Can the cure kill the patient? Corporate credit interventions and debt overhang

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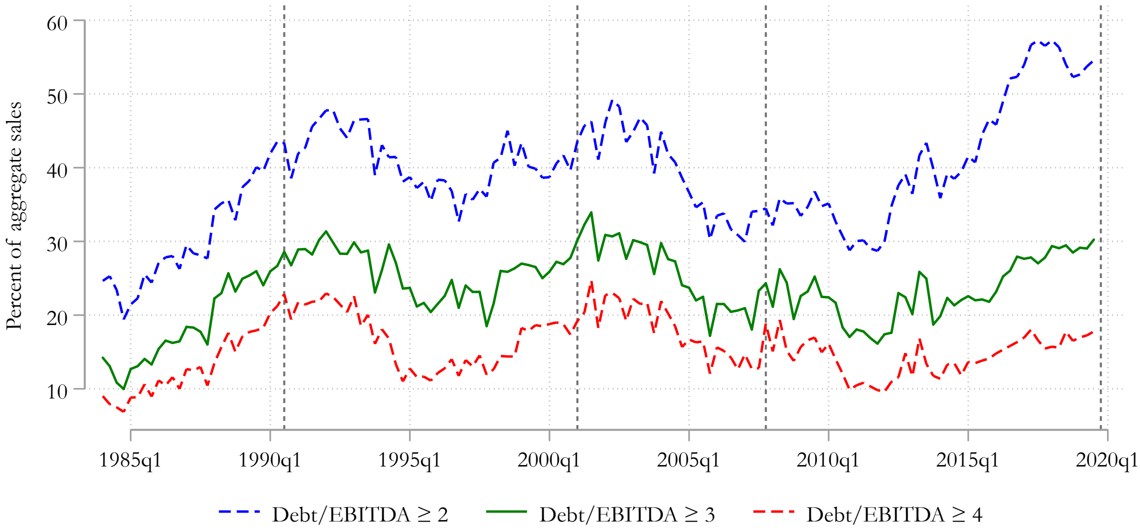
reduce bankruptcies and support investment (short-run) vs. debt overhang (long-run)

Leverage in the run-up to the crisis



[Net leverage] [Interest coverage ratios] [Day of cash on hand] [Projected firms with zero cash]

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new loans vs. forebearance on existing debt vs. equity injections vs. ...

Overview

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   - second-order gains from alternative designs

1. Model

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- partially idiosyncratic, partially aggregate shock $\rightarrow$ cross-sectional distribution over (b, k) [math]

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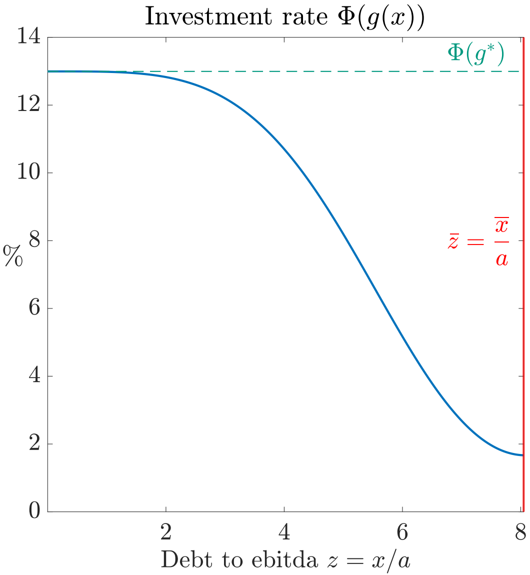

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- debt issuance rate (per unit of capital): trade-off theory with a twist

