Evergreening

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Motivation

Evergreening:

- Idea that banks revive a loan close to default by granting further credit to the same firm
- Potentially contributes to keeping less-productive firms alive & depressing aggregate TFP
- "Zombie"-lending is typically associated with low-capitalized banks during depressions

Research Questions:

1. Is evergreening a general feature of financial intermediation?
2. Can we find empirical evidence even for the U.S. over the recent past?
3. What are the macroeconomic consequences of evergreening?

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This Paper

1. **Static Model**
   - Small deviation from benchmark model: "concentrated vs. dispersed lending"
   - Concentrated lending $\Rightarrow$ better terms to firms with $+$ legacy debt, $-$ productivity
2. **Empirics**
   - Exploit cross-sectional variation in bank exposure to distressed firms
   - $+$ lending & $-$ interest rates to distressed firms if bank owns a larger debt share
3. **Dynamic Model**
   - Embed static model mechanism into dynamic heterogeneous-firm model
   - Economy features relatively larger firms, more debt, lower spreads, lower TFP

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Literature

- **Empirical Evidence on Zombie Lending & Evergreening**
  - Japan: Peek & Rosengren (2005); Caballero, Hoshi & Kashyap (2008)
  - Eurozone: Schivardi, Sette & Tabellini (2020); Blattner, Farinha & Rebelo (2020); Acharya, Eisert, Eufinger & Hirsch (2019); Acharya, Crosignani, Eisert & Eufinger (2020); Bonfim, Cerqueiro, Degryse & Ongena (2022).
  - Cross-country: McGowan, Andrews & Millot (2018), Banerjee & Hofmann (2018)

  Here: Document evidence of evergreening in a non-crisis setting (US financial system)

- **Models of Zombie Lending & Evergreening**
  - Static: Rajan (1994); Puri (1999); Bruche & Llobet (2014); Acharya, Lenzu, Wang (2021)
  - Dynamic: Hu & Varas (2021); Tracey (2021)

  Here: Evergreening w/o asymmetric information or limited liability; dynamic model to study aggregate implications.

Static Model

Firm Problem

Firm Problem Solution

2 periods

- Firm has pre-existing liability b and productivity z
- Borrows new debt Qb' to invest k' today, produces tomorrow (+NPV)
- Defaults on b at the start iff $V(z, b; Q) < 0$; Q offered before default decision
- No default in the 2nd period, new lending risk-free

$$V(z, b; Q) = \max_{b', k'} Qb' - b - k' + \beta^f [z(k')^\alpha - b']$$

$$\text{s.t. } b' \leq \theta k'$$

- **Result**: there exists a $Q^{\min}(z, b)$ such that firm defaults if $Q < Q^{\min}$
- **Result**: investment k' satisfies: $MPK = \frac{1+\theta\beta^f}{\beta^f} - \frac{\theta}{\beta^f} Q$

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Economy I: Dispersed Lending

- Continuum of deep-pocketed, risk-neutral, competitive lenders with $\beta^k > \beta^f$
- Equilibrium contract of competitive lenders satisfies

$$Q = \begin{cases} \beta^k & \text{if } \beta^k \geq Q^{\min}(z,b) \\ 0 & \text{otherwise} \end{cases}$$

- Equilibrium allocation (b^c, k^c, V^c) satisfies

$$MPK = \frac{1+\theta\beta^f}{\beta^f} - \frac{\theta}{\beta^f}\beta^k, \forall z, b$$

- Interest rates and MPK equalized across all non-defaulting firms

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Economy II: Concentrated Lending ("Banks")

Bank Problem Solution

- Two key differences:
  1. Lender owns pre-existing liability b, lost in default
  2. Lender internalizes effect of Q on (b', k', V), Stackelberg leader
- Firm has outside option of borrowing from dispersed lenders, $Q \geq \beta^k$
- Bank problem:

$$W = \max_{Q \geq \beta^k} \mathbb{I}[V(z, b, Q) \geq 0] \times \left[b - Qb'(z, Q) + \beta^k b'(z, Q) \right]$$

- $Q \uparrow$ implies trade-off:
  + Reduce firm's likelihood of default, increase chance of recovering b
  - Less surplus extracted from new contract $b'(\beta^k - Q)$

