

# Entrepreneurship, Business Transfer and Aging

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Many clues of a vastly **transforming entrepreneurial sector**.

We focus on a seldom documented aspect: **SME transfers by entrepreneurs**.<sup>1</sup>

- Both selling and buying a business subject to important **mismatches**,
- Macroeconomic outcomes of related **misallocation issues**,
- Direct policy implications: **taxation** of business selling and buying,
- Demographic backdrop: **aging of entrepreneurs**.

→ Many empirical indicators are unavailable on these issues and lack of a theoretical framework.

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<sup>1</sup>Entrepreneurs: defined as business owners actively managing their firms.

## Three contributions:

- Providing data on **SME selling market** and the importance of **mismatches**<sup>2</sup>.
- Building a stylized **OLG model** with **buy/sell margins** and **mismatches**.
  - Generates consistent distributions of entrepreneurs/workers, entry/exit and business selling dynamics.
- Exploring the **policy implications** of reducing mismatches and generated **misallocations**<sup>3</sup>.
  - **Taxes, credit constraints, mismatches** have quantitative implications.
  - Situation of **aging entrepreneurs** amplifies the issue.

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<sup>2</sup>Anything making buyers' requirements match poorly with characteristics of businesses for sale.

<sup>3</sup>Optimal allocation (capital/labor) to a certain business lost for reasons unrelated to the alloc. itself.

# Motivation

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**Challenge:** scarce data on SME transfers. We build our own business selling dataset:

- Data collected using public info available on the online marketplace *bizbuysell.com* (BBS): oldest/largest platform for business selling in US.  
▶ BBS data: details
- From 2011 to 2018, with an average of *8000 transactions/year*.
- **Information:** selling/list prices, cash-flows, gross-revenues, size (employees, assets), business age, main reason for selling the business...
  - Infer selling probability and time needed to sell a business.
  - Dynamics of reasons to sell
- Distribution of selling prices ↔ **comparable** to that of the PSID. ▶ BBS/PSID

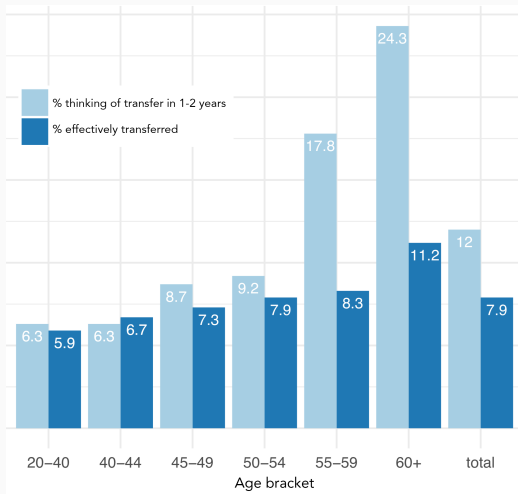
## An important fraction of businesses remain **unsold**:

- *Annual Survey of Entrepreneurs* (ASE) 2016: **20% of entrepreneurs sold** their businesses upon exit while more than **60% planned to sell**,
- *European Commission* (2011): ~ 5% of the 20.8 millions EU-27 SMEs attempt transfer every year, of which **60% fail to transfer**. ~25% business transfer failures for reasons unrelated to economic performance.
- **Collected BBS data (2017-2018):**

Nb. for sale	sold (cumul.)	
	1er year	2nd year
100	15	25

→ long process, with many unsuccessful attempts.

