *In equilibrium, businesses created by wage workers, on average, have higher firm size and profits.*

Finally, as it is often the case with selection mechanisms an increased average productivity is associated to a lower entry rate. It follows that in equilibrium the rate at which wage workers enter will be lower than that of unemployed.

Corollary 11.3 *In equilibrium the entry rate into business ownership of the unemployed is higher than that of salary workers.*

Proof of Proposition 9.

We know that it is equal to $U \quad \forall z \leq \hat{z}$. We need to find the value of $J(z)$ for $z \geq \hat{z}$. The proof just follows from the proof in Proposition 1.[84]

Proof of Proposition 10.

Solving generic KFE. The solution below is the same for both types of business owners (i.e., $d = u, w$). Let j refer to the industry the individual entered and i the industry the individual came from. Since the income received when unemployed is independent of the individual's work history, the origin of all unemployed that become entrepreneurs is always the same.[85] With abuse of notation denote $\Lambda^d_{i,j}$ as the measure of firms created by d type where d indicates whether a worker ($d = w$) or an unemployed ($d = u$), that entered into industry j and, if $d = w$, the owner came from industry i.

Let $\hat{z}$ be the point at which firms exit and $\underline{z}_{d,i}$ the point in which firms enter, with $\underline{z}_{d,i} > \hat{z}_i$. Let $\Lambda(z)^d_{i,j}$ denote the endogenous pdf and $M^d_{i,j}$ the measure of entrants. For type u ($d = u$), $M^d_{i,j}$ is equal to $\psi \Omega_j u e^{-\beta \underline{z}_u}$ and for type w ($d = w$) $M^d_{i,j}$ is equal to $\psi E_i \Omega_j e^{-\beta \underline{z}_{w,i}}$

Finally, let for $[\underline{z}_{d,i}, \infty[$

$$\Lambda^d_{i,j}(z) = \Lambda^d_{i,j,2}(z) \tag{197}$$

[84]Conditional on a wage, the problem for the entrepreneur is exactly as in the model with just one sector.

[85]In other words, there is only one type of unemployment an individual can be in. In contrast, there are many different types of wage work an individual can be in.

and for $]\hat{z}, \underline{z}_{d,i}]$

$$\Lambda^d_{i,j}(z) = \Lambda^d_{i,j,1}(z) \tag{198}$$

Then for $[\underline{z}_{d,i}, \infty[$

$$\frac{\partial \Lambda^d_{i,j,2}(z)}{\partial t} = -\mu \frac{\partial \Lambda^d_{i,j,2}(z)}{\partial z} + \frac{\sigma^2}{2}\frac{\partial^2 \Lambda^d_{i,j,2}(z)}{\partial z^2} + M^d_{i,j}\frac{\beta e^{-\beta z}}{e^{-\beta \underline{z}_{d,i}}} = 0 \tag{199}$$

for $]\hat{z}_i, \underline{z}_{d,i}]$

$$\frac{\partial \Lambda^d_{i,j,1}(z)}{\partial t} = -\mu \frac{\partial \Lambda^d_{i,j,1}(z)}{\partial z} + \frac{\sigma^2}{2}\frac{\partial^2 \Lambda^d_{i,j,1}(z)}{\partial z^2} = 0 \tag{200}$$

The four boundary conditions are

1. $\int_{\underline{z}_{d,i}}^{\infty} \Lambda^d_{i,j}(z)dz < \infty$
2. $\Lambda^d_{i,j,1}(\underline{z}_{d,i}) = \Lambda^d_{i,j,2}(\underline{z}_{d,i})$
3. $\frac{\partial \Lambda^d_{i,j,1}(\underline{z}_{d,i})}{\partial z} = \frac{\partial \Lambda^d_{i,j,2}(\underline{z}_{d,i})}{\partial z}$
4. $\Lambda^d_{i,j,1}(\hat{z}_i) = 0$

Now, to avoid cumbersome notation drop the subscript (i, j).

Then, the proof just follows the same steps as the proof for Proposition 2.

Proof of Proposition 11.

In equilibrium $W^i > U$ otherwise, $\forall i \in I$ such $U > W^i$ all workers in that industry would choose unemployment over employment in that industry and that industry would cease to exist.

Proof of Corollary 11.1.