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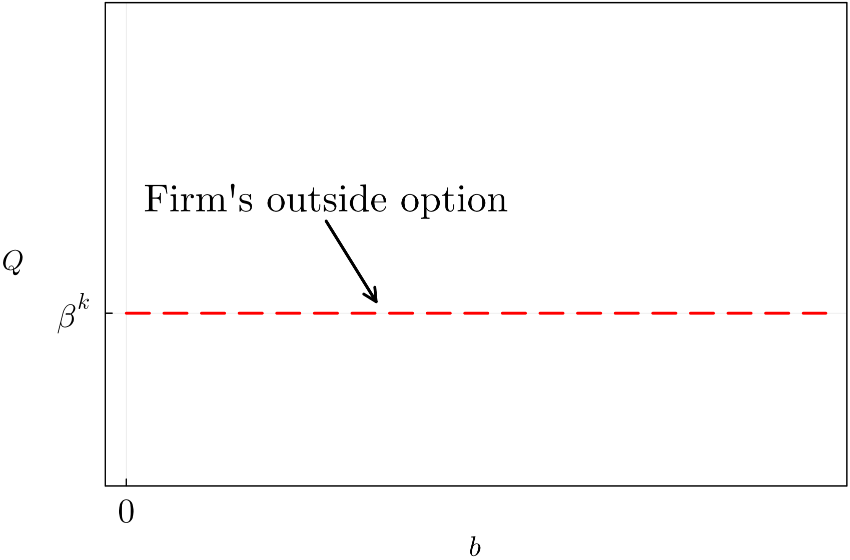

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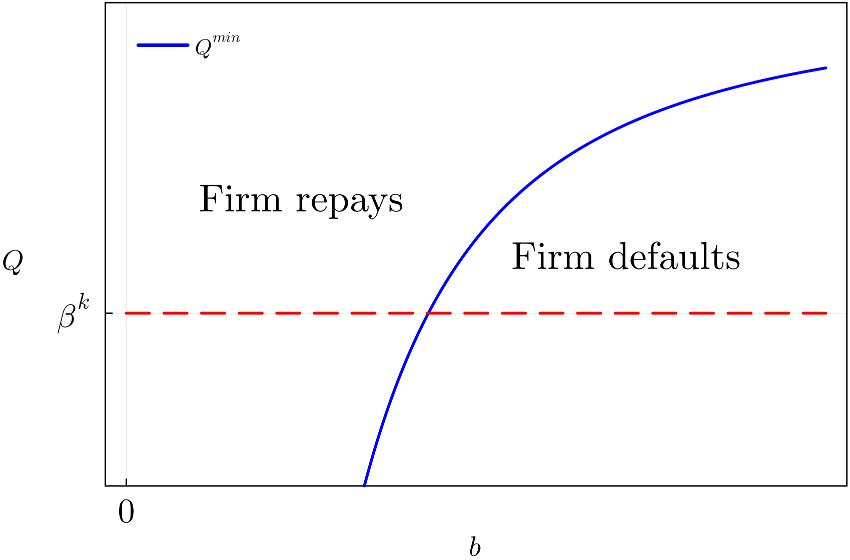

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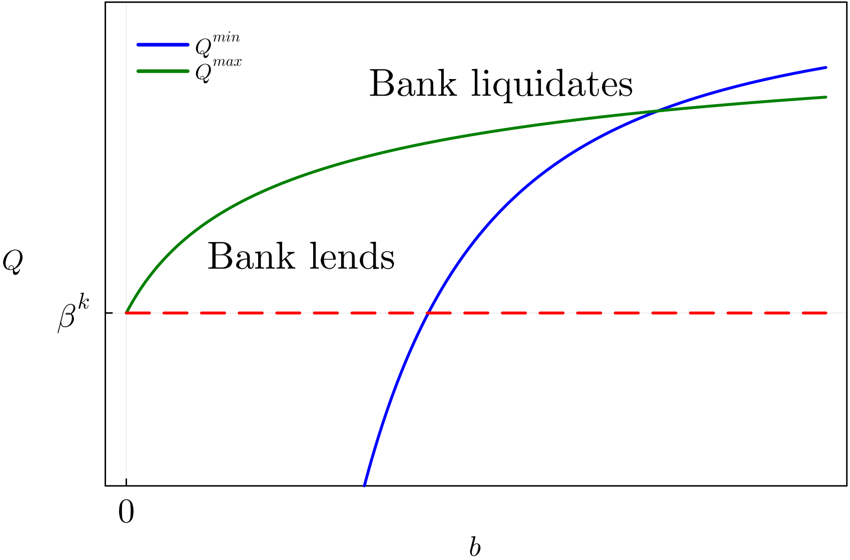