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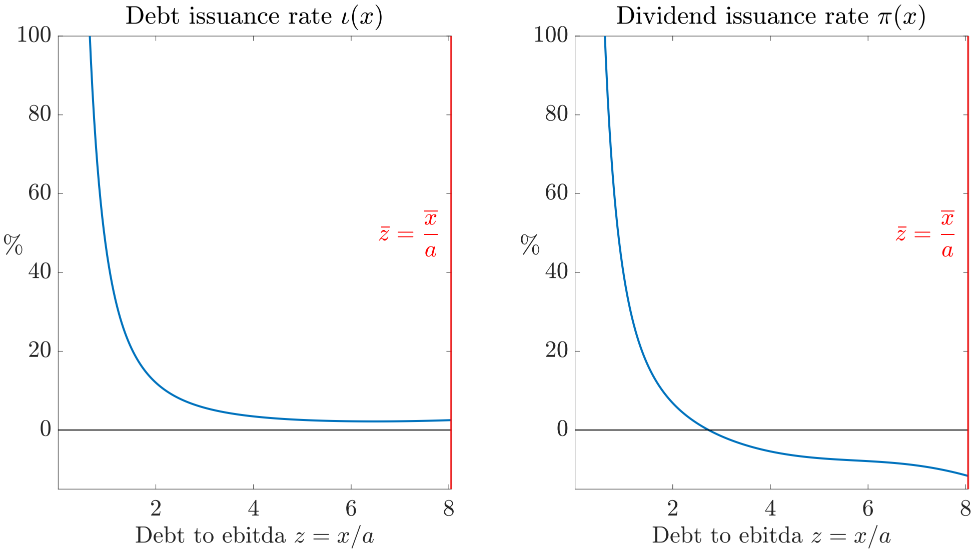
- $\tilde{R}_d(x) - R_d(x)$: debt expected return wedge (between equity and credit market investors)

Financing policies



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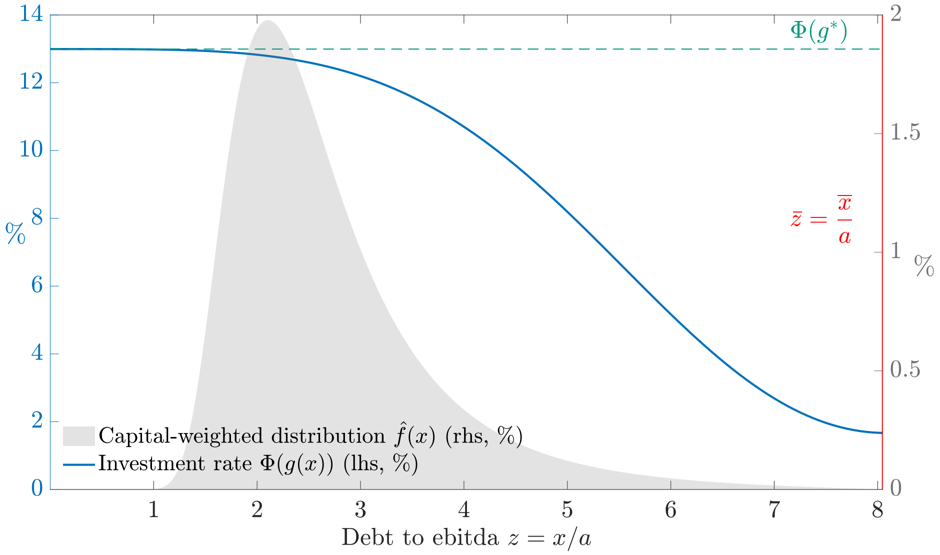
- Aggregate growth $\mu_{K,t} := \hat{g}_t - (1 - \alpha_k)\hat{\lambda}_t$ and aggregate capital stock dynamics

$$dK_t = \mu_{K,t} K_t dt + \rho\sigma K_t dZ_t$$

Long run distribution



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$\hat{z}$	average debt/ebitda	✓	2.71	2.71
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$\kappa\hat{z}$	average (inverse) interest coverage ratio	✗	11.61	13.53
$\hat{\pi}$	average dividend issuance rate	✗	3.32	3.49
$\hat{\iota} - m\hat{x}$	average net debt issuance rate	✗	0.96	1.06
$var(z(x))$	variance of debt/ebitda	✗	3.08	0.90
$\hat{F}(z(x) \leq 1)$	total asset share, debt/ebitda ≤ 1	✗	9.21	0.00
$\hat{F}(z(x) > 3)$	total asset share, debt/ebitda > 3	✗	32.53	22.06

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- Outcomes of focus: expected future macroeconomic aggregates

