Maturity Walls

Philip Coyle
Study Center Gerzensee

Aarhus Finance Forum

Motivation

- Maturity walls: a majority of debt scheduled to mature within short period (< 2 yrs)
    - Large source of rollover risk
    - Failure to rollover $\longrightarrow$ cut investment, fire workers, and default

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- Rating agencies think maturity walls are important for forecasting default

FitchRatings PEOPLE PRODUCT INSIGHTS

RATING ACTION COMMENTARY

Fitch Downgrades Antero Resources LT IDR to 'B'; Places Ratings on Rating Watch Negative

Thu 02 Apr, 2020 - 5:12 PM ET

Elevated Refinancing Risk: AR has a sizable large maturity wall due between 2021 and 2023 ($2.63 billion, starting with its 5.375% 2021 note, of which $953 million remains outstanding). The unsecured bond markets have remained closed to the company, even as select peers have tapped it during a brief January window opening. The collapse in prices since that time have made this situation more difficult.

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- Leave firms exposed when refinancing markets shut
  - Large payment comes due exactly when firm cannot roll it over or raise equity cheaply

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Research Questions

1. Why do firms hold maturity walls, and how do they impact borrowing and default risk?
2. How exposed are firms with maturity walls when credit markets freeze?

What I do in this paper

- Novel measure of repayment concentration: standard deviation of debt maturity dates
  - Mergent FISD (bond level data) + Compustat, 1995–2019
  - 48% of non-financial bond issuers have a maturity wall
  - Concentrated repayments $\longrightarrow \uparrow$ default risk & $\uparrow$ spreads, *beyond* leverage & avg. maturity
  - **Why choose one?** Large fixed costs to issue bonds (economies of scale in issue size)

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- Dynamic credit risk model: firms jointly pick debt level and repayment concentration
  - Trade-off: Fixed debt (convex equity) issuance costs $\longrightarrow$ concentrate (disperse) payments
  - Firms with low rollover risk concentrate & lenders price the exposure

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- Estimate via SMM, externally validate, & quantify
  - Walls $\uparrow$ spreads 36 bps (21%) & default rates 30 bps (25%), holding leverage fixed
  - Wall firms far less resilient to a credit market freeze; standard models miss up to 60%

Empirical Facts

Measuring repayment concentration

St. dev. of maturity dates: Low $\sigma_{Mat,t} \longrightarrow$ concentrated debt payments

$$\sigma_{Mat,t} = \sqrt{\sum_{m=1}^{M} \overbrace{s_{m,t}}^{\text{share due in } m} \left(m - \underbrace{\mu_{Mat,t}}_{\text{avg. mat.}} \right)^2}$$

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Why not # bonds or a Herfindahl index? σ_{Mat} captures payment size *and* spacing

- Firm A: \$100M due yr 1, \$100M due yr 2 $\sigma_{Mat} = 0.5, \quad \text{HHI} = 0.5$
- Firm B: \$100M due yr 1, \$100M due yr 20 $\sigma_{Mat} = 9.5, \quad \text{HHI} = 0.5$

Same bond count, same HHI — very different rollover profiles

σ_{Mat} vs. HHI

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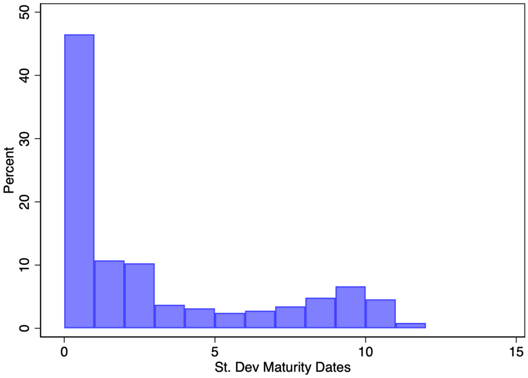
Maturity wall: $\geq 2/3$ of bond principal due within a 2-year window

- 12–24 month horizon over which rating agencies assess refinancing risk
- Binary cutoff on the continuous σ_{Mat}; results flat across thresholds Robustness