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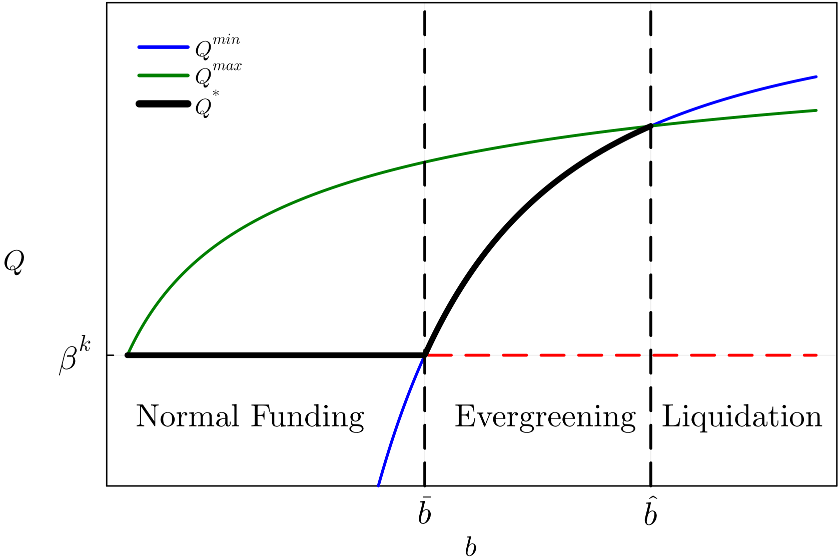

Static Model: Summary

- In ”evergreening region”:
  1. Q increasing in b
  2. Q decreasing in z
- “Worse” fundamentals (low z, high b) $\Rightarrow$ higher Q
- Similar pattern for investment and debt $\neq$ debt overhang
- Theory does not rely on bank capital $\neq$ risk-shifting/gambling for resurrection
- **Next:** empirical evidence for banks extending more credit to firms in distress

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Empirical Strategy

Data

- **Data Set:**
  - C&I loans of Y-14Q data, covers large BHCs, sample: 2014:Q4 - 2019:Q4
  - Loan-level panel with quarterly updates on universe of loan facilities $>$\$1M
  - Detailed information about features of credit arrangement
  - Banks' *risk assessments* about each individual loan or firm
- **Observed Risk Measures:**
  - One-year probability of default (PD), loss given default, ...
  - Use firms' PDs to measure whether they are in distress
  - PD is borrower-specific $\rightarrow$ comparable across banks

Identifying Credit Supply Effects

- Do "concentrated lenders" extend more credit to firms in distress ?
  - Need to account for potential links between bank-firm selection and firm demand
- Following Khwaja and Mian (2008), estimate regression for firm f and bank b:

$$\frac{L_{f,b,t+2} - L_{f,b,t}}{0.5 \cdot (L_{f,b,t+2} + L_{f,b,t})} = \alpha_{f,t} + \beta_1 \text{Debt-Share}_{f,b,t} + \beta_2 \text{Debt-Share}_{f,b,t} \times \text{Distress}_{f,t} + \gamma X_{f,t} + u_{f,b,t}$$

- Debt-share is $L_{f,b,t}/Debt_{f,t}$; Distress equals one if $\overline{PD}_{f,t} \geq \kappa_{90} = 3.89\%$
- Consider interest rate responses to address identification concerns
- Sample restricted to term loans only & pre-COVID period ("normal times")

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Debt Share & Firm Distress

▸ Distress Cutoffs ▸ Interaction Terms ▸ Firm-Level Effects

- Banks with a larger debt-share extend relatively more credit to firms in distress