Note that in steady state the flow of exiting firms of each type is equal to $M^d_{i,j}$.[86] Letting ER^d_i denote Exit Rate for type d , where $d = \{u, w\}$ having entered from

[86]This comes from the fact that, in steady state, the flow of firms exiting a group has to be equal to the flow entering.

industry i if $d = w$ we will have

$$(ER_i^d)^{-1} = [\frac{1 + \beta(\underline{z}_{d,i} - \hat{z})}{-\mu\beta}] \tag{201}$$

$$(ER_i^w)^{-1} > (ER^u)^{-1} \Rightarrow ER^u > ER_i^w \quad \forall i \in I \tag{202}$$

where the first inequality follows from $\underline{z}_{w,i} > \underline{z}_u \quad \forall i \in I$

It follows that in the steady state equilibrium the exit rate is higher for firms of type u.

Proof of Corollary 11.2.

The expression for optimal firm size is given by

$$n(z, w) = (\frac{\alpha}{w})^{\frac{1}{1-\alpha}} e^{\frac{z}{1-\alpha}} \tag{203}$$

It follows average size for type (d, i, j), where $d \in \{u, w\}$, j the industry the individual entered and i representing the industry of origin when $d = w$

$$\int_{\hat{z}} n(z, w) \frac{\Lambda_{i,j}^d(z)}{\eta_{i,j}^d} dz = (\frac{\alpha}{w})^{\frac{1}{1-\alpha}} \frac{M_{i,j}^d}{\eta_{i,j}^d} \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \frac{\Lambda_{i,j}^d(z)}{M_{i,j}^d} dz \tag{204}$$

Now to avoid heavy notation drop the subscripts (i, j) but remember all of the proof is done for a particular (i, j) group. Then the rest of the proof just follows the proof of corollary 3.2.

Proof of Corollary 11.3.

To see that entry is higher for the unemployed, just note that

$$\underline{z}_{w,i} > \underline{z}_u \Rightarrow \psi(1 - F(\underline{z}_u)) > \psi(1 - F(\underline{z}_{w,i})), \forall i \tag{205}$$

L For Online Publication - Supplemental Appendix II : Solving for model with search frictions

To get search frictions assume there is an intermediate goods sector which transforms individuals l into labour units y used by entrepreneurs. The intermediate goods sector has free entry condition ($V = 0$)

$$rV = -cw + q(\theta)(F - V) \tag{206}$$

$$rF = \rho - w + \lambda(V - F) \tag{207}$$

$$V = 0 \tag{208}$$

Wage determined by Nash Bargaining

$$\phi(W - U) = (1 - \phi)(F - V) \tag{209}$$

Problem of the unemployed

$$rU = bw + p(\theta)(W - U) + \psi \int_{\underline{z}_u} (J(z) - U)dF(z) \tag{210}$$

$$rW = w + s(U - W) + \psi \int_{\underline{z}_w} (J(z) - W)dF(z) \tag{211}$$

Problem of the entrepreneur is as before (Optimal Stopping Problem)

$$rJ(z) = \pi^*(z) + \mu J'(z) + \frac{\sigma^2}{2} J''(z) \quad \text{if} \quad z \geq \hat{z} \tag{212}$$

$$J(z) = U - \chi \quad \text{if} \quad z \leq \hat{z} \tag{213}$$

$$J'(\hat{z}) = 0 \tag{214}$$

and optimal quantity n of intermediate good y to purchase solves

$$\pi^*(z) \equiv \max_n e^z n^\alpha - \rho n \tag{215}$$

where ρ is determined by

$$(1 - u - \eta) = \int_{\hat{z}} n(z, p)\Lambda(z)dz \tag{216}$$

Note that total production of intermediate goods is just equal to the measure of workers $(1 - u - \eta)$ and the demand is the total demand due to entrepreneurs.

To see a relationship between w and ρ use Equations (206), (207) and (208) to get

$$w = \frac{\rho q(\theta)}{c(r + s) + q(\theta)} \tag{217}$$

Using the Nash Bargaining condition (Equation (209)) and Equations (208) and (206)

$$\frac{cw}{q(\theta)} = \frac{\phi}{1 - \phi}(W - U) \tag{218}$$

Now replace w by its expression

$$\frac{c\rho}{c(r + s) + q(\theta)} = \frac{\phi}{1 - \phi}(W - U) \tag{219}$$

which pins down θ for a given value of W and U. Finally, ρ is given by market clearing in the intermediate goods sector

$$1 - u - \eta = \int_{\hat{z}} n(z, \rho)\Lambda(z)dz \tag{220}$$

where u is the measure of unemployed, η the measure of entrepreneurs, $n(z, \rho)$ the optimal amount of transformed labour to hire for a given productivity z and price ρ and $\Lambda(z)$ is the distribution of firm productivity.