# Evidence of mismatches



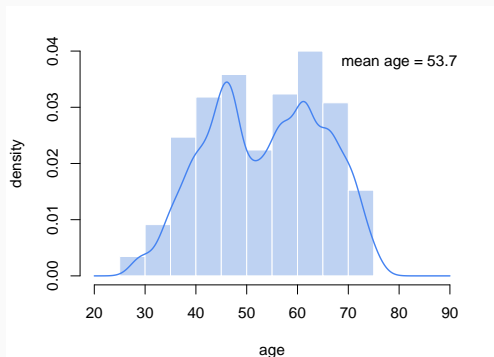
**Figure 1:** Effective transfers with respect to age. *Source: BPCE*

Older age brackets: **higher gap between intentions and effective transfers.**

# Business assets selling and life-cycle

Selling patterns are **strongly** related to the **life-cycle**,

- **15-20%** of sellers: retirement is main motive (BBS data).
  - Entrepreneurs hold 70-80% of their wealth in business assets ([Moskowitz and Vissing-Jørgensen \(2002\)](#)): strong selling/transmission motive at retirement.
- Business assets selling **peaks at retirement** (PSID). ► Buying side



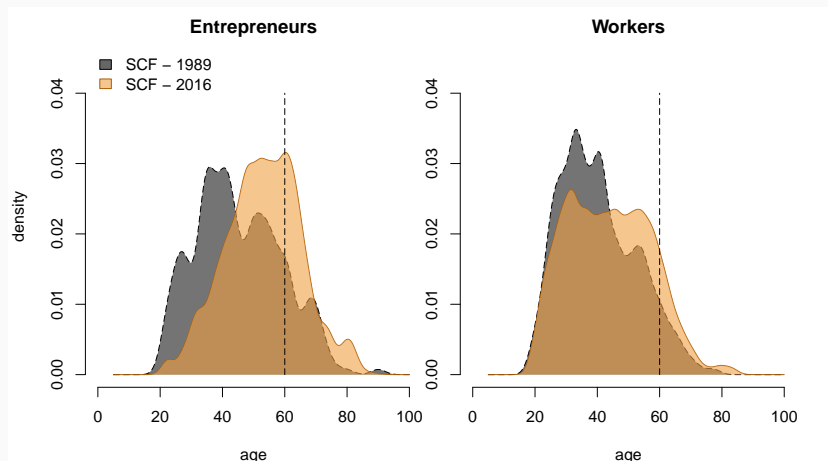
**Figure 2:** Distribution by age of owner of businesses being sold. *PSID*



- Comparing SBO (2007) data and ASE (2015) data: transmission motive (retirement and selling) increased substantially from **~20% to ~37%** in 10 years [► Details](#).
- Mainly driven by the **aging of entrepreneurs**.

Reasons to sell (in BBS)	2011	2015	2018
Retirement (%)	16	19	<b>22</b>

# Distributional consequences of the aging of entrepreneurs



% of entrepreneurs	1989	2004	2016	source
Entrepreneur of age 60 and over	17	22	32	SCF
- share of total business assets held	37	30	45	SCF

- **OECD:** increasing **assistance** on **selling, gifting & inheritance** businesses.
  - *Special capital gains taxation (exemptions, payment rescheduling), funds, institutional assistance*
- **EU:** under the *Small Business Act* & the *Entrepreneurship 2020 Action Plan*:
  - funds to help transfers,
  - “develop models and quality standards relating to advisory services, awareness raising programmes, and online platforms for business transfers”,
  - special taxation measures for transfers to employees.
- **France:** up to 500,000€ tax exemption in case of transfers.

No theoretical framework to evaluate these policies.

Some related papers:

- Entrepreneurship, inequality, wealth: [Quadrini \(2000\)](#), [Cagetti and De Nardi \(2006\)](#), [Poschke \(2013\)](#), [Hurst and Pugsley \(2011, 2015\)](#), [Mankart and Rodano \(2015\)](#),
- Misallocation and policy: [Buera and Shin \(2013\)](#), [Kitao \(2008\)](#), [Cagetti and De Nardi \(2009\)](#),
- Life-cycle, demographic change: [Engbom \(2018\)](#), [Pugsley et al. \(2016\)](#), [Benhabib et al. \(2019\)](#).