	(i)	Δ Credit (ii)	(iii)	(iv)	Δ Interest Rate (v)	(vi)
Debt-Share	-10.59*	-5.75	-10.57	0.18***	0.12*	0.13**
	(6.02)	(5.65)	(6.40)	(0.05)	(0.06)	(0.06)
Debt-Share × Distress	31.58***	22.52**	36.08***	-0.90***	-0.68**	-0.71**
	(7.14)	(8.97)	(12.05)	(0.33)	(0.31)	(0.32)
Fixed Effects						
Firm × Time	✓		✓	✓		✓
Firm × Time × Pur.		✓			✓	
Bank × Time			✓			✓
Bank Controls	✓	✓		✓	✓	
R-squared	0.51	0.52	0.56	0.75	0.74	0.79
Observations	7,980	5,282	7,915	7,849	5,184	7,777
Number of Firms	847	602	844	837	588	834
Number of Banks	36	34	34	36	34	34

Bank controls: ROA, dep/assets, income gap, ln(assets), unused credit/assets, Tier 1 cap. buffer, liab./assets, loans/assets. Standard errors clustered by bank and firm. Distress: $\kappa = 3.89\%$. Sample: 2014:Q4-2019:Q4.

Debt Share & Firm Distress

Distress Cutoffs | Interaction Terms | Firm-Level Effects

- ... at lower interest rates (suggesting supply, not demand)

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Dynamic Model

Dynamic Model

▸ Timing ▸ Firm Problem ▸ Pricing ▸ Equilibrium ▸ Calibration ▸ Model Fit

- Hopenhayn (1992) + Cooley & Quadrini (2001) + Hennessy & Whited (2007)
- Time discrete and infinite $t = 0, 1, \ldots, \infty$
- Continuum of firms, heterogeneous with respect to productivity, capital, and debt
- Firm problem: static model + equity issuance costs, productivity shocks & default shocks
- Endogenous entry and exit of firms
- Calibrate model to Y-14 data + solve stationary equilibrium under
  1. Dispersed lending
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Impact of concentrated lending in the SRIE

▸ Full Table ▸ TFP decomposition

	Δ %
Firm level (Averages)	
Market Leverage	0.60
Interest rate	-1.24
Size	2.34
Productivity	-0.04
Exit rate	-0.70
Aggregates	
Debt	3.13
Capital	3.13
Measured TFP	-0.31

Concentrated lending economy features: (i) more debt, (ii) lower interest rates, (iii) larger firms, (iv) less exit, (v) lower TFP

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How are evergreened firms different ?

▸ Full Table ▸ Evergreened vs. Zombie Firms

	Non-Evergreened	Evergreened	Δ %
Capital	0.75	1.72	128.5
Market leverage	0.53	0.80	50.6
Productivity	1.02	0.94	-8.0
Output	0.41	0.60	46.1
Probability of survival	0.96	0.89	-7.6
Interest rate	7.75	10.02	29.2

- Evergreened firms are (i) larger, (ii) more indebted, (iii) less productive
- But they pay higher interest rates, on average!
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  - Offer better terms to firms with $+$ pre-existing borrowings and $-$ productivity
  - Induces firms to borrow and invest more, may generate misallocation
- **Document evergreening behavior by large U.S. banks**
  - Compare credit conditions across banks that own different shares of firm debt
  - Banks with larger shares offer rel. more credit at lower rates to distressed firms
- **Embed mechanism into dynamic model of industry equilibrium**
  - Equilibrium: less productivity, larger firms, more debt, lower rates
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Appendix

Static Model: Solution to the Firm Problem ▸ Back

- Optimal borrowing b':

$$b' = \begin{cases} 0 & \text{if } Q < \beta^f \\ [0, \theta k'] & \text{if } Q = \beta^f \\ \theta k' & \text{if } Q > \beta^f \end{cases}$$

- Optimal investment k:

$$\alpha z (k')^{\alpha - 1} = \frac{1 - \theta(Q - \beta^f)}{\beta^f} (= MPK)$$

- Given interest rate Q, solution to the firm's problem characterized by set of functions

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  - b', k', V increasing in z, Q
  - V decreasing in b

Bank Problem: Solution ▸ Back

- Let $Q^{\max}(z, b)$ denote maximum Q for which bank lends; $W(z, b; Q^{\max}) = 0$
- Bank's optimal policy is then given by

$$Q = \begin{cases} \beta^k & \text{if } Q^{\min}(z, b) < \beta^k < Q^{\max}(z, b) \\ Q^{\min}(z, b) & \text{if } \beta^k < Q^{\min}(z, b) < Q^{\max}(z, b) \\ 0 & \text{otherwise} \end{cases}$$