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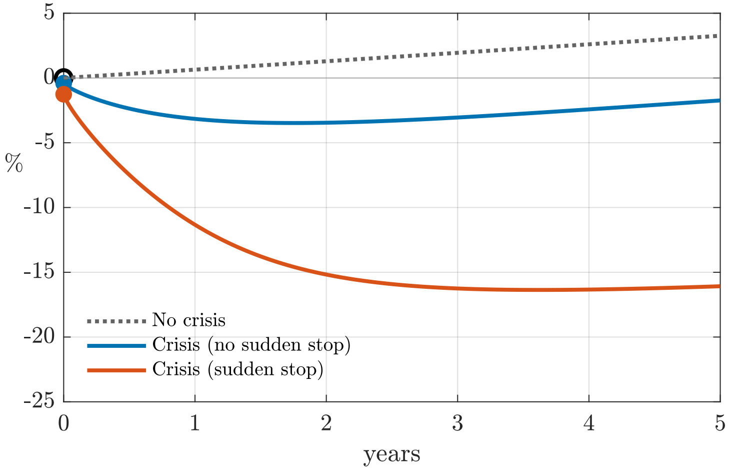

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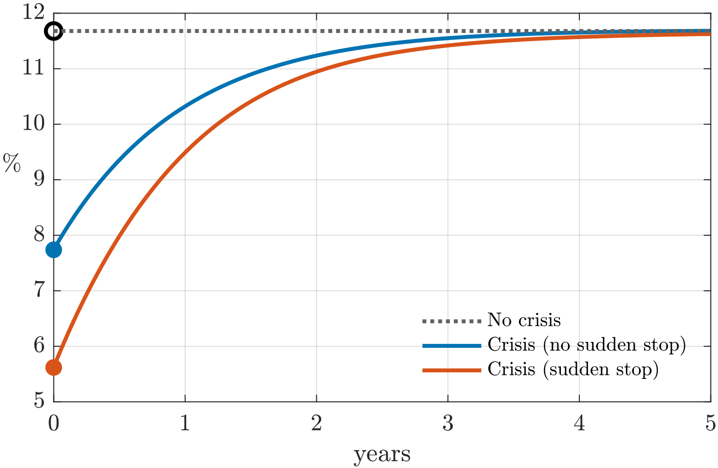

3. Theoretical results with perfect financial markets

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Funding program can

- consist of debt, equity, any hybrid instrument
- be implemented via (fairly priced) government-backed credit guarantees
- be unconditional or conditional on leverage

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More issuance $\implies$ distribution $\hat{f}_t(x)$ shifts right $\implies$ lower investment

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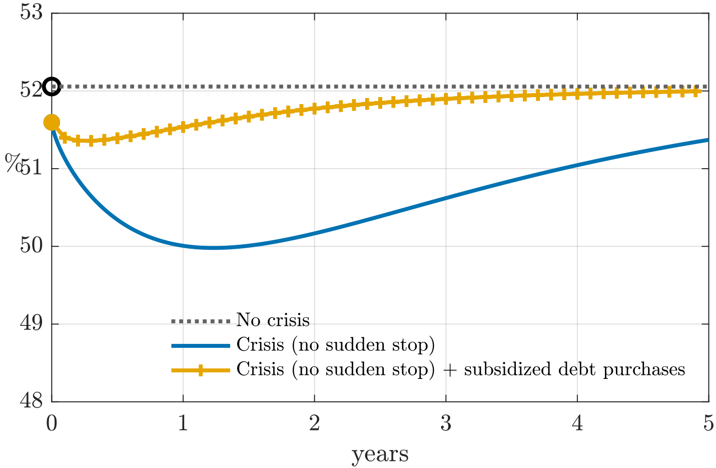

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- Over time, corporate leverage increases, pushing down investment.

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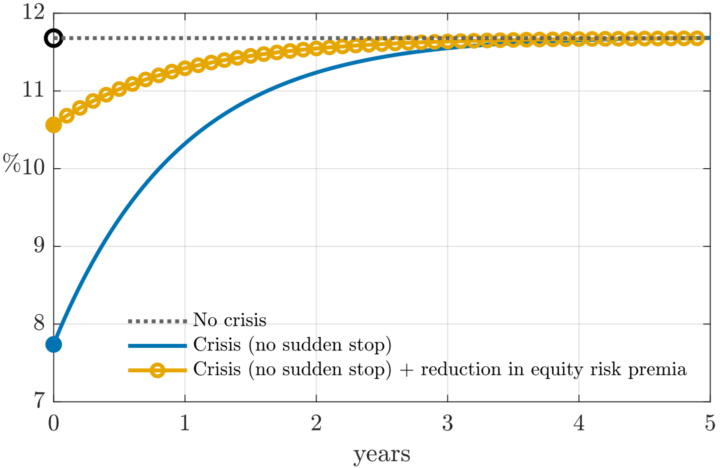

