Entrepreneurship, Labor Market Mobility and the Role of Entrepreneurial Insurance
Online Appendix

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The online appendix is organized as follows. Section A provides additional facts about entrepreneurship relative to section 2 of the paper. Section B details the data source and the associated variables used to construct the flows between occupations, the masses of occupation and the targeted moments. Section C provides a full characterization of the model and section D displays the associated policy functions and the resulting stationary distributions. Section E provides additional properties of the baseline model. The full numerical implementation is detailed in section F. Finally, the robustness of our results is discussed in section G.

A Facts about entrepreneurship

A.1 Fear of failure

Figure 1 plots the relation between the fear of failure index and the self-employment rate in the US as evidenced by the data collected by the Global Entrepreneurship Monitor. This relation is discussed in section 2.1 of the paper. Additionally, Figure 2 displays the cross-sectional correlation between the fear of failure index and self-employment rate across countries.

A.2 Entrepreneurial income

Figure 3 shows that entrepreneurial income is not distributed normally but is rather extremely right-skewed. Most entrepreneurs are concentrated below and around the median income (normalized to unity here) but some of them perform extremely well while others have negative incomes. Whether we consider business or total income, the main idea is that there are potentially important risks associated with an entrepreneurial occupation.

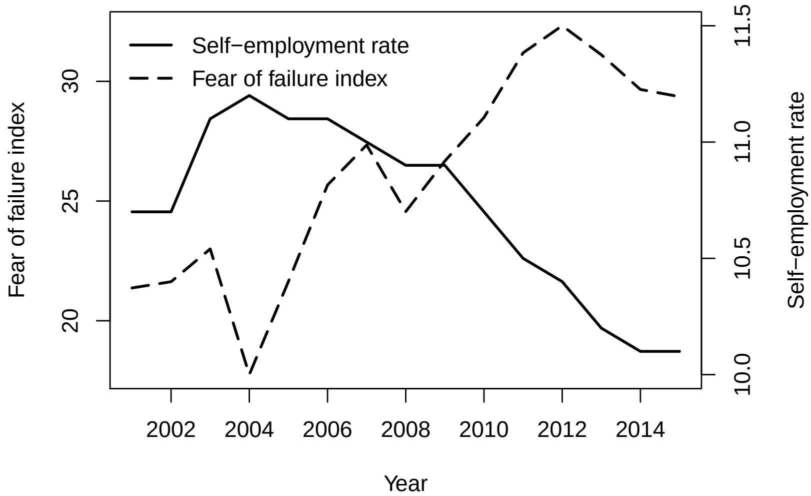

Figure 1. Fear of failure index and self-employment rate in the US. *Source:* Global Entrepreneurship Monitor and The Bureau of Labor Statistics (BLS). The Fear of Failure index measures the 18-64 old population perceiving good opportunities to start a business while indicating that the fear of failure would prevent them from doing so. The self-employment rate (over the working population) is the fraction of the 20-65 old population declaring themselves as self-employed (incorporated or not).

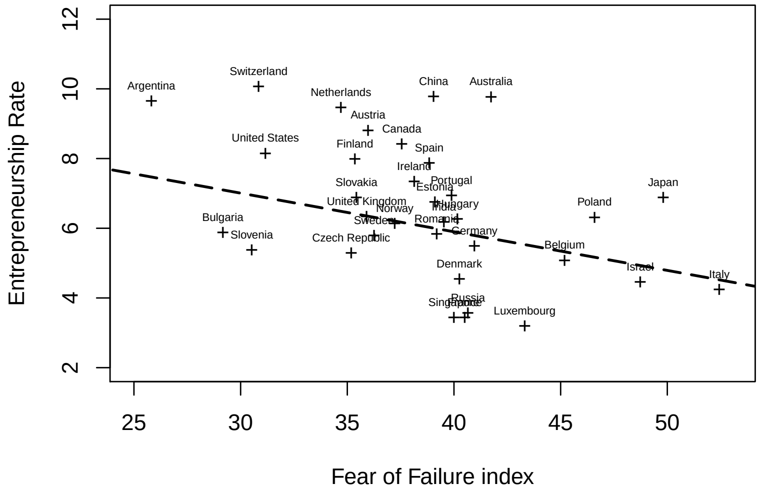

Figure 2. Fear of failure index and self-employment rate across countries.

A.3 Additional occupational flows

Figures 4, 5, 6 and 7 below provide additional occupational flow evidence from the CPS in addition to the flow plot provided and discussed in section 2.2 of the paper. Figure 4 considers the period from 2001 to 2015 and Figure 5 considers the alternative data period 2012-2015 (excluding the 2009 - 2011 unemployment peak). Figure 6 only considers full-time occupation and discards part-time occupied households from the characterization. The shapes are quite similar to the one in the core paper. We notice however that the transition from paid-employment to en-

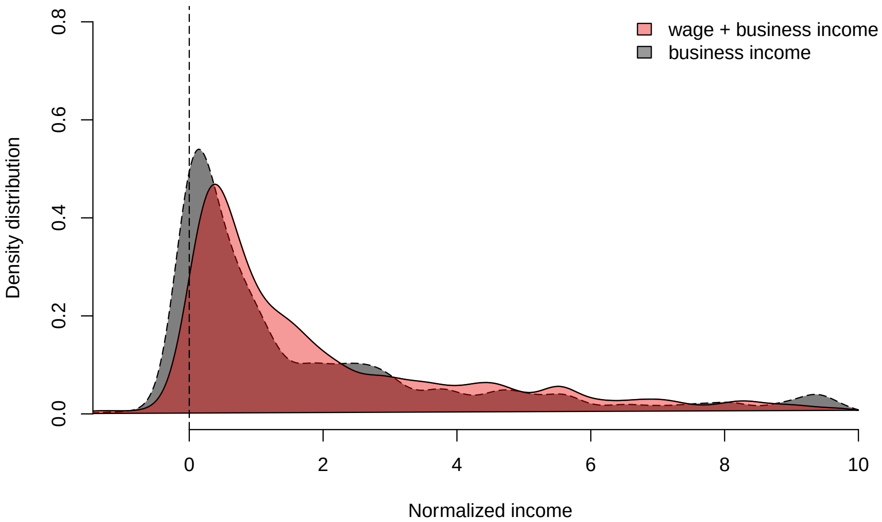

Figure 3. Entrepreneurial income normalized with respect to the median. *Legend:* dashed line refers to only business income and solid line to all entrepreneurial income. *Source:* SCF 2007.

trepreneurship is *U-shaped* in the two dimensions of wage and educational attainment for these 3 figures. Finally, in figure 7 we display the yearly transitions. It appears that when considering only self-employed business-owners, the *S-shape* of the transition from entrepreneurship to paid-employment becomes a *hump-shape* decreasing only for *college* graduates. This could be due to the fact that large movements occur at a high frequency (quarterly frequency), suggesting that many lower than high-school individuals try to run a business but fail relatively quickly (before one year). We also did compute these transitions at a monthly frequency. Shapes are similar to those at a quarterly frequency.