- Properties: (i) $Q^{\max} > \beta^k$ iff $b > 0$; (ii) $\frac{\partial Q^{\max}}{\partial b} > 0$; (iii) $\frac{\partial Q^{\max}}{\partial z} < 0$

Robustness: Distress Cutoffs

▸ Back

		Δ Credit			Δ Interest Rate	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Debt-Share	-10.15*	-10.47*	-10.03	0.19***	0.17***	0.18***
	(5.95)	(6.02)	(5.95)	(0.06)	(0.05)	(0.05)
Debt-Share $\times$ Distress	27.62**	31.51***	26.87**	-1.29*	-0.81**	-1.05*
	(11.93)	(7.62)	(13.08)	(0.66)	(0.31)	(0.55)
Distress Cutoffs						
$\overline{p} \geq \kappa_{95}$	✓			✓		
$\kappa_{99} > \overline{p} \geq \kappa_{90}$		✓			✓	
$\kappa_{99} > \overline{p} \geq \kappa_{95}$			✓			✓
Firm $\times$ Time FE	✓	✓	✓	✓	✓	✓
Bank Controls	✓	✓	✓	✓	✓	✓
R-squared	0.51	0.51	0.51	0.75	0.75	0.75
Observations	7,756	7,980	7,756	7,628	7,849	7,628
Number of Firms	837	847	837	828	837	828
Number of Banks	36	36	36	36	36	36

Bank controls: ROA, dep/assets, income gap, ln(assets), unused credit/assets, Tier 1 cap. buffer, liab./assets, loans/assets. Distress cutoffs: $\kappa_{90} = 3.89\%$, $\kappa_{95} = 7.75\%$, $\kappa_{99} = 35.42\%$. Standard errors clustered by bank and firm. Sample: 2014:Q4-2019:Q4.

Robustness: Interaction Terms

Back

	(i)	∆ Credit (ii)	(iii)	(iv)	∆ Interest Rate (v)	(vi)
Debt-Share	-10.84*	-6.58	-5.45	0.17***	0.21**	0.22*
	(6.01)	(6.10)	(14.08)	(0.05)	(0.09)	(0.12)
Debt-Share × Distress	26.69***	26.50***	34.02***	-0.65*	-0.87***	-0.66**
	(9.24)	(7.08)	(8.50)	(0.34)	(0.29)	(0.29)
Interaction Terms						
Bank Controls × Distress	✓			✓		
Debt-Share × Bank Controls		✓			✓	
Debt-Share × Firm Controls			✓			✓
Firm Controls			✓			✓
Bank Controls	✓	✓	✓	✓	✓	✓
Firm × Time FE	✓	✓	✓	✓	✓	✓
R-squared	0.51	0.51	0.51	0.75	0.75	0.77
Observations	7,980	7,980	7,400	7,849	7,849	7,279
Number of Firms	847	847	797	837	837	787
Number of Banks	36	36	36	36	36	36

Bank controls: ROA, dep/assets, income gap, ln(assets), unused credit/assets, Tier 1 cap. buffer, liab./assets, loans/assets. Firm controls: cash/assets, ROA, tangible assets/assets, ln(assets), liab./assets. Standard errors clustered by bank and firm. Sample: 2014:Q4-2019:Q4.

Zombie Measures & Firm Distress

▸ Back

Zombie Measure	Obs.	Corr. Distress	Indicator	PD Distribution					
				P10	P50	P75	P90	P95	P99
FMP	79,119	0.20	1	.23	1.85	8.07	22.94	61.35	100
			0	.16	.67	1.53	3.7	6.65	23.54
SST	200,156	0.22	1	.31	1.62	3.98	10.22	19.88	100
			0	.17	.73	1.6	3.5	5.9	20
CHK	189,388	-0.04	1	.15	.66	1.56	3.73	6.57	25.16
			0	.18	.97	2.08	5.07	10.01	35.42
Model	245,341	0.14	1	.43	2.8	7.16	19.73	30	100
			0	.17	.76	1.77	3.73	6.92	22.7
PD Baseline				.17	.82	1.91	3.89	7.75	35.24

FMP=Favara, Minoiu, Perez-Orive (2022), SST=Schivardi, Sette, Tabellini (2022), CHK=Caballero, Hoshi, Kashyap (2008), Model=leverage>p90, ROA<p10.