4. Disruption in financial markets

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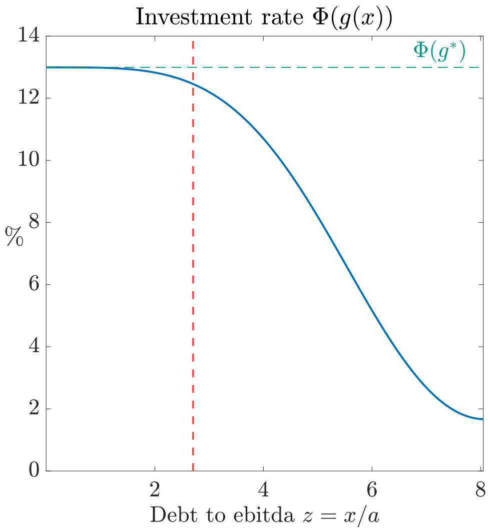
- Credit market intervention are uncontroversially beneficial for expected future aggregate capital and output, even if they increase corporate leverage (relative to laissez-faire)

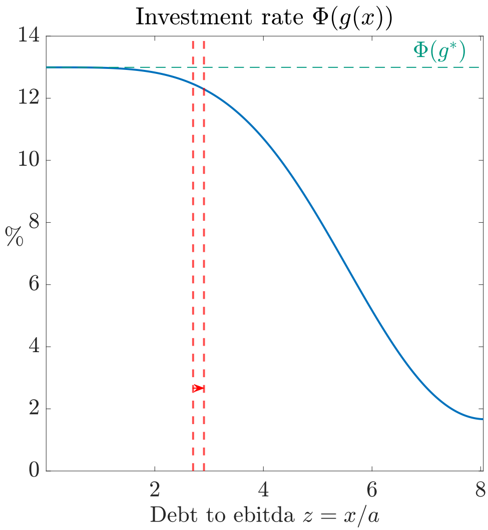
Why are debt overhang effects of credit market interventions so small?



BCP loans move the debt/ebitda ratio:

$$z_t = \frac{b_t}{ak_t} \approx 2.20 \quad \rightarrow \quad z_t' = \frac{b_t + \overbrace{(1/\chi)\,(a - \underline{a})\,k_t}^{\text{amount borrowed}}}{ak_t} = z_t + \frac{1}{\chi}\left(1 - \frac{\underline{a}}{a}\right) = z_t + 0.25 \approx 2.45$$

Why are debt overhang effects of credit market interventions so small?



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Small move, in a region where the slope of investment is not steep.

Other interventions

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  - In that case, firms with leverage $x < x^*(d_g)$ do not take loan
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- Debt forbearance program
  - Similar to what US implemented in connection with agency mortgages
  - Difficult to implement in practice given required lender compensation

Key take-aways

Conclusion

Fed + Treasury providing credit to firms during the crisis.

1. What will the ***net*** economic impact of these programs be?

2. Would there be large gains to doing things differently?

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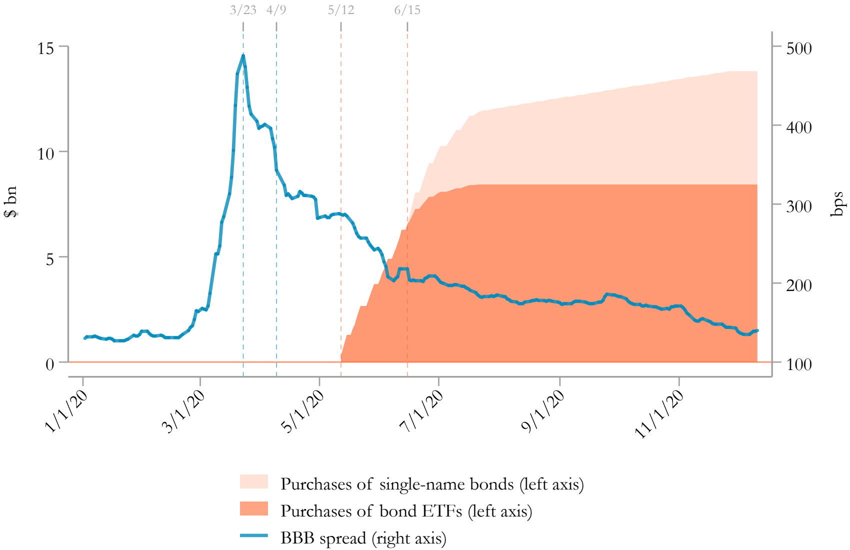
   Weak debt overhang effects during the recovery

2. Would there be large gains to doing things differently?

   Not really! Unless $\partial g / \partial x$ is much larger ...