# Model

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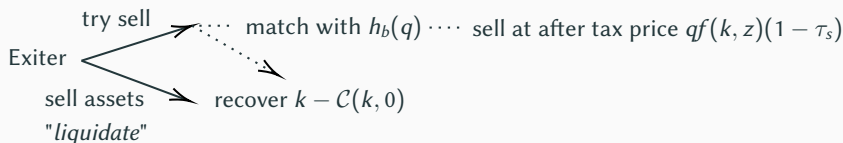
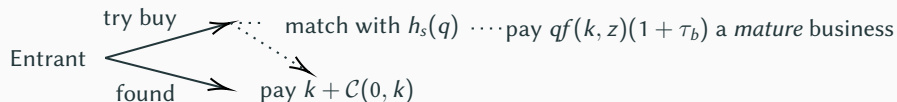
# Model: Key Ingredients

- **Occupations:** entrepreneur ( $o_e$ ) & worker ( $o_w$ )
  - > endogenous **buy/found** and **sell/liquidate** decisions.
  - > equilibrium **business price** and **matching mechanism**.
- **Demographics:** stylized OLG
  - stochastic aging, age indexed by  $j$ .
  - Last age bracket: entrepreneurs choose when to retire given cost to remain.
- **Two assets:** liquid savings **a** and **illiquid business asset k**
- **Technology:**  $f(z, k) = zk^\eta$ , with business maturity ( $m$ ):
  - **Mature** firms can be sold.
  - **Immature** firms: can't be sold, higher interest rate (*asym. info, no sale history, etc.*) ▶ SSBF Reg.  $\phi_m$ : probability of becoming mature,
  - Corporate (non-entrepreneurial) representative sector.

## Model: Entry & Exit

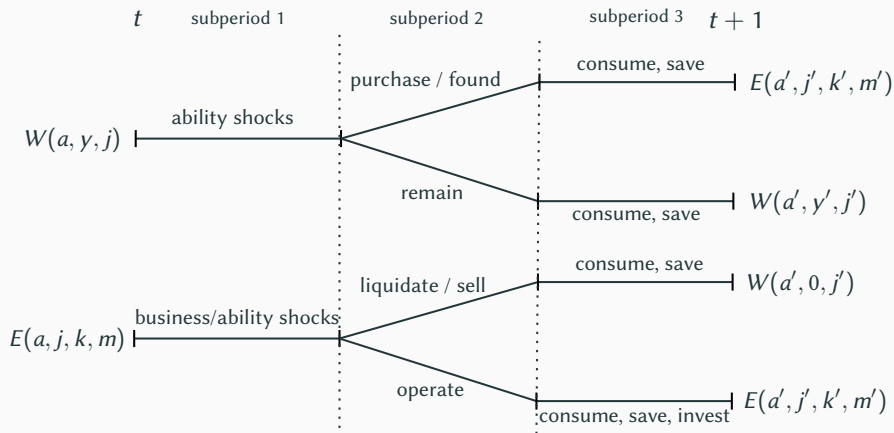
→ **Adjustment costs** on illiquid capital:  $C(k, k')$ , prevent costless entry/exit.

→ **Units of production**  $f(z, k)$  (or alt. profit) are exchanged



- **Endogenous exit** (retirement) or exogenous exit (forced to exit due to shock)
- **Credit markets:** entrants can borrow up to  $(1 - \theta)k$

# Model: Timing





# Model equations: entrepreneurs

## Subperiod 3: Consumption/saving decisions

### Continuing entrepreneurs:

$$E^c(a, k, \mathbf{x}_e) = \max_{c > 0, a' \geq -(1-\theta)k', k' \geq 0} \left\{ \mathcal{U}(c, j, o_e) + \beta \mathbb{E}_{\mathbf{x}'_e | \mathbf{x}_e} E(a', k', \mathbf{x}'_e) \right\}$$
$$s.t. \quad c + a' + k' = (1 + \tilde{r}(m))a + \pi(z, k) + k - \mathcal{C}(k, k')$$

### Exiting entrepreneurs:

$$E^e(a, k, \mathbf{x}_e, s) = \max_{c > 0, a' \geq 0} \left\{ \mathcal{U}(c, j, o_e) + \beta \mathbb{E}_{y', j' | j} \mathcal{W}(a', \tilde{\mathbf{x}}'_w) \right\}$$
$$s.t. \quad c + a' = (1 + \tilde{r}(m))a + \pi(k, z) + \underbrace{sq(k, \tau_s)}_{\text{selling}} + \underbrace{(1-s)(k - \mathcal{C}(k, 0))}_{\text{liquidating}}$$

$\mathbf{x}_e = \{j, m, z\}$ ,  $\tilde{\mathbf{x}}'_w$  is the new worker specific exogenous state, we assume such a worker starts at the lowest worker productivity.