Effects at the Firm-Level

back

- Do these effects persist at the firm-level, affecting total debt and investment?
  - Aggregation: weigh regressors by debt shares across banks for some firm f
- Estimate regression for firm f at annual frequency:

$$\frac{y_{f,t+4} - y_{f,t}}{0.5 \cdot (y_{f,t+4} + y_{f,t})} = \alpha_f + \tau_{m,k,t} + \beta_1 HHI_{f,t} + \beta_2 HHI_{f,t} \cdot Distress_{f,t} + \beta_3 Distress_{f,t} + \gamma X_{f,t} + u_{f,t}$$

- Firm outcomes: y is either total debt or tangible assets ("investment")
- $HHI_{f,t} = \sum_b (L_{f,b,t}/Debt_{f,t})^2$ is the Herfindahl-Hirschmann-Index for debt concentration
- $Distress_{f,t}$ measures firm distress and is defined as above: $\overline{PD}_{f,t} >= 3.89\%$
- Fixed effects: firm α_f and industry-state-time $\tau_{m,k,t}$

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Effects at the Firm-Level

back

- Debt & investment decline for distressed firms, but less so if their debt is concentrated

	Δ Total Debt		Investment	
	(i)	(ii)	(iii)	(iv)
HHI	28.29***	27.64***	10.17***	10.25***
	(8.59)	(8.57)	(3.82)	(3.85)
HHI × Distress	11.61**	16.38***	7.08**	6.63*
	(5.27)	(6.22)	(3.45)	(3.81)
Distress	-4.43***	-6.61***	-2.75***	-2.42***
	(1.34)	(1.70)	(0.70)	(0.83)
Fixed Effects				
Firm	✓	✓	✓	✓
Time × Industry × State	✓	✓	✓	✓
Firm Controls × Distress		✓		✓
Firm Controls	✓	✓	✓	✓
R-squared	0.56	0.56	0.58	0.58
Observations	62,785	62,785	74,260	74,260
Number of Firms	14,887	14,887	17,611	17,611
Number of Banks	37	37	37	37

Firm controls: cash, net income, tangible assets, liabilities, debt (all relative to assets), ln(assets), observed credit/debt. Standard errors clustered by main-bank and firm. Sample: 2014:Q4-2019:Q4.

Dynamic Model: Timing

▸ back

Within each period t:

1. Firm productivity z realized
2. Lending contract Q is offered, depending only on curren states (z, b, k)
3. Firm draws "preference shocks" $\varepsilon^P, \varepsilon^D \sim$ extreme value, chooses to default or not
4. Entrants pay cost of entry
5. Firms repay, invest, produce, borrow, and pay dividends

Dynamic Model: Firm Problem

back

- Value given Q and realization for the extreme-value shocks

$$V_0(z,b,k,\varepsilon^P,\varepsilon^D;Q)=\max\left\{V^P(z,b,k;Q)+\varepsilon^P,0+\varepsilon^D\right\}$$

- $\varepsilon^P-\varepsilon^D\equiv\varepsilon\sim$ logistic with scale parameter κ, thus

$$\text{Prob of Repayment}:\mathcal{P}(z,b,k;Q)=\frac{\exp\left[V^P(z,b,k;Q)/\kappa\right]}{1+\exp\left[V^P(z,b,k;Q)/\kappa\right]}$$

$$\text{Expected Value}:\mathcal{V}(z,b,k;Q)=\mathbb{E}_{\varepsilon^P,\varepsilon^D}V_0(z,b,k,\varepsilon^P,\varepsilon^D;Q)=\kappa\log\left\{1+\exp\left[V^P(z,b,k;Q)/\kappa\right]\right\}$$