Fact 1: 48% of bond issuers have a maturity wall



Mean 3.0 yrs Median 1.5 yrs

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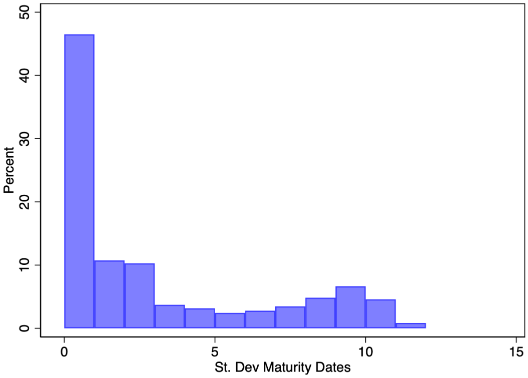

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	1 bond	2 bonds	3–5	6+
Firm-years	6,018	3,012	4,142	4,217
Share w/ wall	1.00	0.43	0.20	0.03
Share of all walls	0.73	0.16	0.10	0.01

- $\sim$3/4 of walls are single-bond firms ($\sigma_{Mat} = 0$ mechanically)
- Other 1/4 returned to market bunched principal anyway

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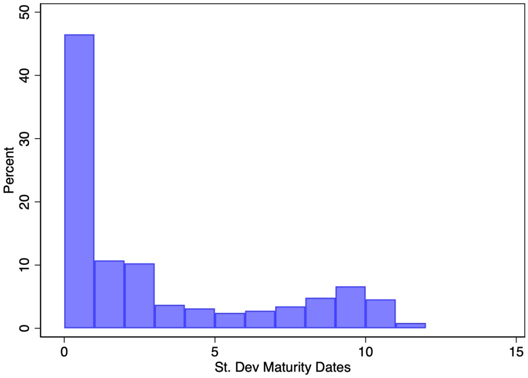

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Maturity walls appear to be a choice not a constraint

- Walls survive among firms that *can* disperse (large, IG, old) More
- Firms don't hoard cash, cut investment, or buyback early as a large payment approaches More

Fact 2: Concentrated repayments associated w/ higher credit risk

	(1) Prob Default (pps)	(2) Yield (pps)	(3) Coupon (bps)	(4) Credit Spread (bps)
Leverage	5.784***	0.579***	65.881***	50.792***
	(0.422)	(0.099)	(7.661)	(8.061)
Avg. Bond Maturity	-0.286	0.053	0.438	4.558
	(0.254)	(0.053)	(4.895)	(4.911)
St. Dev of Maturity Dates$_{t-1}$	-0.454*	-0.151***	-13.248***	-14.311***
	(0.249)	(0.052)	(5.096)	(4.788)
Observations	6367	1374	1910	1216
R^2	0.241	0.769	0.764	0.692
Controls	Firm	Firm & Bond	Firm & Bond	Firm & Bond
Fixed Effects	Ind & Year	Ind & Year	Ind & Year	Ind & Year

Takeaway:

- $+1$ s.d. dispersion $\longrightarrow \downarrow$ 0.45 pps default prob. & $\downarrow$ 14 bps spread
- Holds *beyond* leverage and average maturity — it is the spacing that is priced
- Also associates w/ realized default/failure: wall $\longrightarrow +2.8$–3.9 pps over 3–5 yrs

More

Fact 3: There are economies of scale in bond issuance

Underwriter fees: cost to *issue*

- Two services, both fixed per issue:
    - Screening & certification
    - Demand discovery & placement

- Attach to the *bond*, not the dollars

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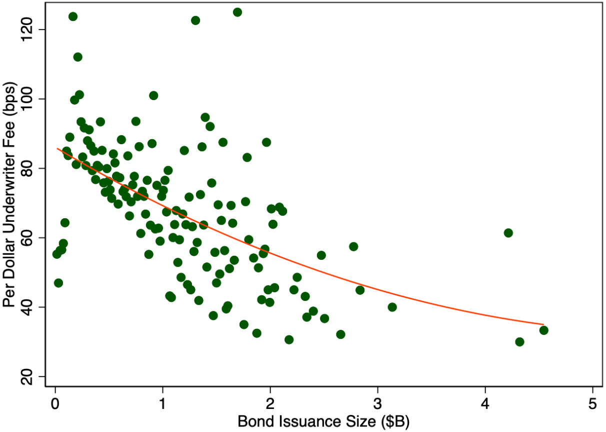
- Underwriter spread (fee / size):
  - $<$ \$1B issue: 85 bps
  - $>$ \$3B issue: 40 bps
- Residualized: still a 25 bps gap