# Model equations: entrepreneurs

## Subperiod 2: Selling attempt stage

$$S(a, k, \mathbf{x}_e) = h_s(q) \underbrace{E^e(a, k, \mathbf{x}_e, s = 1)}_{\text{selling}} + (1 - h_s(q)) \max \left\{ \underbrace{E^e(a, k, \mathbf{x}_e, s = 0)}_{\text{liquidating}}, \underbrace{E^c(a, k, \mathbf{x}_e)}_{\text{operating}} \right\}$$

## Subperiod 1: Selling/liquidating decisions

$$E(a, k, \mathbf{x}_e) = \underbrace{\chi(m)}_{\text{exo shock forced to exit}} \left[ \max \{ \tilde{S}(a, k, \mathbf{x}_e), E^e(a, k, \mathbf{x}_e, 0) \} \right] \\ + (1 - \chi(m)) \left[ \max \{ \underbrace{S(a, k, \mathbf{x}_e)}_{\text{trying to sell}}, \underbrace{E^e(a, k, \mathbf{x}_e, 0)}_{\text{liquidating}}, \underbrace{E^c(a, k, \mathbf{x}_e)}_{\text{operating}} \} \right]$$

# Matching; business selling and buying market

- Intermediation by passive brokers à la [Garriga and Hedlund \(2017\)](#).
- All agents are **price takers** ( $q \equiv$  business price level).

## Brokers free entry conditions on sell & buy sides:

$$\kappa_s f(z, k) = \underbrace{\alpha_s(\theta_s)}_{\text{match prob}} \underbrace{(q - (q - \mu)^{1-\sigma})}_{\text{Net revenue}} f(z, k) \qquad \kappa_b f(z, k) = \underbrace{\alpha_b(\theta_b)}_{\text{match prob}} \underbrace{((q + \mu)^{1+\sigma} - q)}_{\text{Net revenue}} f(z, k)$$

Entry cost  $\kappa$ ,  $\theta = \frac{\text{brokers}}{\text{sellers or buyers}}$ , elasticity  $\sigma$ , fixed margin  $\mu$ .

## Selling/buying prob.:

$$h_s(q) = \left( \frac{q - (q - \mu)^{1-\sigma}}{\kappa_s} \right)^{\frac{\gamma_s}{1-\gamma_s}} \qquad h_b(q) = \left( \frac{(q + \mu)^{1+\sigma} - q}{\kappa_b} \right)^{\frac{\gamma_b}{1-\gamma_b}}$$

→ **Both  $q$  and probabilities may respond in equilibrium.**

- $\sigma \rightarrow 0$ : only prices respond, fixed probabilities
- $\sigma \rightarrow \infty$ : only probabilities respond, fixed price

## Government

- **collect taxes:** labor inc. ( $\tau_w$ ), **taxes on buying/selling**  $\{\tau_s, \tau_b\}$
- pays retirement pensions + government expenditures

## Equilibrium

- $\{r_t, w_t\}$  clear the capital/labor markets in the non-entrepreneurial sector
- $q_t$  clears the *business sale market*
- $\tau_{w,t}$  balance the gov. budget.