- Firm value of repayment:

$$V^P(z,b,k;Q)=\max_{b',k',n} div-\mathbb{I}[div<0][e_{con}+e_{slo}\times div]+\beta^f\mathbb{E}_{z'}[\mathcal{V}(z',b',k')|z]$$

$$\text{s.t. } div=zk^\alpha n^\eta-wn-k'+(1-\delta)k+Qb'-b-c_f$$

$$b'\leq\theta k'$$

Dynamic Model: Firm Problem

back

- Value given Q and realization for the extreme-value shocks

$$V_0(z, b, k, \varepsilon^P, \varepsilon^D; Q) = \max \left\{ V^P(z, b, k; Q) + \varepsilon^P, 0 + \varepsilon^D \right\}$$

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$$b' \leq \theta k'$$

Dynamic Model: Firm Problem

back

- Value given Q and realization for the extreme-value shocks

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Dispersed vs. Concentrated Lending

back

- $\mathcal{P}(s;Q)$ is probability of repayment, $s=(z,b,k)$, and $\psi(s)$ is recovery value
- **Dispersed Lending**: Free-entry for lenders $\Rightarrow$ zero-profit condition, implying

$$Q^{disp}(s)b' = \beta^k \mathbb{E}_{z'}[\mathcal{P}(s')b' + (1-\mathcal{P}(s'))\psi(s')]$$

- **Concentrated Lending**: Lender can choose Q, subject to participation constraint

$$\max_Q W(s;Q) = \mathcal{P}(s;Q)\left[b - Qb'(s;Q) + \beta^k \mathbb{E}_{z'}[W(s')|z]\right] + (1-\mathcal{P}(s;Q))\psi(s)$$

$$\text{s.t.} \quad V(s;Q) \geq V(s;Q^{new}(s))$$

where

$$Q^{new}(s): 0 = -Q^{new}b'(s;Q^{new}) + \beta^k \mathbb{E}_{z'}[W(s')|z]$$

Dispersed vs. Concentrated Lending

back

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Stationary Industry Equilibrium

back

Given an arbitrary interest rate function Q, a SIE consists of

1. Policy functions $(k, b')(z, b, k)$ and value functions $V(z, b, k)$
2. Equilibrium wage w
3. Mass of entrants m
4. Stationary distribution $\lambda(z, b, k)$

such that:

1. Policies and values solve the firm's problem given (Q, w)
2. Wage is such that the free-entry condition is satisfied
3. Mass of entrants is such that the market for labor clears
4. λ satisfies its law of motion

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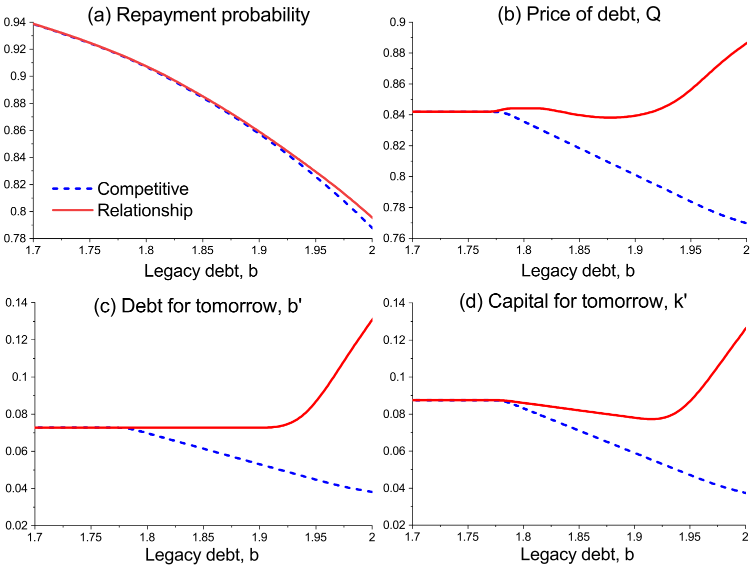
Dynamic Model: Policy Functions

▸ back



Dynamic Model: Entrants & Industry Equilibrium ▸ Back

- Large pool of entrants may pay cost κ to enter and start producing next period.
- We assume that each entrant is endowed with κ units of physical capital
- The value that they obtain is given by

$$V^E(w) = \int_{\underline{z}}^{\tilde{z}} \frac{V(z, 0, \kappa; w)}{\tilde{z} - \underline{z}} \mathrm{d}z.$$