Solving for optimal profits gives

$$\pi^*(z) = (1 - \alpha)(\frac{\alpha}{\rho})^{\frac{\alpha}{1-\alpha}} e^{\frac{z}{1-\alpha}} \tag{221}$$

Replacing ρ by its expression as a function of w and θ we get

$$\pi^*(z) = (1-\alpha)\left(\frac{\alpha}{\frac{w(c(r+\lambda)+q(\theta))}{q(\theta)}}\right)^{\frac{\alpha}{1-\alpha}} e^{\frac{z}{1-\alpha}} \tag{222}$$

The cost of an intermediate goods unit for entrepreneurs is a function of wages individuals receive and tightness in the market θ. Note that

$$\frac{\partial \pi^*(z)}{\partial \theta} < 0 \tag{223}$$

and

$$\frac{\partial \pi^*(z)}{\partial w} < 0 \tag{224}$$

L.1 Characterizing the Equilibrium

Proposition 12 *The solution to the firm's optimal stopping problem implies*

$$J(z) = \frac{B}{r - \frac{\mu}{1-\alpha} - \frac{\sigma^2}{2}\frac{1}{(1-\alpha)^2}}\left(e^{\frac{z}{1-\alpha}} + \frac{1}{a(1-\alpha)} e^{-a(z-\hat{z}) + \frac{\hat{z}}{1-\alpha}}\right) \tag{225}$$

where

$$B \equiv (1-\alpha)\left(\frac{\alpha}{\rho}\right)^{\frac{\alpha}{1-\alpha}} \tag{226}$$

$$a = \frac{\mu + \sqrt{\mu^2 + 2r\sigma^2}}{\sigma^2} > 0 \tag{227}$$

Not surprisingly, the value function of the business owner $J(z)$ is increasing in productivity for the range of values for which the business operates $z \in [\hat{z}, \infty[$. [87]

[87] To see this note that

$$\frac{\partial^2 J(z)}{\partial z^2} = C\left(\frac{1}{1-\alpha}\right)\left(\frac{e^{\frac{z}{1-\alpha}}}{1-\alpha} + a e^{-a(z-\hat{z}) + \frac{\hat{z}}{1-\alpha}}\right) > 0 \tag{228}$$

and for $z = \hat{z}$

$$\frac{\partial J(z)}{\partial z} = 0. \tag{229}$$

This implies for $z \geq \hat{z}$,

$$\frac{\partial J(z)}{\partial z} \geq 0. \tag{230}$$

Let $\Lambda^w(z)$ denote the measure of business owners operating a business project of productivity z that were employed by somebody else when they received the current business opportunity and $\Lambda^u(z)$ the measure of business owners operating a business project of productivity z that were not working at the moment they received the current business opportunity.[88]

Proposition 13 *For all $i \in \{u, w\}$, the measure of business owners running a firm of productivity z is given by,*

- *For $z \in [\hat{z}, \underline{z}_i]$*

$$\Lambda^i(z) = \Lambda_1^i(z) = \frac{M^i}{-\mu}(1 - e^{\frac{2\mu}{\sigma^2}(z-\hat{z})}) \tag{232}$$

- *For $z \in]\underline{z}_i, \infty[$*

$$\Lambda^i(z) = \Lambda_2^i(z) = \frac{\beta M^i \frac{\sigma^2}{-2\mu} e^{\frac{2\mu}{\sigma^2}(z-\underline{z}_i)}}{(\mu + \frac{\sigma^2\beta}{2})} - \frac{M^i}{-\mu} e^{\frac{2\mu}{\sigma^2}(z-\hat{z})} - \frac{M^i e^{-\beta z}}{e^{-\beta \underline{z}_i}(\mu + \frac{\sigma^2}{2}\beta)} \tag{233}$$

where

$$M^i = \psi u e^{-\beta \underline{z}_u} \quad \textit{if} \quad i = u \tag{234}$$

$$M^i = \psi(1 - u - \eta)e^{-\beta \underline{z}_w} \quad \textit{if} \quad i = w \tag{235}$$

Corollary 13.1 *The measure of business owners, η, and the fraction that were not working prior to entering entrepreneurship, $\frac{\eta^u}{\eta}$, are given by :*

$$\eta = \frac{\psi(1-\eta)}{s + f + \psi e^{-\beta \underline{z}_w}}[A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}] \tag{236}$$

$$\frac{\eta^u}{\eta} = \frac{A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u}}{A_u(s + \psi e^{-\beta \underline{z}_w})e^{-\beta \underline{z}_u} + A_w f e^{-\beta \underline{z}_w}} \tag{237}$$