## Solution methods:

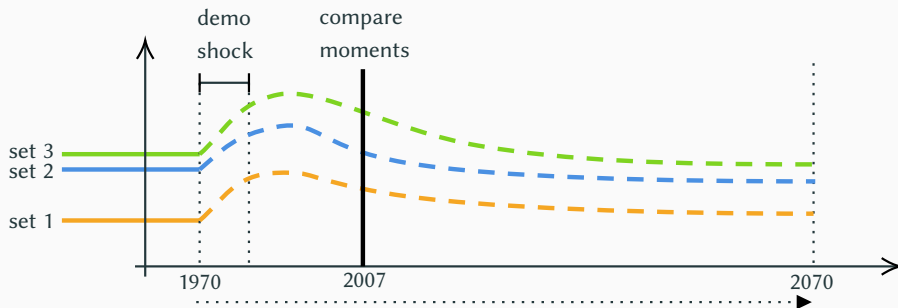
- **Block recursivity:**  $(q_t, r_t, w_t, \tau_{w,t})$  are sufficient.
- **Use EGM** (Carroll (2006)) and **perturbated solution** (Type-I Extreme Value shock) of the discrete - continuous choice model (Iskhakov et al. (2017))

## **Parameterization & model fit**

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# Parametrization (preliminary)

**Non-Stationary Calibration:** taking into account **demographic change**



- Stationarity in 1970 and 2070.
- Test a set of parameters corresp. to the 1970 equilibrium and compare 2007 generated moments to 2007 moments in data.

$$\hat{\Phi}_{1970} = \underset{\Phi_{1970}}{\operatorname{argmin}} \sum_{k=1}^M \left| m_{k,2007} - \tilde{m}_{k,2007}(\Phi_{1970}, \{\mathbf{x}_t\}_{1970}^{2070}) \right|$$

where for instance:  $\mathbf{X}_t = \{DEMO_t, TFP_t, TAX_t\}$  and  $\Phi_{1970} = \{\tau_{up}, \tau_{down}, u_R, u_E\}$

# Benchmark parametrization

## Fixed parameters:

- retirement pensions: 40% of previous wage (entr. have a min pension level)
- $y$  processes fit earning profile as in PSID.
- $\mathcal{C}(k, 0) \equiv \tau_{down}k$ : liquidation cost of 20%.
- benchmark taxes  $\tau_s = 0.2$  and  $\tau_b = 0.15$  (scaled to capital gains taxes)

## Endogenous parameters:

- $\mathcal{C}(k, k') \equiv \tau_{up}(k' - k)$ : investment cost
- exogenous probability of exit  $\chi(m)$
- matching technology:  $\sigma = 0$ , only  $q_t$  respond, fixed mismatch  $\{h_b, h_s\}$ :

$$h_s(q) \equiv \bar{h}_s = \left( \frac{\mu}{\kappa_s} \right)^{\frac{\gamma_s}{1-\gamma_s}} \quad h_b(q) \equiv \bar{h}_b = \left( \frac{\mu}{\kappa_b} \right)^{\frac{\gamma_b}{1-\gamma_b}}$$

→ robustness: explore various cases where  $\sigma > 0$ .

Targeted moment	Model	Data	$\approx$ identified
Self employment rate	9.6%	9.5%	$u_E, \eta$
Share of entrepreneurs investing	20%	25%	$\tau_{up}$
Share of business buyers (rlv. to new ent.)	28%	25%	$\overline{h_b}$
Share of business sold (rlv. to exit ent.)	14.8%	15%	$\overline{h_s}$
Early stage entrepreneurs ( $< 5y$ ), exit rate	35%	35%	$\chi(m)$
Mature entrepreneurs ( $> 5y$ ), exit rate	10%	10%	
Share of entrepreneur/retired in $[65,+]$	4.0%	4.2%	$u_R$
Interest rate	4.5%	4.5%	$\beta$
Ratio of median wealth (ent. to workers)	8	7.5	$u_E, \eta$