Calibration

back

Parameter	Description	Value	Source/Reason
ω	Cost of entry	1.184	Normalize $w = 1$
ρ_z	TFP persistence	0.767	Gomes 2001, Gourio & Miao 2010
σ_u	TFP volatility	0.110	Gomes 2001, Gourio & Miao 2010
e_{slope}	Equity issuance cost	0.200	Hennessy & Whited 2007
δ	Depreciation rate	0.100	Aggregate investment/capital of 10%
α	Production, capital share	0.320	Profit share of 16%
η	Production, labor share	0.480	Profit share of 16%
β^k	Lender discount rate	0.970	Real rate of 3%
ψ_1	Recovery value	0.350	Kermani & Ma 2020
β^f	Borrower discount factor	0.884	Internally calibrated
$\mathbf{c}$	Fixed cost	0.055	Internally calibrated
κ	Logistic distr., scale	0.225	Internally calibrated
$\tilde{z}$	TFP distr. for entrants	1.147	Internally calibrated
$\underline{k}$	Initial capital	0.805	Internally calibrated
θ	Constraint parameter	1.040	Internally calibrated
e_{con}	Fixed cost of issuing equity	0.010	Internally calibrated

Model Fit

back

Moment	Source	Data	Model
Market leverage (median)	Y-14/Compustat	0.63/0.57	0.59
Debt over fixed assets (median)	Y-14/Compustat	1.09/1.20	1.04
Investment rate (aggregate)	Y-14/Compustat	0.104/0.14	0.117
Profit share (aggregate)	Y-14	0.16	0.176
Interest rate spread (median)	Y-14	3.46%	4.47%
Exit rate	Hopenhayn et al. 2018	9.0%	8.8%
Size at entry (relative to mean)	Lee & Mukoyama 2015	0.60	0.58
Size at exit (relative to mean)	Lee & Mukoyama 2015	0.49	0.38
TFP at entry (relative to mean)	Lee & Mukoyama 2015	0.75	0.88
TFP at exit (relative to mean)	Lee & Mukoyama 2015	0.64	0.86

Impact of introducing concentrated lending ▸ back

	Δ % with const. entry	Δ % with const. labor
Firm level (Averages)		
Market Leverage	0.60	0.54
Interest rate	-1.24	-1.13
Size	2.34	1.99
Productivity	-0.04	-0.02
Exit rate	-0.70	-0.17
Aggregates		
Debt	3.13	1.04
Capital	3.13	1.04
Labor	2.14	0.00
Output	2.14	0.10
Wage	0.00	0.10
Measured TFP	-0.31	-0.23
Number of firms	0.77	-0.94

Concentrated lending economy features: (i) less exit, (ii) more debt, (iii) lower interest rates, (iv) lower TFP

TFP Decomposition

▸ back

$$Y = \underbrace{\left(\frac{1}{S}\right)^{1-\alpha-\eta}}_{\text{avg. firm size}} \times \overbrace{\mathbb{E}[z^{\frac{1}{1-\alpha-\nu}}]^{1-\alpha-\eta}}^{\text{selection}} \times \underbrace{\frac{Y}{Y*}}_{\text{static misallocation}} \times \overbrace{K^{\alpha}N^{1-\alpha}}^{\text{factor qtys.}}$$

Ratio	% Δ
Output	2.12%
Factors	2.43%
Capital	0.99%
Labor	1.45%
MTFP	-0.31
Size	-0.27
Selection	-0.01
Static Misallocation	-0.03

TFP losses arise primarily from increased firm size.

How are subsidized firms different ? ▸ Back

Subsidized vs. Non-subsidized Firms in the RLE (medians)

	Non-subsidized	Subsidized	Δ %
Capital	0.75	1.72	128.5
Productivity	1.02	0.94	-8.0
Output	0.41	0.60	46.1
Payouts/assets	0.05	-0.01	-114.4
Market leverage	0.53	0.80	50.6
Interest rate	7.75	10.02	29.2
Probability of survival	0.96	0.89	-7.6
Interest-coverage ratio	1.67	0.45	-73.1
Age	7.87	10.17	29.2

- Larger, more indebted, less productive
- Actually pay higher interest rates, on average!

Subsidized Firms vs. Zombie Firms

Back

Zombie firm definition from Favara, Minoiu, and Perez-Orive (2022):

- Leverage above median
- ICR below 1
- Negative net income

Model: 5.8% vs. 5.7% in the data.