More

Secondary market corporate credit facilities' ("SMCCF") purchases



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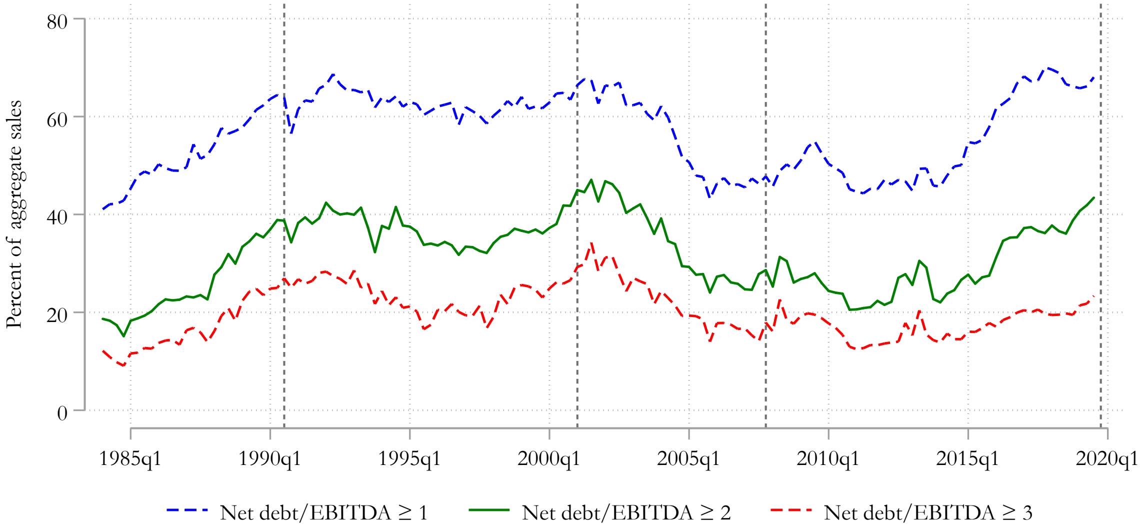
Leverage in the run-up to the crisis: net debt



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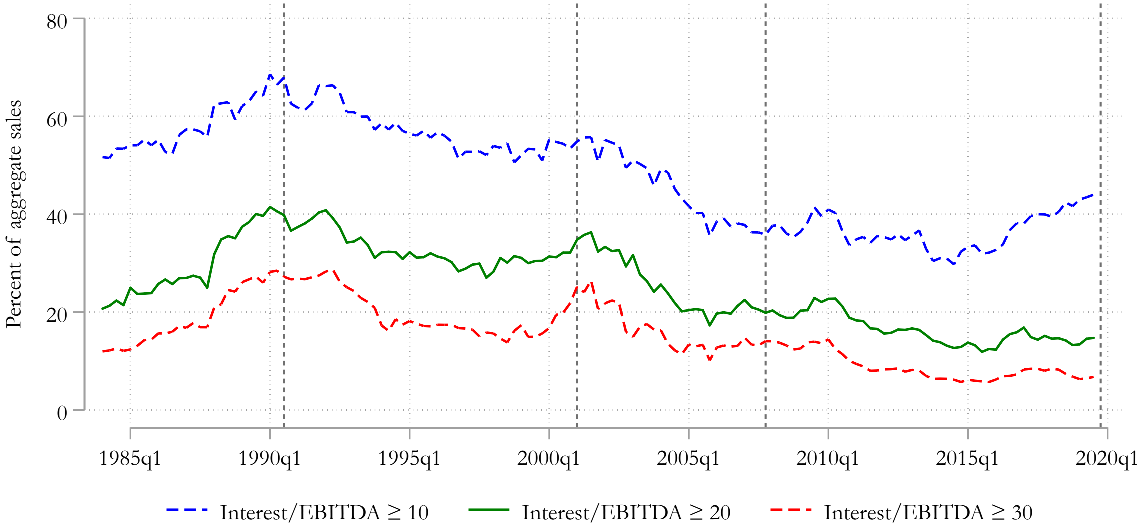
Interest coverage ratios in the run-up to the crisis