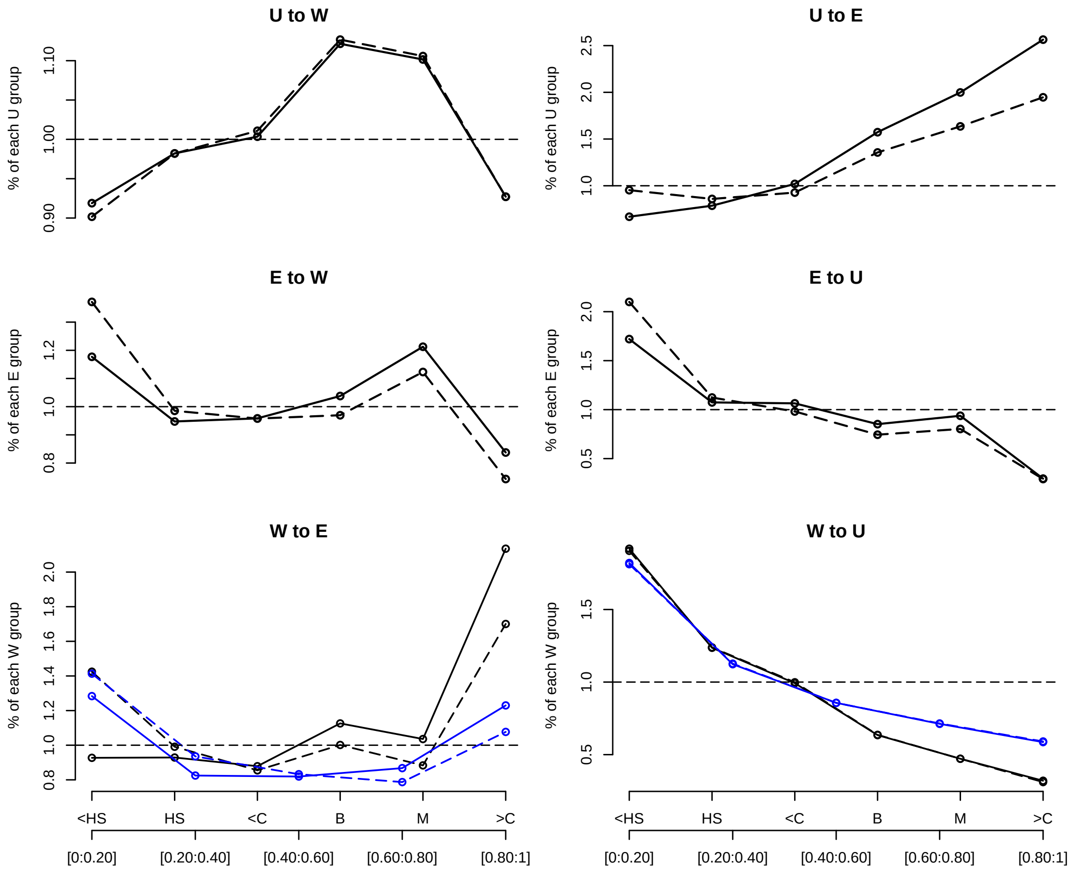

Figure 4. Quarterly flows from a given occupation to another by educational attainment (black) and wage earnings (blue), from 2001 to 2015. A dashed lines refer to self-employment only while a solid line to only self-employed business owners. *Data sources:* monthly basic CPS.

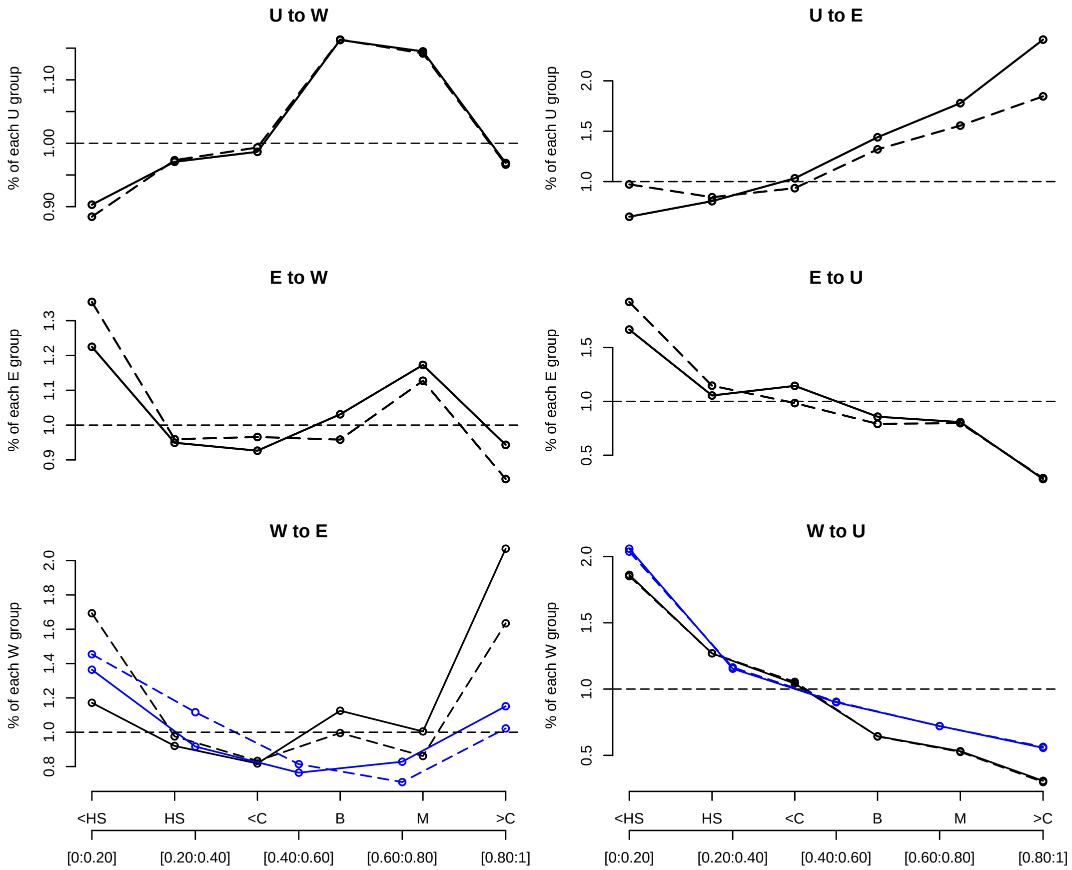

Figure 5. Quarterly flows from a given occupation to another by educational attainment (black) and wage earnings (blue), from 2012 to 2015. A dashed lines refer to self-employment only while a solid line to only self-employed business owners. *Data sources:* monthly basic CPS.

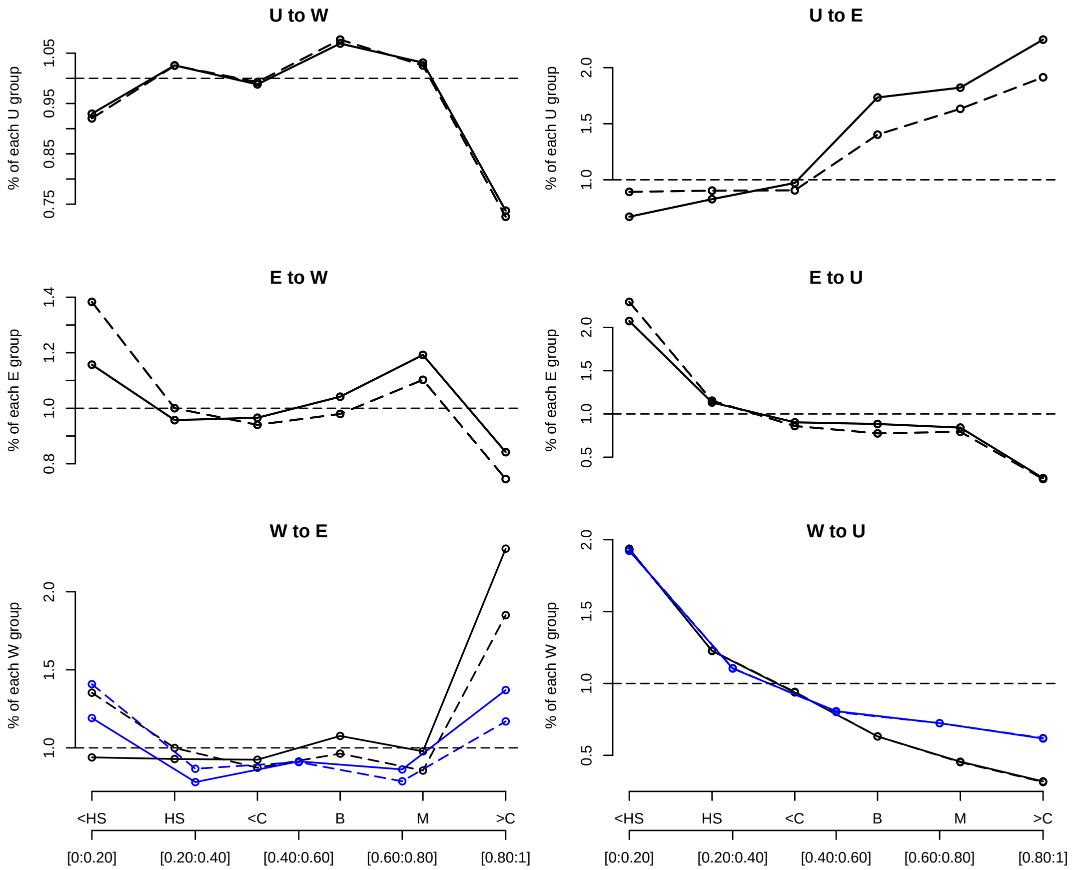

Figure 6. Quarterly flows from a given occupation to another by educational attainment (black) and wage earnings (blue), restricting to full-time movements. A dashed lines refer to self-employment only while a solid line to only self-employed business owners. *Data sources:* monthly basic CPS from 2001 to 2008.