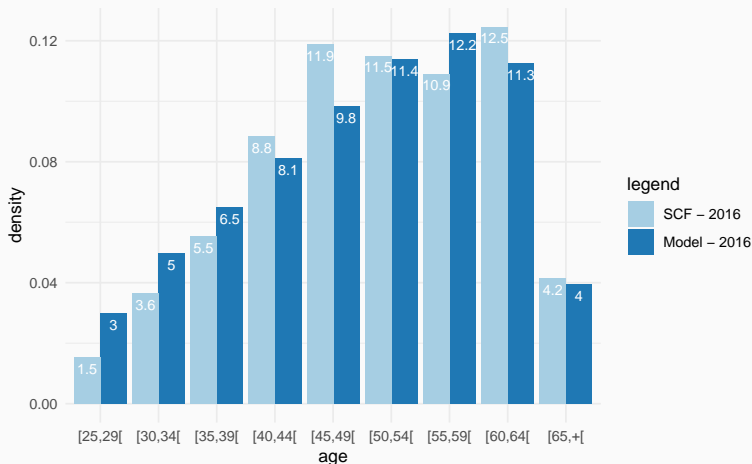
$u_E$ : non pecuniary benefits of running a firm.

$u_R$ : cost of running a firm after the retirement age.



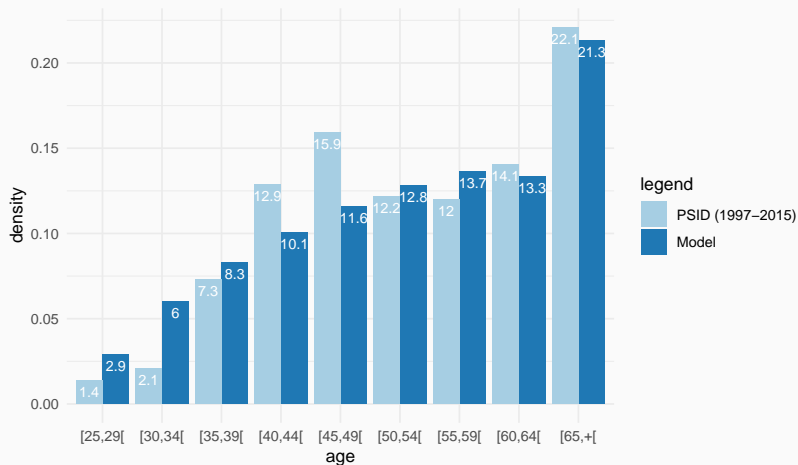
# Life-Cycle distribution of Entrepreneurs

**Figure 3:** Distribution of entrepreneurs by age relative to population (W+E+R)



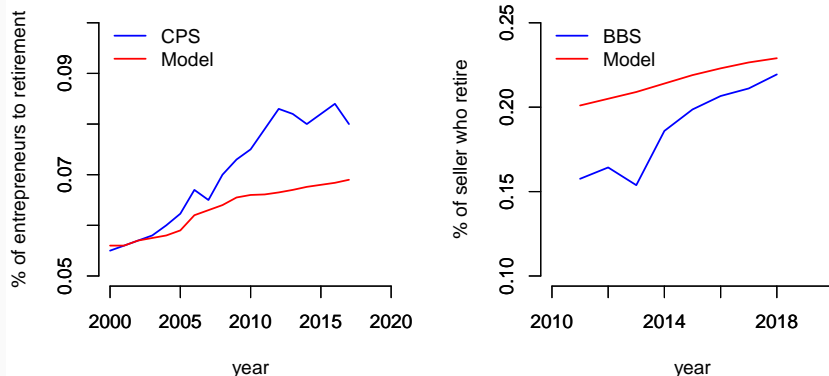
- **with aging:** high proportion of entrepreneurs around age 55.
- most entry: around [35-45[ in model/data (**lower entry incentive when older:** lose  $y$  and face "sell constraint").

**Figure 4:** Distribution of sellers by age relative to entrepreneurial population



- generates **peaks of selling at retirement.**
- consistent with the overall pattern.

# Dynamics of entrepreneurial retirement



**Figure 5:** Dynamics of entrepreneurs exiting at retirement: data vs model

- the model dynamics **fit the demographic evolution**.
- not considering the evolution might under-estimate the effect of mismatches on the business sale market in coming years.