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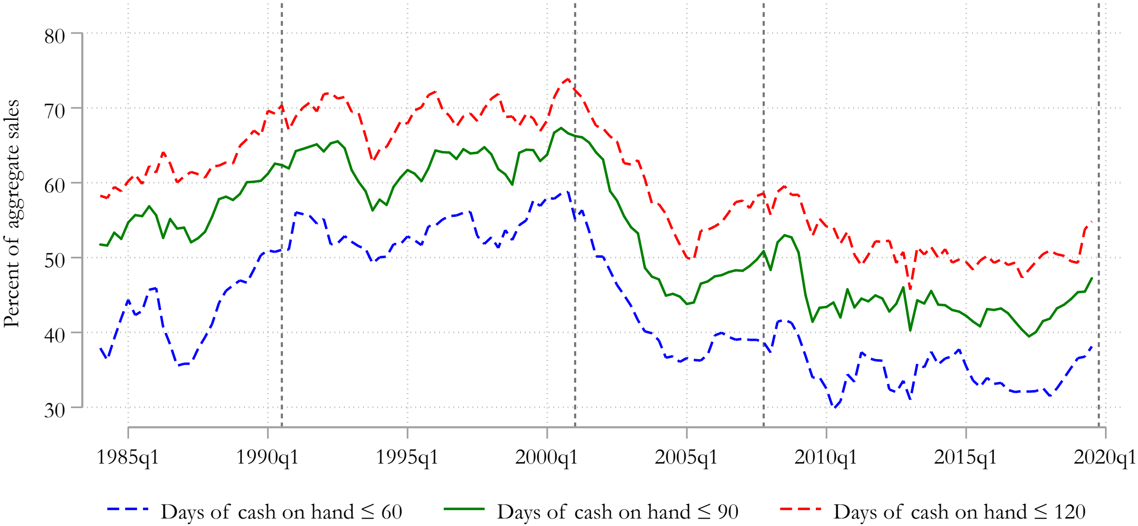
Days of cash on hand in the run-up to the crisis



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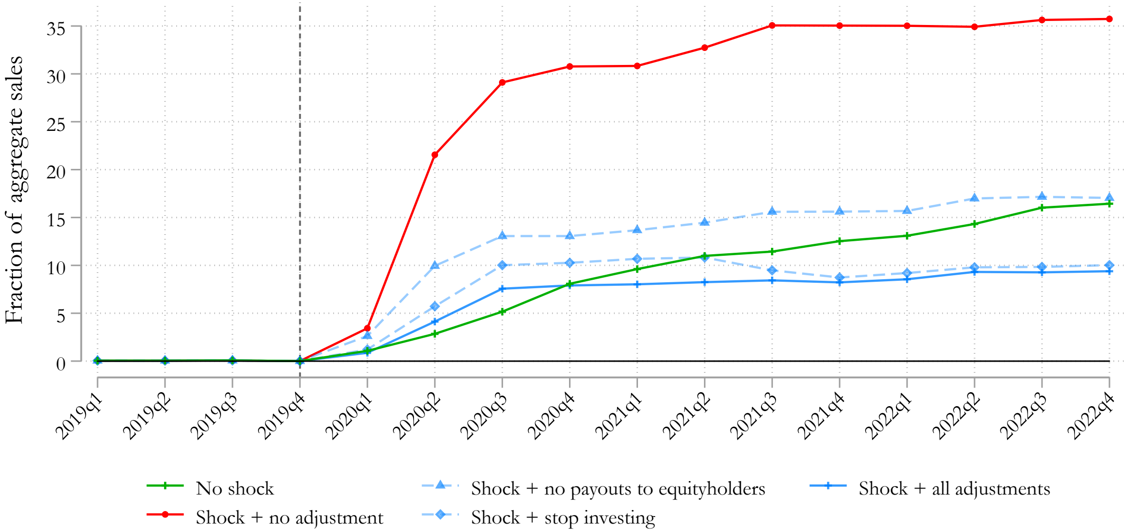
Projected firms with zero cash