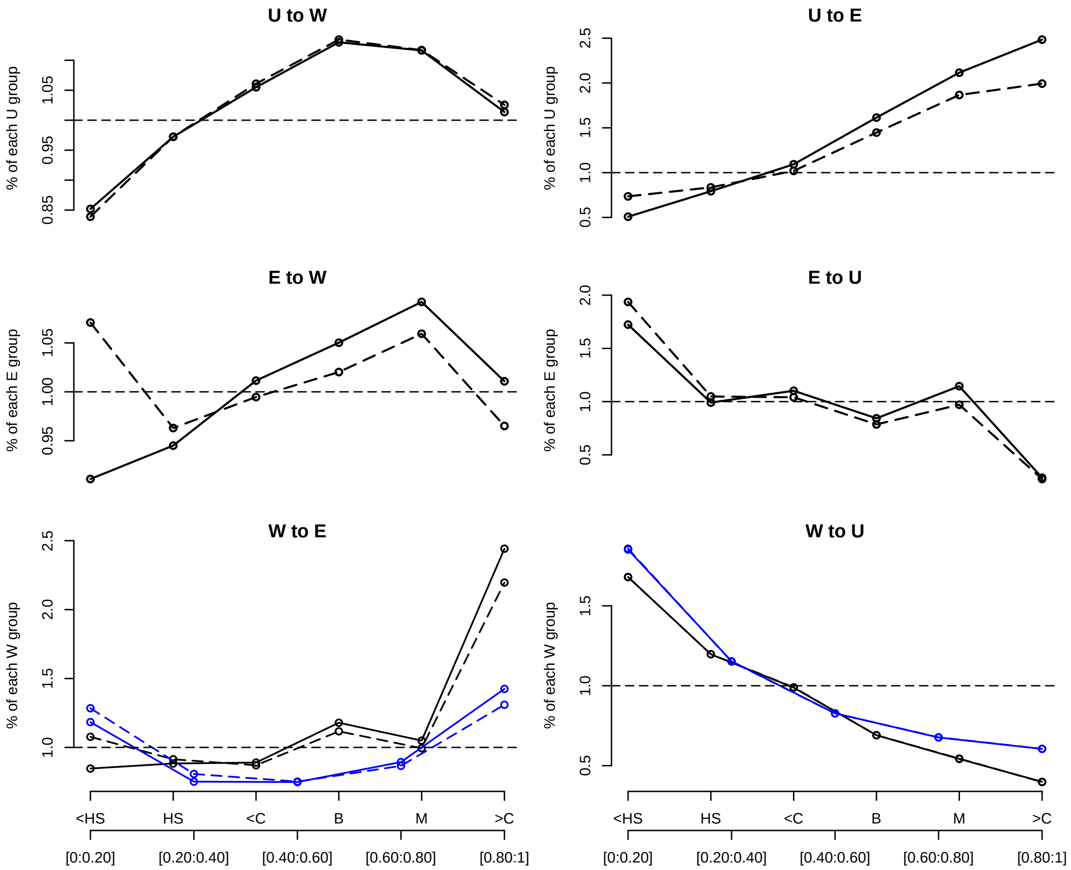

Figure 7. Yearly flows from a given occupation to another by educational attainment (black) and wage earnings (blue). A dashed lines refer to self-employment only while a solid line to only self-employed business owners. *Data sources:* monthly basic CPS from 2001 to 2015.

A.4 Yearly occupational flows

Using the CPS, we also compute the yearly occupational flows from 2001 to 2008. Table 1 summarizes the results. As a comparison, Cagetti and De Nardi (2009) obtain a yearly entrepreneurial exit rate toward paid-employment of about 22% within their model and a yearly worker exit rate toward entrepreneurship of about 2.4%. We find quite similar flows using our definition of an entrepreneur.

	W	E	U
W	94.6	2.2	3.2
E	21.6	76.9	1.5
U	56.0	3.7	40.3

Table. 1. Flows between occupations during a year. *Data sources:* authors' computations using CPS data from 2001 to 2015. We restrict our sample to individuals aged between 20 to 65 years old.

A.5 Flows from entrepreneurship to employment and conversely by activity sector and education

In Table 2, we detail flows from employment to entrepreneurship and from entrepreneurship to employment by origin CPS main occupation and educational attainment. The majority of the lowly educated individuals leaving paid employment for entrepreneurship were occupied in the production sector or the services sector. We find the same type of flows from entrepreneurship to paid employment. However, the picture is quite different for highly educated individuals: a majority of the movers originate in the professional and related sector with management activities coming in second[1]. Mid education groups such as individuals with a bachelor's degree or less than a college degree seem to bridge the gap with more diverse origin sectors. This seems to suggest that individuals with different educational attainments are selected in different activity sectors associated with different performances and growth expectations.

[1]Professional and related occupations refer to engineers, architects, surveyors, mathematical and computer scientists, teachers, lawyers, judges etc. A complete definition is available in the BLS documentation.

Employment to entrepreneurship flow (%)	<HS	HS	<C	B	M	>C
Professional and related	1	6	15	29	51	77
Management, business, and financial occupations	6	9	16	29	29	16
Sales and related	9	11	15	18	10	4
Service	25	19	16	6	4	2
Production, maintenance, and repair	40	31	17	6	2	0
Transportation and material moving	10	8	6	2	0	0
Others	9	16	15	10	6	1
Entrepreneurship to employment flow (%)	<HS	HS	<C	B	M	>C
Professional and related	1	4	11	19	35	72
Management, business, and financial occupations	16	22	24	33	35	17
Sales and related	10	15	19	24	16	5
Service	24	16	17	7	4	1
Production, maintenance, and repair	31	25	16	8	5	3
Transportation and material moving	11	7	3	2	2	1
Others	7	11	10	6	5	2

Table. 2. Flows from employment to entrepreneurship and from entrepreneurship to employment by origin sector educational attainment. *Data sources:* authors' own computations using CPS data from 2001 to 2008, defining entrepreneurs as self-employed business owners. Category "others" refers to individuals meeting no other condition and office and administrative support.

B Data: additional elements

In this section, we detail additional elements about our sample selection. The main discussion about data elements is conducted in section 2 and Appendix A of the core paper.

B.1 Current Population Survey: sample details

We use the CPS from 2001 to 2008 to compute masses and transitions between occupations. We restrict our sample to the population aged between 20 and 65 years old. Quarterly probability to exit a given occupation to another one is computed using all months from 2001 to 2008 in order to boost sample sizes. We end up with a panel of around 7 millions of matched individuals. In order to control for false matches, we construct a specific individual identifier that controls for age, sex and US state. Probabilities are multiplied by the first-month respondent weight (PWCMPWG) to generate a numeric value for the fraction of individuals in a specific occupation leaving to another occupation. Finally, we take the weekly earnings as a measure of wage.

Worker We classify as a worker an individual who currently work in a job or who declares being temporarily absent from a job (PEMLR = 1 or 2, and PEIO1COW = 1:5 or 8).

Unemployed individual Individuals classified as unemployed are those who do not have a job, but have actively looked for one in the preceding 4 weeks (except for temporary illness), and are currently available for work. According to the Bureau of Labor Statistics (BLS), actively looking for work may consist in contacting an employer, a university or an employment center (job interviews, submitting resumes, answering job advertisements, checking unions or professional registers, etc.). Workers expecting to be recalled from temporary layoffs are counted as unemployed whether or not they have engaged in a specific job seeking activity (PEMLR = 3 or 4). We also count as unemployed *all individuals marginally attached to the labor force*. Those individuals declare wanting a job (PRWNTJOB = 1), are currently available for work (PEDWAVL = 1), have looked for a job in the last 12 months (even if they did not actively search in the 4 weeks preceding the interview for various reasons) (PRJOBSEA = 1, 2 or 3). Such individuals are likely to be represented in our model, since we account for individuals that could search a relatively small amount of time, which may classify them as not in the labor force following the BLS definition.

Entrepreneur In the case of an entrepreneur, we use a definition similar to Cagetti and De Nardi (2006). Using the CPS, we define an entrepreneur as a self-employed (incorporated or unincorporated) worker (PEIO1COW = 6 or 7), who currently work (PEMLR = 1 or 2) and own his business (HUBUS = 1). We control business ownership by creating a specific variable that indicates whether or not the individual was owning his firm from 2001 to 2008, allowing us to control for measurement errors arising in the survey[2]. The share of entrepreneurs varies between 8.5% to 11% (relative to the population of workers, entrepreneurs and unemployed) depending of the assumption considered and the period.

B.2 Survey of Consumer Finance

We use the SCF 2001, 2004 and 2007 waves in order to compute various moments relative to entrepreneurship. To be consistent with our CPS sample, we restrict the definition of an entrepreneur to individuals declaring being self-employed and owning a business (that they

[2]If we do not construct this additional variable, the flow from entrepreneurship to paid-employment during a quarter jump to 16%, which is inconsistent with yearly flows (see Cagetti and De Nardi (2006)). Therefore, our definition captures a part of self-employment that is not business ownership, but this is more consistent with resulting flows.

actively work in) with at least 5000$ invested in it[3]. In table 3, we report those SCF moments that can be compared to those obtained with the model.