Takeaway: economies of scale, consistent with large fixed costs

Shelf reg. Issuance freq Robustness

Model

Model Environment

Standard credit-risk model, plus one new choice: repayment concentration

- Continuum of risk neutral firms maximize equity value
  - Persistent revenue shocks: $y \sim G(y|y_{-1})$
  - Default, continue, or re-enter with no debt after default

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- Debt is priced by risk neutral lenders
  - Firm-specific prices $q_D(b'_D, b'_C, y)$, $q_C(b'_D, b'_C, y)$
  - Zero-profit condition reflects default risk and recovery χ

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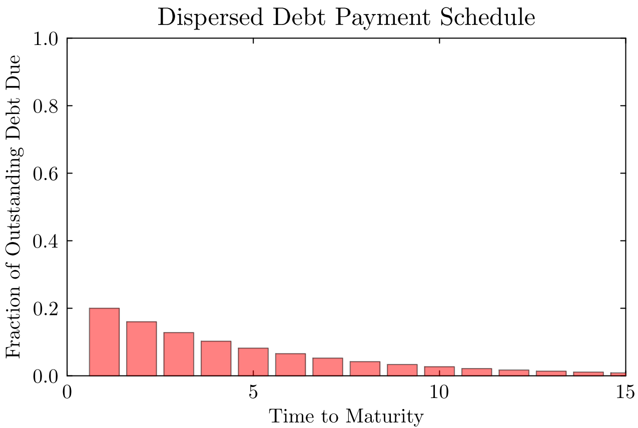
- What breaks Modigliani–Miller?
  - Tax benefit of debt
  - Convex equity issuance cost α
  - Fixed debt issuance cost c_I
  - Limited liability, liquidation costs

Modeling dispersed and concentrated debt payments



Dispersed Debt Payments (b_D):

- Exponentially maturing coupon bonds with constant amortization rate λ
- Each period: λb_D units of required principal repayments from maturing bonds

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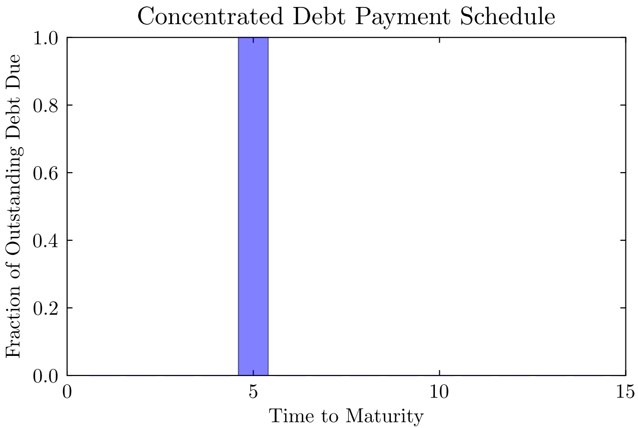
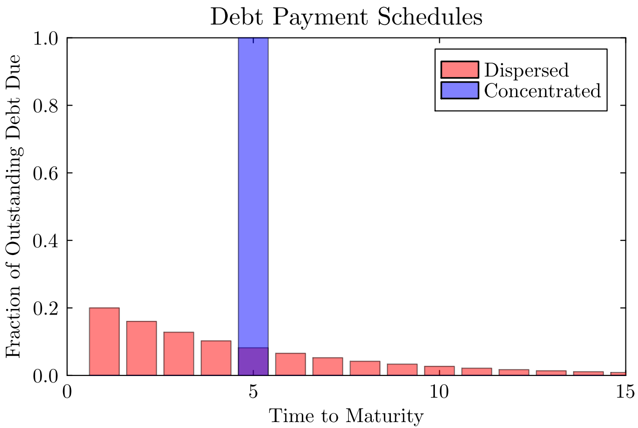


Concentrated Debt Payment (b_C):

- Bond pays a coupon until random expiration $(\eta = 1)$ which arrives w/ probability λ
- When bond expires $(\eta = 1)$, firm must fully repay b_C

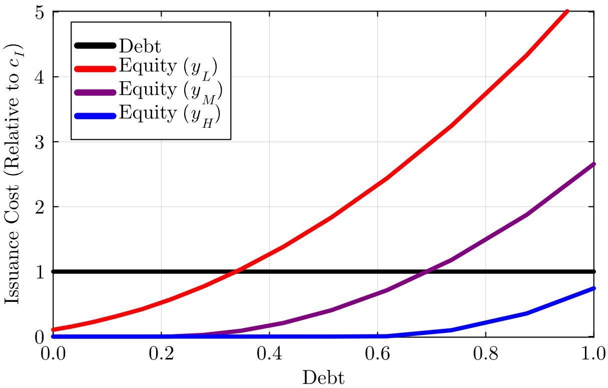
Modeling dispersed and concentrated debt payments