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Model of the firm

- Technology with adjustment costs: $\Phi(g_t)\,k_t dt$ spent allows capital to grow by $g_t k_t dt$

$$dk_t^{(j)} = k_{t-}^{(j)}\left[g_{t-}^{(j)}dt + \sigma\left(\rho dZ_t + \sqrt{1-\rho^2}dZ_t^{(j)}\right) + (\alpha_k - 1)\,dN_t^{(j)}\right]$$

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- Shareholder problem and debt valuation

$$E(k_t, b_t) = \sup_{g,\iota,\boldsymbol{\tau}} \mathbb{E}^{\mathbb{Q}_e} \left[\int_t^{+\infty} e^{-r_e(s-t)} \pi_s k_s ds \right] \qquad D(k_t, b_t) = \mathbb{E}^{\mathbb{Q}_d} \left[\int_t^{+\infty} e^{-(r_d+m)(s-t)} \alpha_b^{N_t} (\kappa + m) ds \right]$$

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Mathematical derivations

- HJB equation for shareholders

$$0 = \max_{\iota, g} \Big[-(r-g)e(x) + a - \Phi(g) - (\kappa + m)x + \iota d(x) - \Theta(a - \kappa x)$$

$$+ [\iota - (g+m)x] e'(x) + \frac{\sigma^2}{2} x^2 e''(x) \Big]$$

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- Expected debt returns (R_d and $\tilde{R}_d$) and equity returns (R_e)

$$R_d(x) = r_d - \rho\nu_d\sigma\frac{xd'(x)}{d(x)}, \qquad \tilde{R}_d(x) = r_e - \rho\nu_e\sigma\frac{xd'(x)}{d(x)}, \qquad R_e(x) = r_e - \rho\nu_e\sigma\left[1 - \frac{xe'(x)}{e(x)}\right]$$

GMM (exactly identified case)

Parameter	Description	Point estimate	Standard error	$[5, 95]$ normal CI
a	average product of capital	0.223	0.001	[0.231, 0.235]
σ	volatility of idiosyncratic shock	0.236	0.010	[0.219, 0.253]
γ	curvature of capital adjustment cost	2.550	0.643	[1.493, 3.608]

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GMM (exactly identified case)

Moment	Description	Targeted?	Data	Model
$100 \times \hat{\Phi}$	average investment rate	✓	9.48	9.47
$\hat{z}$	average debt-to-ebitda	✓	2.71	2.71
$100 \times \frac{cov(\Phi(x), z(x))}{var(z(x))}$	slope of inv. w.r.t debt-to-ebitda	✓	−3.66	−3.66
$100 \times \kappa\hat{z}$	average (inverse) interest coverage ratio	✗	11.61	13.53
$100 \times \hat{\pi}$	average dividend issuance rate	✗	3.32	3.49
$100 \times \hat{\iota}$	average gross debt issuance rate	✗	10.21	7.38
$100 \times (\hat{\iota} - m\hat{x})$	average net debt issuance rate	✗	0.96	1.06
$var(z(x))$	variance of debt-to-ebitda	✗	3.08	0.90
$var(100 \times \Phi(x))$	variance of investment rate	✗	23.36	13.32
$100 \times \hat{F}(z(x) \leq 1)$	total asset share, debt-to-ebitda ≤ 1	✗	9.21	0.00
$100 \times \hat{F}(z(x) \leq 2)$	total asset share, debt-to-ebitda ≤ 2	✗	43.00	19.89
$100 \times \hat{F}(z(x) \leq 3)$	total asset share, debt-to-ebitda ≤ 3	✗	67.47	77.94

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The strength of the debt overhang channel

Average growth:

$$\text{Growth rate of all-equity firm} = 2.8\%$$
$$\text{Aggregate growth rate of } K_t = 0.9\%$$

Marginal effects:

$\partial(i/k)_t/\partial x_t$	$(i/k)_t =$ Gross investment	$(i/k)_t =$ Net investment
Model	-0.094	-0.106
Lang, Ofek, Stulz (1996)		-0.105
An, Denis, Denis (2006)		-0.086
Cai, Zhang (2011)	-0.038	
Wittry (2020)	-0.038	

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