X / SCF	**2001**	**2004**	**2007**	**Average**	**Model**
Share of entrepreneurs (in %)	8.8	8.5	9.1	8.8	8.8
Fraction of unemployed (in %)	4.2	5.2	5.2	4.9	5.0
Ratio of median net worth (entrepreneur to worker)	7.3	8.7	7.5	7.8	8.1
Ratio of median net worth (entrepreneur to all population)	6.2	7.2	6.6	6.7	6.2
Ratio of median income (entrepreneur to worker)	1.71	1.67	1.57	1.65	1.66
Fraction of pop. with net worth < 1/10 of median (in %)	21.1	22.2	23.43	22.2	15.2
Gini coefficient - wealth	0.81	0.82	0.82	0.82	0.63
Fraction of capital hold by entrepreneurs (in %)	28.5	30	31.5	30	29.4
Ratio of median entrepreneurs' debt to entrepreneurs' earnings	0.95	1.37	1.59	1.3	0.93
Ratio of median ent. income to ent. net worth (in %)	0.166	0.128	0.11	0.134	0.106
Ratio of median worker income to worker net worth (in %)	0.72	0.73	0.60	0.68	0.63
% of entrepreneurs with zero or negative income (in %)	0.05	0.8	2.8	1.2	2.7

Table. 3. Various moments using different SCF waves as compared to the baseline model.

B.3 Part-time versus full-time movements

We display in table 4 the full transition matrix accounting for full and part-time occupations. We class an individual in a part-time occupation when she is working less than 20 hours per week. It appears that individuals working part-time are likely to remain in a part-time occupation (the probability is around 60%). Nonetheless, full-time workers are unlikely to become part-time workers or entrepreneurs whereas full-time entrepreneurs have a chance to become a part-time entrepreneurs. This could be driven, for instance, by a lack of production opportunities forcing entrepreneurs to only work part-time. Overall, the flows of full-time entrepreneurs and workers do not seem to be affected when we distinguish part-time and full-time.

	Transition (%)				
	W_F	W_P	E_F	E_P	U
W_F	95.34	2.23	0.39	0.05	1.98
W_P	32.99	61.38	0.48	0.74	4.42
E_F	4.00	0.32	90.44	4.42	0.82
E_P	4.33	3.67	31.34	58.5	2.16
U	39.68	7.67	1.70	0.69	50.25

Table. 4. Flows between occupations for different definitions of entrepreneurship per quarter. *Data sources:* authors' own computations using CPS data from 2001 to 2008.

[3]The magnitude of the moments are quite similar under different assumptions for this value. We impose a restriction of 5000$ to reduce misreporting effects and to be more consistent with our CPS sample. Moreover, note that this definition of an entrepreneur selects individuals that are on average better off than the average of all self-employed.

B.4 Not in the labor force (NLF)

In the baseline model, we are computing the flows between three occupations: entrepreneurship, paid-employment and unemployment. We therefore abstract from non-participation. This assumption might create a bias. Table 5 reports the flows between occupations accounting for NLF individuals. There are two main observations. First, entrepreneurial and worker flows are relatively unchanged when we take into account the NLF population. Concerning the unemployment flows, we note that a substantial fraction of unemployed individuals falls into a NLF status for various reasons (discouragement, not actively searching for a job, not directly available for work, etc.). At the same time, an important fraction of the NLF population seems to switch between employment and unemployment. This may indicate that some of them are still attached to the labor force if an opportunity of work becomes available. This could be due to recently graduated young individuals or long-run and discouraged unemployed individuals who finally find a job, without actively looking for it.

	Transition (without NLF)			**Transition (with NLF)**			
	W	E	U	W	E	U	NLF
W	97.35	0.50	2.15	94.17	0.48	2.08	3.27
E	4.8	94.22	0.99	4.62	90.67	0.95	3.76
U	47.36	2.4	50.25	36.61	1.85	38.84	22.70
NLF	-	-	-	8.50	1.08	3.66	86.77

Table. 5. Flows in percentage between occupations during a quarter, taking into account not in the labor force (NLF) individuals. *Data sources:* flows computed using the monthly basic CPS from 2001 to 2008. We restrict our sample to individuals aged between 20 to 65.

C Detailed model characterization

In this section, we provide detailed value functions characterizations to support the more compact form used in sections 3.3, 3.4 and 3.5 of the core paper. For convenience, we note W the value function associated with a worker, U with an unemployed individual and E an entrepreneur. We characterize here the credit status with the superscript e and the insurance status with the subscript j, except for a worker who is by definition always insured. The future values of those value functions are respectively noted:

$$W^{e\prime} = W(a', \theta', y', e'), \qquad U_j^{e\prime} = U(a', \theta', e', j), \qquad E_j^{e\prime} = E(a', \theta', z', e', j)$$

As with the simplified notations of the model, the continuation value $\mathcal{E}_j^{e\prime}$ defines the future value of a new entrepreneur starting a business with insurance status j and credit status e.

Workers Following the notations of the paper, we can write the value function of a worker in details as follows:

$$
\begin{aligned}
W(a,\theta,y,e) = \max_{c,a',s_e} u(c,0,s_e) + \beta \sum_{\theta'\in\Theta}\sum_{y'\in\mathcal{Y}} \pi(y'|y)\pi(\theta'|\theta) \\
\Big\{(\mathbb{1}_{e=A} + \phi\mathbb{1}_{e=C})\Big[(1-\eta)\Big(\pi_e \max\{W^{A\prime}, \mathcal{E}_n^{A\prime}\} + (1-\pi_e)W^{A\prime}\Big) \\
+ \eta\Big(\pi_e \max\{U_i^{A\prime}, \mathcal{E}_i^{A\prime}\} + (1-\pi_e)U_i^{A\prime}\Big)\Big] \\
+ (1-\phi)\mathbb{1}_{e=C}\Big[(1-\eta)\Big(\pi_e \max\{W^{C\prime}, \mathcal{E}_n^{C\prime}\} + (1-\pi_e)W^{C\prime}\Big) \\
+ \eta\Big(\pi_e \max\{U_i^{C\prime}, \mathcal{E}_i^{C\prime}\} + (1-\pi_e)U_i^{C\prime}\Big)\Big]\Big\}
\end{aligned}
$$

$$
\text{s.t.} \quad (2), (3), (4)
$$

Notice that when $e = A$, then $\pi_c(e' = A|e = A) = 1$. Hence a worker with access to the credit market remains non excluded next period. In the other case, if $e = C$, then $\pi_c(e' = A|e = C) = \phi$. The simplified notations combines those probability in the expectation operator.

Unemployed individual Following the notations of the paper, we can write the value function of an unemployed individual in details as follows:

$$
\begin{aligned}
U(a,\theta,e,j) = \max_{c,a',s_w,s_e} u(c,s_w,s_e) + \beta \sum_{\theta'\in\Theta}\sum_{y'\in\mathcal{Y}} \Pi_y(y')\pi(\theta'|\theta) \\
\Big\{(\mathbb{1}_{e=A} + \phi\mathbb{1}_{e=C})\Big[\pi_w\Big((1-\pi_e)W^{A\prime} + \pi_e\mathcal{U}_j^A(W,E)\Big) \\
+ (1-\pi_w)\Big(\pi_e\mathcal{U}_j^A(U,E) + (1-\pi_e)\mathcal{U}_j^A(U)\Big)\Big] \\
+ (1-\phi)\mathbb{1}_{e=C}\Big[\pi_w\Big((1-\pi_e)W^{C\prime} + \pi_e\mathcal{U}_j^C(W,E)\Big) \\
+ (1-\pi_w)\Big(\pi_e\mathcal{U}_j^C(U,E) + (1-\pi_e)\mathcal{U}_j^C(U)\Big)\Big]\Big\}
\end{aligned}
$$

s.t.

$$\mathcal{U}_j^{e\prime}(W,E) = \mathbb{1}_{\{j=i\}}\Big((1-\rho)\max\{W^{e\prime},\mathcal{E}_i^{e\prime}\} + \rho\max\{W^{e\prime},\mathcal{E}_n^{e\prime}\}\Big) + \mathbb{1}_{\{j=n\}}\max\{W^{e\prime},\mathcal{E}_n^{e\prime}\}$$
$$\mathcal{U}_j^{e\prime}(U,E) = \mathbb{1}_{\{j=i\}}\Big((1-\rho)\max\{U_i^{e\prime},\mathcal{E}_i^{e\prime}\} + \rho\max\{U_n^{e\prime},\mathcal{E}_n^{e\prime}\}\Big) + \mathbb{1}_{\{j=n\}}\max\{U_n^{e\prime},\mathcal{E}_n^{e\prime}\}$$
$$\mathcal{U}_j^{e\prime}(U) = \mathbb{1}_{\{j=i\}}\Big((1-\rho)U_i^{e\prime} + \rho U_n^{e\prime}\Big) + \mathbb{1}_{\{j=i\}}U_n^{e\prime}$$
$$(6), (7), (3), (4)$$

With ρ the probability that an unemployed individual loses her UI rights next period. The probability of getting the transitory shock y' is given by the invariant probability distribution Π_y and the shock is known before the decision to take the job.