[88] In other words, this amount to saying that $\Lambda^w(z)$ and $\Lambda^u(z)$ are defined such that

$$\int_{\hat{z}} \Lambda^u(z)dz + \int_{\hat{z}} \Lambda^w(z)dz + u + e = 1 \tag{231}$$

where e is the measure of workers.

where

$$A_i = [\frac{1 + \beta(\underline{z}_i - \hat{z})}{-\mu\beta}]. \tag{238}$$

We are now ready to define a Stationary competitive equilibrium

Definition 3 *A Stationary competitive equilibrium is defined by $\underline{z}_u, \underline{z}_w, \rho, \eta, \eta^u, \Lambda^u(z), \Lambda^w(z), u, \theta, w$ such that*

- $W > U$
- $J(\underline{z}_w) = W$
- $J(\underline{z}_u) = U$
- $J(\hat{z}) = J(\underline{z}_u) - g$
- *The expression for $J(z)$ is given by Proposition 12*
- *The expression for $\Lambda^u(z)$ and $\Lambda^w(z)$ are given by Proposition 13*
- *u is given by*
$$u = \frac{(s + \psi(1 - F(\underline{z}_w)))(1 - \eta)}{p(\theta) + s + \psi(1 - F(\underline{z}_w))} \tag{239}$$
- *η and η^u are defined by corollary 13.1*
- $$\rho = \alpha[\frac{1}{(1 - u - \eta)}(\int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda^u(z)dz + \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda^w(z)dz)]^{1-\alpha} \tag{240}$$
- $$\frac{c\rho}{c(r + s) + q(\theta)} = \frac{\phi}{1 - \phi}(W - U) \tag{241}$$
- $$w = \frac{\rho q(\theta)}{c(r + s) + q(\theta)} \tag{242}$$

The first condition states that the value of being a employed worker is higher than the value of not working. Otherwise, no individual would ever choose to transition to wage work and markets would not clear. The second and third guarantee that individuals' decisions to open a business are optimal and the last three just come from market clearing in the final good sector, determination of tightness in the intermediate goods sector and wage determination via Nash Bargaining. Next, I summarize that the equilibrium can be characterized by a system of 5 equations and 5 unknowns.

A Stationary equilibrium can be characterized by 5 variables $(\theta, \rho, \hat{z}, \underline{z}_u, \underline{z}_w)$ and 5 equations

- $$rJ(\underline{z}_u) = bw + f(J(\underline{z}_w) - J(\underline{z}_u)) + \psi \int_{\underline{z}_u} (J(z) - J(\underline{z}_u))dF(z) \tag{243}$$

- $$rJ(\underline{z}_w) = w + s(J(\underline{z}_u) - J(\underline{z}_w)) + \psi \int_{\underline{z}_w} (J(z) - J(\underline{z}_w))dF(z) \tag{244}$$

- $$J(\hat{z}) = J(\underline{z}_u) - \chi \tag{245}$$

- $$\rho = \alpha[\frac{1}{(1-u-\eta)} \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda^u(z)dz + \int_{\hat{z}} e^{\frac{z}{1-\alpha}} \Lambda^w(z)dz]^{1-\alpha} \tag{246}$$

-

- $$\frac{c\rho}{c(r+s)+q(\theta)} = \frac{\phi}{1-\phi}(J(\underline{z}_w) - J(\underline{z}_u)) \tag{247}$$

where $J(z)$ is given by Proposition 12 and $\Lambda^u(z), \Lambda^w(z)$ are given by Proposition 13.

We are ready to go over the main theorem that subsequently generates all the patterns that were documented in the data. It states that in equilibrium wage workers are more selective on which business opportunities to implement. The necessary and sufficient condition for it is simply that the income received while not working is lower than that received as a worker. Were it not the case the equilibrium would not exist as markets would not clear.

Proposition 14 *In equilibrium,* $\underline{z}_w > \underline{z}_u \Leftrightarrow b < 1$

The next corollaries are all a result of the difference in selection directly relating to the patterns documented empirically.

Corollary 14.1 *In equilibrium, businesses created by employed workers have a lower exit rate than those created by not working individuals.*

Corollary 14.1 is a result of the combination of all business owners exiting at the same threshold while having different levels of selection upon entry between the two types.