Remarks:

- Firm required to pay $\overbrace{\tilde{c}(b_D + b_C)}^{\text{Coupon}} + \overbrace{\lambda b_D + \eta b_C}^{\text{Principal}}$ to avoid default
- Bonds are identical in terms of (i) payment amount and (ii) average maturity $(1/\lambda)$
- Differ only in terms of schedule of payments

Which firms choose a maturity wall?



- Debt issuance cost is flat
  It is a fixed cost c_I More

- Equity injection cost rises convexly in debt
  Is higher at low income More

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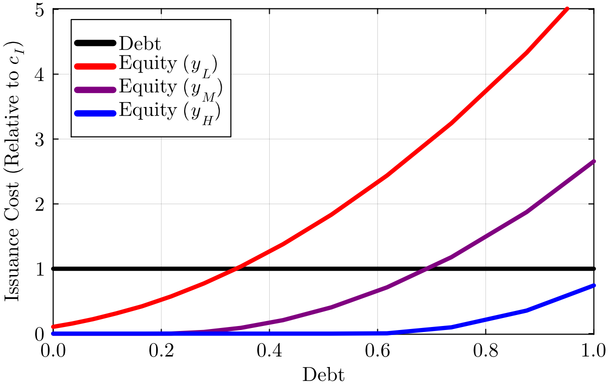

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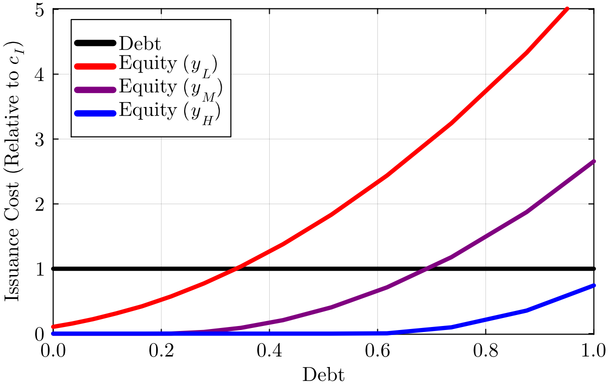

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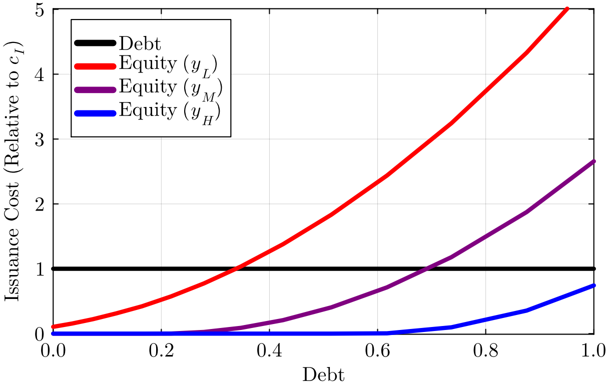

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Takeaway: low-leverage, high-income firms hold walls

- Concentration is chosen by low rollover-risk firms, not distressed ones

Model fit and external validation

Targeted (6 moments, 5 parameters): default rate, avg. & s.d. debt/income, avg. spread, avg. σ_{Mat}, avg. underwriter fee

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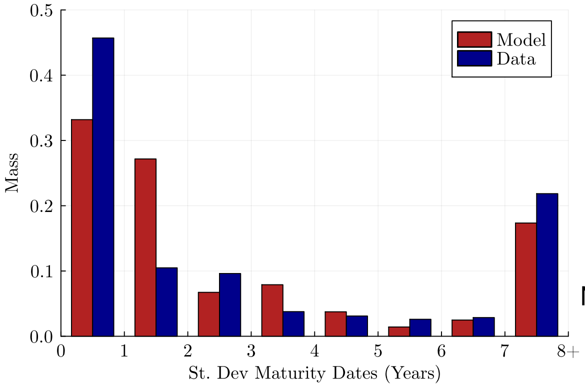

Distribution of σ_{Mat} (untargeted)

Untargeted: Concentration is priced

	Credit Spread (bps)	
	Data	Model
Leverage	29.7	72.8
Sales	-36.9	-46.6
σ_{Mat}	-12.4	-19.8

Model matches:

- Prices repayment concentration
- Leverage distribution
- Persistence of the dispersion choice

Estimation Leverage fit More validation

Quantitative Exercises

1. How much do maturity walls contribute to credit risk?
2. Are firms less risky if issuing debt is cheaper?
3. How exposed are wall firms when credit markets freeze?