Non excluded entrepreneur - repayment case

$$R(a,k,\theta,z,j) = \max_{c,a',s_w} u(c,s_w,0) + \beta\sum_{\theta'\in\Theta}\sum_{y'\in\mathcal{Y}}\Pi_y(y')\pi(\theta'|\theta)$$
$$\Big\{(\mathbb{1}_{\{j=i\}}q + \mathbb{1}_{\{j=n\}})\Big(\pi_w\max\{W^{A\prime},E_n^{A\prime}\} + (1-\pi_w)\max\{U_n^{A\prime},E_n^{A\prime}\}\Big)$$
$$+\mathbb{1}_{\{j=i\}}(1-q)\Big(\pi_w\max\{W^{A\prime},E_i^{A\prime}\} + (1-\pi_w)\max\{U_i^{A\prime},E_i^{A\prime}\}\Big)\Big\}$$

$$\text{s.t.}\quad (3), (7), (11), (12)$$

Such an entrepreneur keeps her access to the credit market next period.

Non excluded entrepreneur - bankruptcy case

$$B(a,k,\theta,z,j) = \max_{c,a',s_w} u(c,s_w,0) + \beta\sum_{\theta'\in\Theta}\sum_{y'\in\mathcal{Y}}\Pi_y(y')\pi(\theta'|\theta)$$
$$\Big\{\pi_w W^{C\prime} + (1-\pi_w)\big((\mathbb{1}_{\{j=i\}}q + \mathbb{1}_{\{j=n\}})U_n^{C\prime} + \mathbb{1}_{\{j=i\}}(1-q)U_i^{C\prime}\big)\Big\}$$

$$\text{s.t.}\quad (3), (7), (14), (15)$$

Such an entrepreneur is excluded from the credit market next period.

Excluded entrepreneur

$$\hat{E}(a,k,\theta,z,j) = \max_{c,a',s_w} u(c,s_w,0) + \beta \sum_{\theta'\in\Theta}\sum_{y'\in\mathcal{Y}} \Pi_y(y')\pi(\theta'|\theta)$$
$$\Big\{(\mathbb{1}_{\{j=i\}}q + \mathbb{1}_{\{j=n\}})\Big((1-\phi)\Big[\pi_w \max\{W^{C\prime}, E_n^{C\prime}\} + (1-\pi_w)\max\{U_n^{C\prime}, E_n^{C\prime}\}\Big]$$
$$+ \phi\Big[\pi_w \max\{W^{A\prime}, E_n^{A\prime}\} + (1-\pi_w)\max\{U_n^{A\prime}, E_n^{A\prime}\}\Big]\Big)$$
$$+ \mathbb{1}_{j=i}(1-q)\Big((1-\phi)\Big[\pi_w \max\{W^{C\prime}, E_i^{C\prime}\} + (1-\pi_w)\max\{U_i^{C\prime}, E_i^{C\prime}\}\Big]$$
$$+ \phi\Big[\pi_w \max\{W^{A\prime}, E_i^{A\prime}\} + (1-\pi_w)\max\{U_i^{A\prime}, E_i^{A\prime}\}\Big]\Big)\Big\}$$

$$\text{Subject to:} \quad (3), (7), (20), (21)$$

ϕ is the probability to recover the access to the credit market.

D Policy functions and resulting distributions

D.1 Search policy functions

In figure 8 and 9, we report the search policy functions of workers, entrepreneurs and unemployed individuals generated by the baseline model and discussed in section 5 of the core paper.

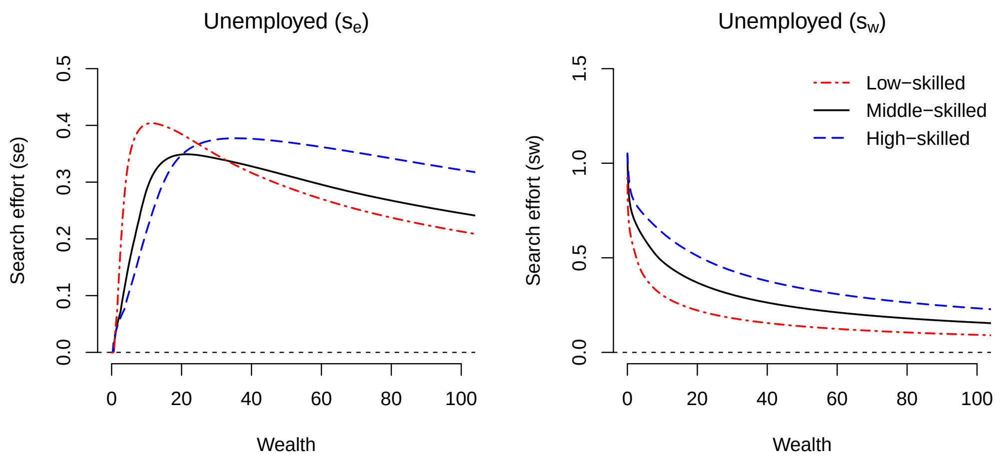

Figure 8. Business (left) and job (right) optimal search efforts for insured unemployed individuals.

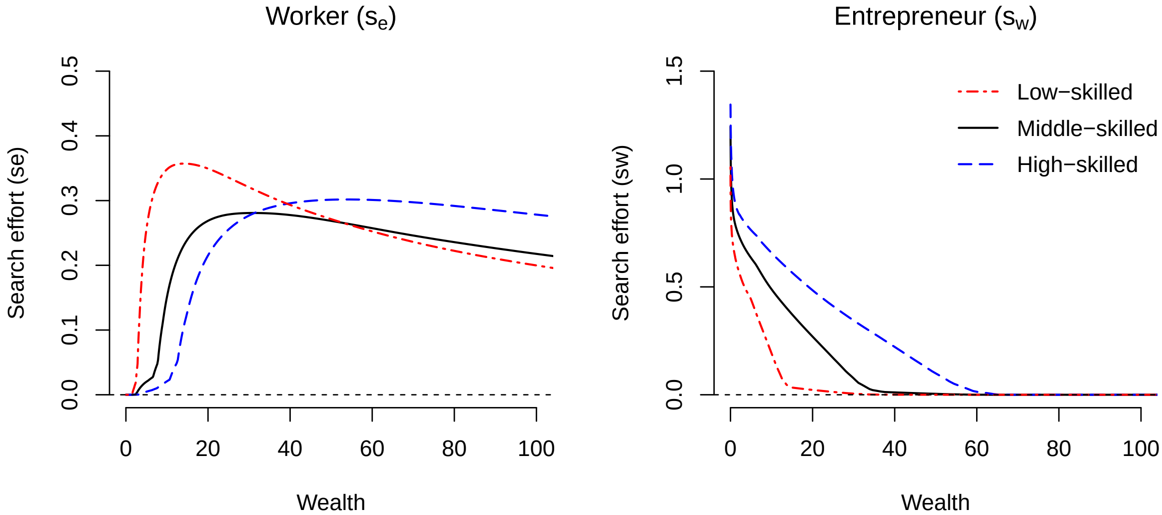

Figure 9. Workers' optimal business search effort (left) and entrepreneurs' optimal job search effort (right). *Note:* these are optimal policies under the non-exclusion case. For workers we choose $y = y_3$ and for entrepreneurs we take $z_{-1} = z_1$.

D.2 Endogenous spreads and borrowing constraints

In the baseline model, an entrepreneur will default only when the business shock z is too small. This is because, in such a case, an entrepreneur generates a small loss and expected future profits are small. Because the external creditor perfectly anticipates this behavior, it charges a higher price to risky entrepreneurs, with a higher incentive to default. The resulting interest rate depends on the entrepreneur's states. In particular, entrepreneurs with sufficient levels of wealth would never default. Indeed, for those entrepreneurs, bankruptcy costs (fees and expected losses from credit market exclusion) are high as compared to the benefits of renegotiating their debt. The incentive to default is also strongly related to the business shock z_{-1} realized during the previous period. Entrepreneurs who experienced a bad shock have a higher probability of default, lowering their ability to borrow by increasing the charged interest rate.

D.3 Distributions

Figure 11 displays the distribution of the three occupations in the model. As in Cagetti and De Nardi (2006), distributions display important concentration of wealth in the hand of entrepreneurs, consistent with the data.