# Policy Experiments

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1. Change two key margins of **business transfer taxation**:
  - Selling and buying taxes:  $\{\tau_b, \tau_s\}$ ,
  - Adjusting labor income tax  $\tau_w$ .
2. Key role of **credit conditions** ( $\theta$ ) & **cost structure** ( $\tau_{up}, \tau_{down}$ ).
3. **Effect of baby-boomers.**
4. (in progress) generalized mismatch: both probabilities and prices react.

Study effects on:

- Aggregate capital and output
- Entrepreneurship, nb. of transfers and business life-cycle.
- *Welfare* (in progress)

# Taxing business transfers

Y	$r$ (%)	$q$	% Entr.	$\frac{\text{sell}}{\text{exit}}$	Mature bus.
Benchmark economy (2016)					
2.501	4.54	2.51	9.63	14.81%	79.7%
Cutting $\tau_s$ by 5pp, higher $\tau_w$					
+1.1%	4.51	2.50	<b>9.77</b>	15.00%	79.6%
Cutting $\tau_b$ by 5pp, higher $\tau_w$					
+2.4%	4.47	2.62	<b>10.03</b>	15.40%	80.2%
Subsidizing purchase of businesses: $\tau_b = -5\%$ , higher $\tau_w$					
+4.9%	4.38	2.75	<b>10.46</b>	16.00%	80.7%

→ **taxes on business transfer** have a **sizable impact**.

→ **improves capital allocations** toward mature and **more productive businesses** and **avoid** capital liquidation.

## Credit parameters & costs

Y	$r$ (%)	$q$	% Entr.	$\frac{\text{sell}}{\text{exit}}$	mature bus.
Benchmark economy (2016)					
2.501	4.54	2.51	<b>9.63</b>	<b>14.81%</b>	<b>79.7%</b>
More severe borrowing constraint ( $\theta = 0.4$ )					
<b>-4.1%</b>	4.67	2.46	<b>8.96</b>	<b>14.42%</b>	<b>79.2%</b>
Higher adj. cost $\tau_{up}$ (+10%)					
<b>-2.7%</b>	4.763	2.52	<b>9.22</b>	<b>15.16%</b>	<b>80.4%</b>

→ **Credit conditions** and **adj. costs** **interact** with the business sale market

- **tighter borrowing constraint:** lower the possibility of buying existing businesses
- **higher adj. cost:** increases demand for existing businesses (and nb. of transfers) but lower overall output.

	Y (output)		
	$t = 2020$	$t = 2025$	$t = 2030$
<b>With demo change</b>			
benchmark	2.52	2.49	2.48
abolishing tax $\tau_b$ in 2018	+1.4%	+1.7%	+1.3%
<b>Without demo change (same parameters)</b>			
benchmark	2.37	2.37	2.37
abolishing tax $\tau_b$ in 2018	+1.1%	+1.2%	+1.2%

**Table 1:** Effect of taxation with/without demographic change.

→ not considering the demographic change would bias policy evaluations.



- OECD economies face important business transfer issues due to mismatches. Situation exacerbated with aging of entrepreneurs.
- We **contribute a framework** to study this from a *macro-perspective*.
- Model is **consistent with data**
  - **economic factors** (credit conditions, adj. cost) have important effects on **selling/buying margins**.
- There is a **role for policy instruments** favoring business transfers.
  - reducing capital gain taxes on transfers increases output.
  - demo change has important consequences.

# Appendix

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## Brooklyn HVAC Company

Kings County, NY



Asking Price: **\$375,000** ⓘ

Cash Flow: **\$150,674** ⓘ

Gross Revenue: **\$829,506** ⓘ

Inventory: **N/A** ⓘ

EBITDA: **N/A** ⓘ

Rent: **\$1,700 /Month**

FF&E: **\$70,000** ⓘ

Established: **1996**

## Detailed Information

**Location:** Kings County, NY

**Real Estate:** Leased

**Building SF:** 1,100

**Lease Expiration:** 1/1/2024

**Employees:** 5

**Furniture, Fixtures, & Equipment (FF&E):** Included in asking price

**Facilities:** 1,100 office and warehouse space. Equipped with working space for capital repairs, welding station, and a storage area for iron metal. Facilities also includes storage area for ducts and piping on an upper level.