Corollary 14.2 *In equilibrium, businesses created by employed workers, on average, have higher firm size and profits relative to those created by not working individuals.*

Corollary 14.2 is a direct consequence of the fact that both profits and firm size are monotonically increasing in productivity.

Corollary 14.3 *In equilibrium, the entry rate into business ownership of not working individuals is higher than that of employed workers.*

Finally, as it is often the case with selection mechanisms an increased average productivity is associated to a lower entry rate.

It follows that this stylized model is capable of capturing the differences in businesses created by not working individuals versus employed workers in the data. The next section derives a testable prediction from the theory and tests it in the data.

Proof of Proposition 12.

We know that it is equal to $U \quad \forall z \leq \hat{z}$. We need to find the value of $J(z)$ for $z \geq \hat{z}$. As in the benchmark model conditional on a price for the input of the entrepreneur (w before, and now ρ), the optimal stopping problem is the same. It follows, the proof just follows from the proof in Proposition 1.[89]

Proof of Proposition 13.

Solving generic KFE. The solution below is the same for both types of business owners (i.e., $i = u, w$)

Let $\hat{z}$ be the point at which firms exit and $\underline{z}_i$ the point in which firms enter, with $\underline{z}_i > \hat{z}$. Let $\Lambda(z)$ denote the endogenous pdf and M the measure of entrants. For type u ($i = u$), M is equal to $\psi u e^{-\beta \underline{z}_u}$ and for type w ($i = w$) M is equal to $\psi(1 - u - \eta)e^{-\beta \underline{z}_w}$

Finally, for $[\underline{z}_i, \infty[$

$$\Lambda^i(z) = \Lambda^i_2(z) \tag{248}$$

and for $]\hat{z}, \underline{z}_i]$

$$\Lambda^i(z) = \Lambda^i_1(z) \tag{249}$$

Then for $[\underline{z}_i, \infty[$

$$\frac{\partial \Lambda^i_2(z)}{\partial t} = -\mu \frac{\partial \Lambda^i_2(z)}{\partial z} + \frac{\sigma^2}{2} \frac{\partial^2 \Lambda^i_2(z)}{\partial z^2} + M^i \frac{\beta e^{-\beta z}}{e^{-\beta \underline{z}_i}} = 0 \tag{250}$$

for $]\hat{z}, \underline{z}_i]$

$$\frac{\partial \Lambda^i_1(z)}{\partial t} = -\mu \frac{\partial \Lambda^i_1(z)}{\partial z} + \frac{\sigma^2}{2} \frac{\partial^2 \Lambda^i_1(z)}{\partial z^2} = 0 \tag{251}$$

The four boundary conditions are

1. $\int_{\underline{z}_i}^{\infty} \Lambda^i(z) dz < \infty$
2. $\Lambda^i_1(\underline{z}_i) = \Lambda^i_2(\underline{z}_i)$
3. $\frac{\partial \Lambda^i_1(\underline{z}_i)}{\partial z} = \frac{\partial \Lambda^i_2(\underline{z}_i)}{\partial z}$

[89] Conditional on a wage, the problem for the entrepreneur is exactly as in the model with just one sector.

4. $\Lambda_1^i(\hat{z}) = 0$

The proof then just follows the same steps as the proof for Proposition 2.

Proof of Corollary 13.1.

The steps of this proof just follow the steps of the proof of corollary 2.1.

Proof of Proposition 14.

The only difference between the value functions of U and W in the framework with search frictions relative to the benchmark model is that the exogenous transition rate from U to W, f, is replaced by an equilibrium object $p(\theta)$. But from the point of view of the individual making the decision to open a firm or not, the transition rate from W to U is taken as given.

It follows that for this proof we can just follow the same steps as the proof for Proposition 3, except that I replace f by $p(\theta)$.

Proof of Corollary 14.1.

The proof of this corollary just follows the proof of corollary 3.1.

Proof of Corollary 14.2.

The expression for optimal firm size is given by

$$n(z, w) = (\frac{\alpha}{\rho})^{\frac{1}{1-\alpha}} e^{\frac{z}{1-\alpha}} \tag{252}$$

The only difference relative to the model without search frictions is that the cost of one input for the entrepreneur was w and here it is ρ. But other than that the expression is identical. It follows that the proof of this corollary just follows the proof of corollary 3.2.

Proof of Corollary 14.3.

$\underline{z}_w > \underline{z}_u \Rightarrow \psi(1 - F(\underline{z}_u)) > \psi(1 - F(\underline{z}_w))$.