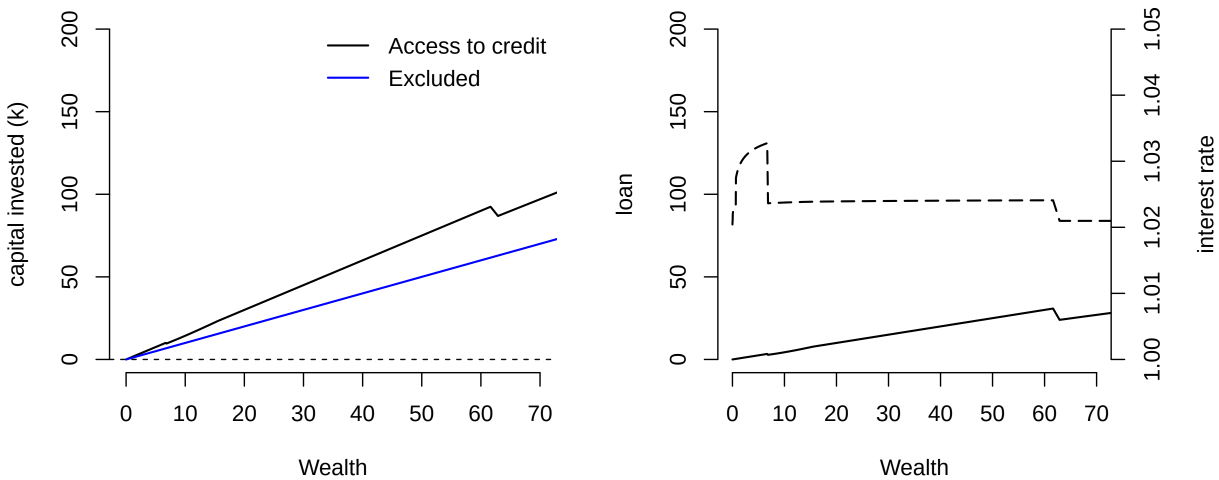

Figure 10. Entrepreneur's policy functions. Left panel: capital invested k, right panel: loan $k - a$ and resulting interest rate $r(\Phi, k)$ for non-excluded entrepreneurs. Plot correspond to $\theta = \theta_2$ and $z = z_6$.

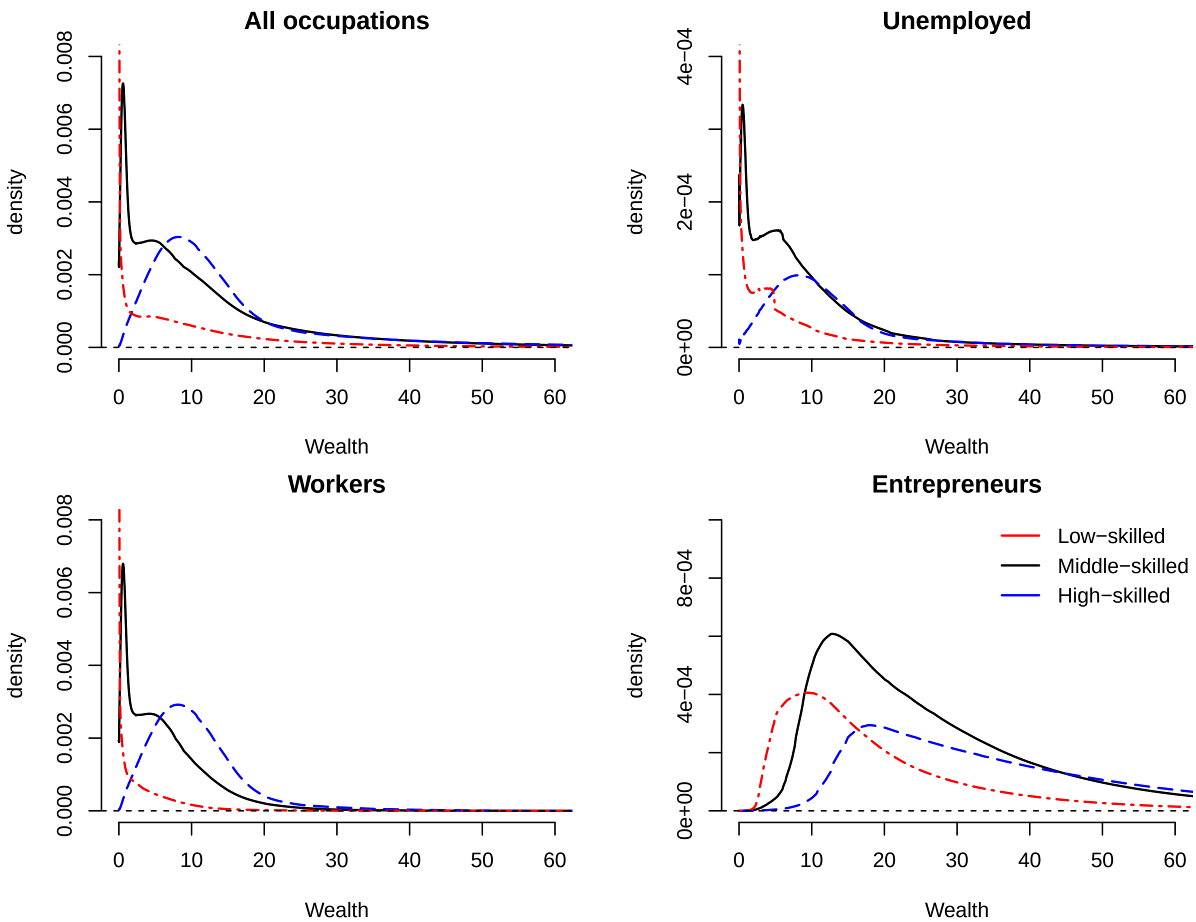

Figure 11. Distribution for the three occupations.

E Additional properties of the quantitative model

E.1 Occupational flows by wage quintiles, data and model

Figure 12 displays how the baseline model matches the shapes of the flows from a given occupation to another as compared to CPS data for fitted wages (except for the transition W to U and W to E where we use exact wages). In the data, information is available for the wages of employed workers but not for entrepreneurs or unemployed for obvious reasons. Thus we use a specific methodology to recover this information. We estimate a potential wage that an individual (i.e. unemployed or entrepreneurs) could have if she would have taken a job. We use age, age^2, age^3, sex, $education$, $occupation$ and $industry\ sector$ as covariates to fit the observed $log(wage)$ of a worker in the data. We obtain an R^2 of about 0.37 using simple OLS. We then assign to all the individuals the potential wage using the coefficient estimates. It appears that educational attainment, that we use as the main proxy for ability in the baseline model, produce almost the same transitions except for the E to W transition which is now decreasing, a feature that we do not capture in the model.

E.2 Normalized income of entrepreneurs

Table 6 compares the fraction of entrepreneurs with an income lower than a given level of normalized income (including wage, business income, and interests from savings) in the model and in the data. The model exhibits a slightly higher concentration of total income on the left side with respect to data.

Normalized income level	**0.1**	**0.3**	**0.5**	**0.7**	**1.0**	**1.5**	**2.0**	**2.5**
Model (% entrepreneurs)	4.6	12.7	25	36	50	66.2	77	83.9
Data (% entrepreneurs)	3.7	9.9	20.9	33	50	63.2	73	79

Table. 6. Fraction of entrepreneurs with an income lower than a given level of normalized income.

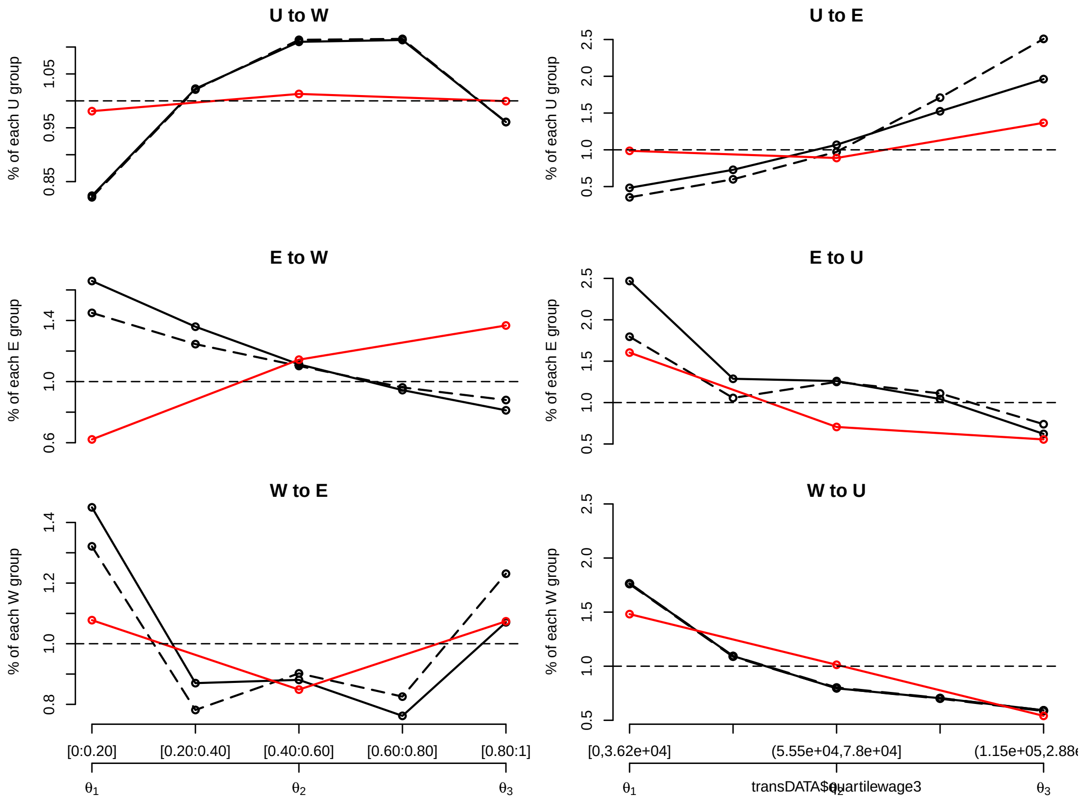

Figure 12. Quarterly flows from a given occupation to another by CPS fitted wage quintile (black) and model (red). The dashed lines refer to self-employment only while the solid line to only self-employed business owners. Wages are estimated for entrepreneurs and unemployed. *Data sources:* authors' own computations using CPS data from 2001 to 2008.