**Growth & Expansion:** The HVAC industry is growing and evolving due to rising construction activities, increasing population, urbanization, climatic changes and decreasing unemployment rate. Rising demand for energy-efficient products continue to create generate growth in the HVAC industry. With the increase of spending on construction in the US, HVAC contractors are in an excellent position to capitalize on the opportunities in the market that lie ahead.

**Support & Training:** Available

**Reason for Selling:** Retirement

Data	Median Price	Mean Price
PSID	95K	682K
BBS	190K	579K

**Table 2:** Representativity of the BBS dataset.

- BBS displays a fewer very small businesses and a fewer very large businesses

Reasons for ceasing/selling a business *over time*:

	SBO (2007)	ASE (2015)
Business ceasing (% of total)	5.5	6.4
<b>Operations ceased due to</b>		
Business activity related (%)	44	30.3
Retirement (%)	<b>9.9</b>	<b>18.4</b>
Selling motivated reasons (%)	<b>11</b>	<b>17.1</b>
Other reasons (%)	35.1	34.2

Source	Founded	Purchased	Gift/joined	Inheritance
SBO (2007)	65.6%	<b>23.3%</b>	7.8%	3.2 %
SCF (2016)	74.4%	<b>18.2%</b>	3.9%	3.5%

**Table 3:** Type of acquisition (respondant: each business owners in SBO, SCF).

**Table 4:** Probability to switch entrepreneur (OLS).

	Worker to Entrepreneur
Year experience/100	<b>−0.07618***</b> (0.01317)
Net worth	<b>0.00431***</b> (0.00083)
Age/100	<b>0.15839***</b> (0.03505)
$(Age/100)^2$	<b>−0.00201***</b> (0.00053)
Sex	<b>−0.02217***</b> (0.00261)
Year education	<b>0.00139***</b> (0.00047)
<i>N</i>	20,771
<i>R</i> <sup>2</sup>	0.00780

*Notes:* \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . In parenthesis: std. deviation.



## Business acquisition and interest charged SSBF

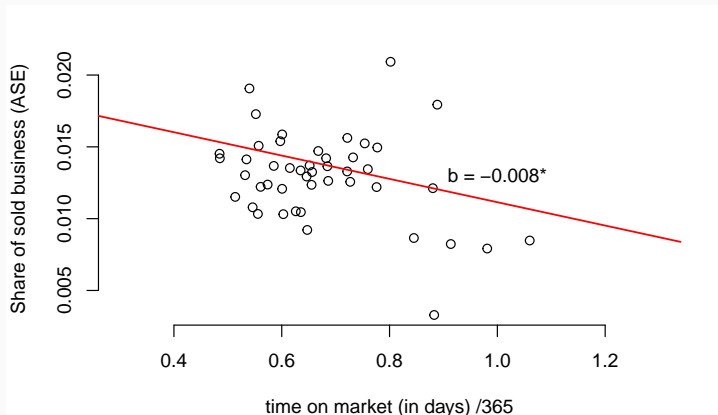
	Interest rate (%)	
	All firms	Young firms (<5y)
	(1)	(2)
Purchased	-0.58*** (0.13)	-1.59*** (0.28)
Controls	Yes	Yes
N	8,919	1,811
R <sup>2</sup>	0.12	0.31

Notes: p<0.1; \*\* p<0.05; \*\*\* p<0.01. In parenthesis: std. deviation.

Comparing interest rates on purchased vs. founded businesses:

- Young purchased businesses: cheaper access to credit than founded ones,
- Difference disappear after a few years when firm generate history (even though there is survivor bias)

# Share of sold business and easiness to sell



**Figure 6:** Share sold (ASE) and average TOM (BBS) by US state.

$$TOM = \sum_s \alpha(s) \times \frac{\text{Avg. number of days to sell}_s}{365} \quad \alpha(s) = \text{sector share}$$

> State where easier to sell  $\leftrightarrow$  more sold businesses.

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