F Numerical implementation

State space and grid definition In our model, an household is fully characterized by a state vector $\mathbf{x} = (o, y, \theta, z, e, j, a)$ with $a \in A$, $y \in \mathcal{Y}$, $z \in \mathcal{Z}$, $\theta \in \Theta$, $o \in \{w, e, u\}$, $e \in \{A, C\}$ and $j \in \{i, n\}$. We compute the household problem using a grid of asset **a** of 350 points, spaced according to an exponential rule. We discretize the process z, y and θ with respectively 7, 5 and 3 grid points. We compute the second stage entrepreneur's problem over a grid of cash-on-hand with 350 grid points.

F.1 Algorithm

We organize the algorithm as follows.

1. Initialize a full dimension grid space composed of all different possible asset values (a), productivity level (y), innate ability (θ) and entrepreneurial state (z). The maximum asset level is chosen sufficiently large to get ergodicity of the policy functions.

2. Guess initial tax rate τ_w and prices $\{w, r\}$.

3. Given prices, solve the consumption-saving-search (CSS) problem of a worker and an unemployed agent.

4. For the entrepreneur's problem, we proceed as follows.

   - First we solve the CSS problem of the values B, R and $\hat{E}$ on a grid of cash-on-hand.
   - Given the solution to the previous values, set a grid of possible investment value k with bound $[0, \lambda a]$.
   - Separate the problem in multiple regions. Between $[0, a]$, we apply a standard solver to find the optimal k. Between $[a, \lambda a]$, we apply a grid search that account for multiple solutions that could arise due to the endogenous determination of the spread r^b.
   - For each $k > a$, start by providing the loan at the risk-free interest rate r. If the entrepreneur default for this interest rate, then compute the resulting new interest rate r^b implied by the zero profit condition of the bank. Iterate the process until r^b is consistent with the default probability. A loan that implies a default probability equals to 1 is not allowed.
   - Save the best solutions to the problem and find the optimal k level.

5. Construct the transition matrix $\mathbf{M}$ generated by Π_y, Π_z and Π_θ, $a'(\mathbf{x})$, $s_w(\mathbf{x})$, $s_e(\mathbf{x})$ and the default decision. Compute the associated stationary measure of individuals $\Gamma(\mathbf{x})$, by first guessing an initial mass of one of households with zero asset and then by iterating on $\Gamma'(\mathbf{x}) = \mathbf{M}\Gamma(\mathbf{x})$ until $|\Gamma'(\mathbf{x}) - \Gamma(\mathbf{x})| < \mu$, with μ very small.

6. Compute the resulting total asset level, total labor supplied and total investment in the entrepreneurial sector. Total capital invested in the corporate sector is given as the difference between total savings and total capital invested in the entrepreneurial sector. Total labor used in the corporate sector is given by total labor supplied by workers.

7. Update prices $\{r, w\}$ using the marginal productivities in the corporate sector and tax rate τ_w to close the government budget up to a relaxation. Back to step 2 until convergence of labor income tax rate and prices.

F.2 Optimal search efforts

We describe here the solution algorithm for computing ex-ante all the optimal search efforts. Given a set of parameter $(\kappa_w, \kappa_e, \psi_e, \psi_w)$, the solutions s_w and s_e for each occupation is computed only once.

In order to pre-compute the search efforts, we set up a very large grid that we call **diffval** ($\mathcal{G}_{\mathbf{\Delta V}} = [0, dmax]$), which summarizes the option values (ΔV) of interest, that are needed to compute either s_w or s_e, as shown above. Given this grid, we solve for the optimal search efforts. We end up with grid $\mathcal{G}_{\mathbf{w}}$ and $\mathcal{G}_{\mathbf{e}}$ over optimal search efforts corresponding to values in the grid $\mathcal{G}_{\mathbf{\Delta V}}$. When solving for the household problem, we therefore compute ΔV and we find, using linear interpolation, the corresponding optimal search efforts $s_w(\Delta V)$ and $s_e(\Delta V)$.

Worker and entrepreneur search efforts The solution for the optimal search efforts of a worker and an entrepreneur (who repays) is straightforward and are given respectively by the first order conditions:

$$\frac{\partial W(a,\theta,y,e)}{\partial s_e} = 0$$
$$-\psi_w(s_w)^{\psi_w} + \beta\pi_w'(s_w)\underbrace{\Big[\eta\max\{0,\mathcal{E}_i' - U_i'\} + (1-\eta)\max\{0,\mathcal{E}_n' - W'\}\Big]}_{\Delta V > 0} = 0$$

$$\frac{\partial R(a,k,\theta,z,j)}{\partial s_w} = 0$$
$$-\psi_e(s_e)^{\psi_e} + \beta\pi_e'(s_e)\underbrace{\Big[\max\{W', E_{j'}'\} - \max\{U_{j'}', E_{j'}'\}\Big]}_{\Delta V > 0} = 0$$

Unemployed individuals An individual who is currently unemployed can search at the same time a business idea and a job. A convenient way to rewrite the value function in order to solve ex-ante the optimal search efforts is to use option values as follows:

$$\begin{aligned} U(a,\theta,e,j) = \max_{c,a',s_w,s_e} & u(c,s_w,s_e) \\ & + \beta\mathbb{E}_{\theta',y',j',e'|\theta,y,j,e}\Big\{U_{j'}' + \pi_w(W' - U_{j'}') + \pi_w\pi_e\max\{0,\mathcal{E}_{j'}' - W'\} \\ & + (1-\pi_w)\pi_e\max\{0,\mathcal{E}_{j'}' - U_{j'}'\}\Big\} \end{aligned}$$

The job search effort solves:

$$\frac{\partial U(a,\theta,e,j)}{\partial s_w} = 0$$
$$u_{s_w} + \beta\Big[\pi'_w(W' - U'_{j'}) + \pi'_w\pi_e \max\{0, \mathcal{E}'_{j'} - W'\} - \pi'_w\pi_e \max\{0, \mathcal{E}'_{j'} - U'_{j'}\}\Big] = 0$$

and the condition for the business search effort is:

$$\frac{\partial U(a,\theta,e,j)}{\partial s_e} = 0$$
$$u_{s_e} + \beta\Big[\pi_w\pi'_e \max\{0, \mathcal{E}'_{j'} - W'\} + (1-\pi_w)\pi'_e \max\{0, \mathcal{E}'_{j'} - U'_{j'}\}\Big] = 0$$

Using the notation $\mathcal{P}(s_w) = \pi_w \max\{0, \mathcal{E}'_{j'} - W'\} + (1-\pi_w)\max\{0, \mathcal{E}'_{j'} - U'_{j'}\}$, we get the following condition for the optimal business search effort:

$$\pi_e(s_e^*) = 1 - \frac{\psi_e(s_e^*)^{\psi_e}}{\beta\kappa_e\mathcal{P}(\bar{s}_w)}$$

At the optimal search effort, the probability of finding a business idea $\pi_e(s_e^*)$ is decreasing with the cost of the search $\psi_e(s_e^*)^{\psi_e}$ and increasing with the discount factor β, the matching parameter κ_e and the value associated of being entrepreneur relative to other occupations $\mathcal{P}(\bar{s}_w)$. We pre-compute the optimal search effort s_e^* given ΔV and s_w. We then apply a root-finding optimizer to search for the corresponding s_w^* within the CSS problem.

F.3 Transitional dynamics

To solve the transition, we compute the solutions of the household problem backward, starting at the new steady-state. We then find prices that are consistent with the implied policies and we iterate until convergence. We assume that the economy is in the initial steady state in period 0 and the reform is announced and implemented in period 1. Agents did not anticipate the policy before its implementation. The economy makes a transition to reach the final steady state in period T. We choose T large enough so that the resulting stationary distribution in period T is close enough to the post-reform steady states. The algorithm for the transition dynamics is:

1. Guess a path for $\{\mathcal{L}_1, ..., \mathcal{L}_{T-1}\}$ with $\mathcal{L}_t = \{r_t, w_t, \tau_{w,t}\}$. $\mathcal{L}_0$ and $\mathcal{L}_T$ are given by initial and final steady-states.

2. Use value functions of the final steady state (period T) to solve the households' problem

backwards starting from $T-1$ until period 1.

3. Use the distribution of the initial steady state and the resulting policy functions to compute the path of the distribution of household $\{\hat{\Gamma}(\mathbf{x})_1, ..., \hat{\Gamma}(\mathbf{x})_T\}$.

4. Given these distributions, compute new path $\{\mathcal{L}_1, ..., \mathcal{L}_{T-1}\}$. Iterate from step 2 until the difference between the initial path is close enough to the resulting path.

5. When convergence is achieved, check if the resulting final distribution $\hat{\Gamma}(\mathbf{x})_T$ is close enough to the steady-state distribution $\Gamma(\mathbf{x})_T$ up to a relaxation. If the two distributions are identical, then stop, else, increase the number of periods T.

F.4 Welfare: computation and additional elements

Between the reformed steady-state and the initial baseline economy, we follow Flodén (2001) in order to compute the *ex-ante* utilitarian social welfare change, by computing the premium ω_V that measures the percent of life-time consumption that a newborn in the economy A would need to be indifferent between economy A (without the policy) and B (with the policy).

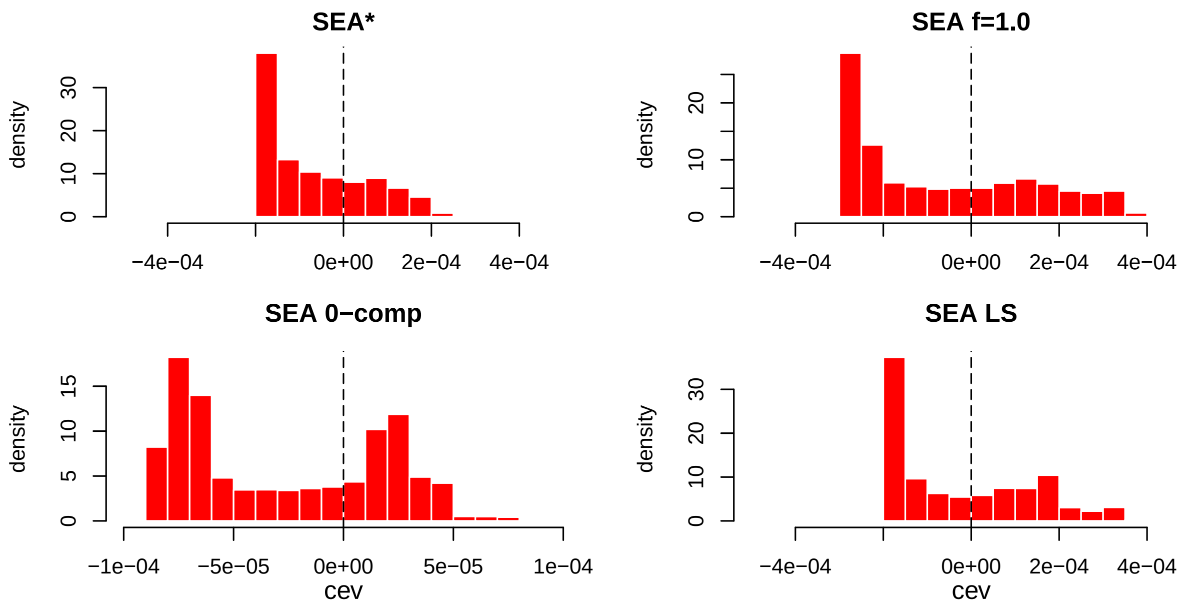

Figure 13. Distribution of welfare gains/losses over the transition.

Along the transition, we measures the constant increment in percentage of consumption in every state that has to be given to each agent so that she is indifferent between remaining in the benchmark economy and moving to another economy that makes a transition to a new steady-state implied by the reforms. Figure 13 depicts the welfare gains/losses over the transition for four reforms considered in the paper.

G Robustness

Reparameterization using self-employment We have parameterized again the model using self-employment as the definition for entrepreneurship and assessed the impact of the **SEA*** in such an economy. Table 7 summarizes the parameters and the moments of the new calibration. We target a higher exit rate and a larger fraction of entrepreneurs. We also target a different shape of the transition from paid-employment to entrepreneurship, in line with the data.

A. Parameter	**Symbol**	**Value**
Discount factor	β	0.9742
z process (autocorrelation, variance)	ρ_z, σ_z^2	0.8636, 0.197
Businesses' return to scale	ν	0.79
Search utility parameter	$\psi_e = \psi_w$	2.579
Matching parameter	κ_e,κ_w	0.328,0.842
Bankruptcy cost	ϕ	0.0275
Entrepreneur's innate ability	$[g_1, g_2, g_3]$	[0.0686, 0.0772, 0.1007]
B. Targeted moments	**Target**	**Model**
Unemployment rate (in %)	5.0	5.0
Share of entrepreneurs (in %)	10.5	10.6
Entrepreneurs' exit rate (in %)	6.5 - 7.5	7.1
Fraction of new entrepreneurs prev. unemployed (in %)	20	20
Capital-output ratio (annual)	2.65	2.66
Ratio of net worth E/pop	7 - 8	7.6
Bankruptcy rate (as fraction of entrepreneurs) (in %)	0.57	0.58
Fraction of entrepreneur with neg. earnings (in %)	10	10.5
Flows W to E by quantiles / avg rate (%)	$\begin{bmatrix} Q1 & Q2 & Q3 \\ 1.1 & 0.85 & 1.0 \end{bmatrix}$	$\begin{bmatrix} Q1 & Q2 & Q3 \\ 1.11 & 0.89 & 1.0 \end{bmatrix}$

Table. 7. Estimated parameters and targeted moments for the alternative model with self-employment as entrepreneur's definition.

Again, the model is able to reproduce the main features concerning the observed transitions. Table 8 summarizes the aggregate transitions in the model against the data. The magnitudes found in the model are close to their data counterparts.

	Mass (%)		**Transition: Model (Data)** (%)		
	Target	Model	W	E	U
W	84.5	84.4	97.15 (97.20)	0.76 (0.70)	2.09 (2.11)
E	10.5	10.6	6.09 (6.15)	92.93 (92.46)	0.98 (1.40)
U	5.0	5.0	43.88 (46.04)	3.22 (3.72)	52.90 (50.25)

Table. 8. Transition between occupations during a quarter (data counterparts between braces). *Data sources:* authors' computations using CPS data from 2001 to 2008. We restrict our sample to individuals aged between 20 to 65 years old.

In table 9, we summarize the results of the model under the **SEA*** reform. Results are quite similar to our baseline model but effects are stronger with all self-employed. Most notably, the share of entrepreneurs increases by more than 2.1% and the share of insured entrepreneurs account for 3.3% of all entrepreneurs under the **SEA*** in this alternative specification, against 1.8% and 2.9% when considering self-employed business owners.

	Baseline	**SEA*** ($f = 0.3$, $\bar{q} = 0.5$)
Fraction of entrepreneurs	10.57	10.79
% unemployed starting businesses (in %)	3.22	3.59
entrepreneurship exit rate (in %)	7.07	7.16
unemployment rate (in %)	4.988	4.974
corporate jobs (in %)	84.44	84.23
new firm per year (th.)	500	515.78
necessity share (in %)	8.5	6.7
Entrepreneurial sector production	0.386	0.393
Corporate sector capital	3.58	3.574
Entrepreneurial sector capital	1.729	1.761

Table. 9. The **SEA*** effects on aggregates.

Fixed start-up cost Other alternatives, such as implementing a fixed start-up cost had no significant impact on our numerical results, but of course, the parameterization is different. Notice also that we implicitly already incorporate a start-up cost since an individual has to search an idea before creating his business. Results with an entry cost suggest that the **SEA*** leads to a larger increase in the share of entrepreneurs while unemployed individuals are less likely to create a business as compared to the no-entry cost case. Indeed, imposing an entry cost reduces the temptation to exit entrepreneurship in case of a bad shock, since individuals would have to repay the entry cost if they want to recreate a firm.

Bankruptcy specification In the baseline economy, we have assumed that entrepreneurs could default in equilibrium but are subject to a cost component and a recovery rate. We also explore the case where no bankruptcy is allowed here. Under this assumption, we obtain a lower flow from entrepreneurship to unemployment of about 0.39% against 0.74% in the benchmark case and 0.99% in the data. Policy results are qualitatively unchanged but the magnitude of the **SEA*** is larger. The policy leads to a 2.2% increase in the share of entrepreneurs against 1.86% in the benchmark. Indeed, the ability to bankrupt can be viewed as an extra insurance mechanism on top of the **SEA***. Removing the option to default implies a larger entrepreneurial risk, which increases the effectiveness of the **SEA***.

Business shock and fraction of negative entrepreneurial earnings We also conduct some robustness on the business shock z. We have reduced artificially the variance of the shock to 0.12. The fraction of entrepreneurs with zero or negative earnings falls to 2.7%. Under this experiment, the effect of the insurance policy is slightly lowered. This is because even with low shock z variance, the insurance induces the entry of some unemployed individuals who run small firms that generate low profits. Under the **SEA***, such new entrepreneurs are compensated and receive part of their UI rights in addition to their starting low profit.

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