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In equilibrium:

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Counterfactual economy:

i firm's total leverage decision is held constant at baseline values
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	bps	%	Baseline Value
Δ Default Rate	30.0	25.0	1.2%
Δ Credit Spread	35.9	21.1	1.7%

A wall raises risk *given* leverage — even though it is comparatively safe firms that adopt one

Are firms less risky if issuing debt is cheaper?

Underwriter fees (c_l) are a key input into the firm's wall choice

- Manconi, Neretina, Renneboog (2018): bond underwriters have market power
- Rents are 16% (12.2 bps) of the fee on average, up to 25% (19.4 bps)
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- Level: dispersed debt is safer, so firms lever up $\longrightarrow \uparrow$ default risk & spreads

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	Baseline	$0.84\, c_I$	$0.75\, c_I$
Dispersion σ_{Mat}	2.62 yrs	4.85 yrs	5.62 yrs
Book leverage	20.72%	38.03%	42.48%
Average credit spread	1.69%	2.64%	2.88%
Firm default rate	1.19%	1.96%	2.15%

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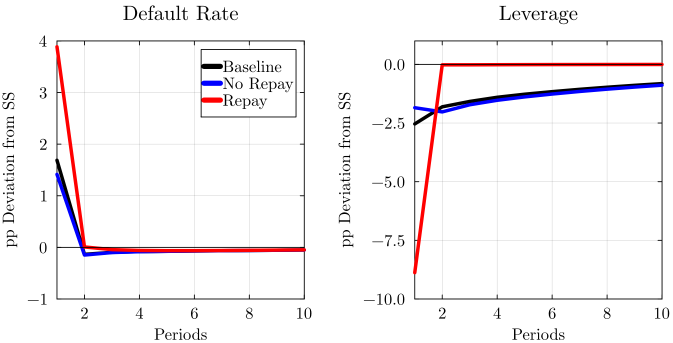
The level effect dominates: cheaper issuance makes firms riskier, not safer

Leverage response? Firm value

How exposed are wall firms when markets freeze?

Credit market freeze

- Unanticipated, one-period shock
    i. debt market shuts, $q_D = q_C = 0$
    ii. equity issuance cost rises
- Severity matched to 2008 defaults
- Wall may fall due when markets shut



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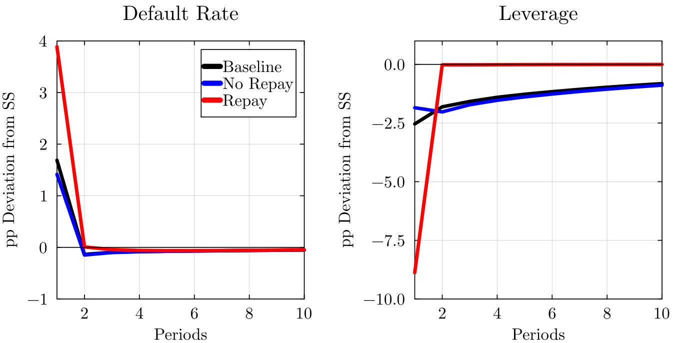

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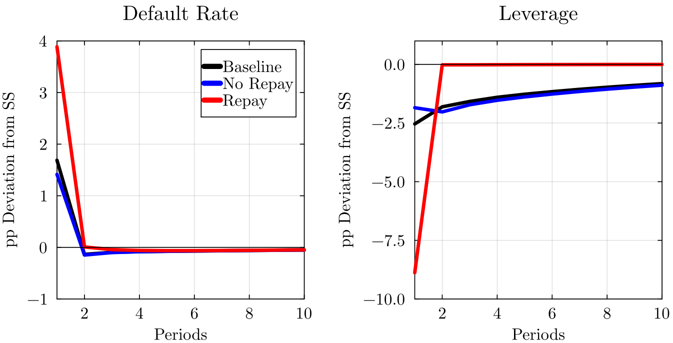

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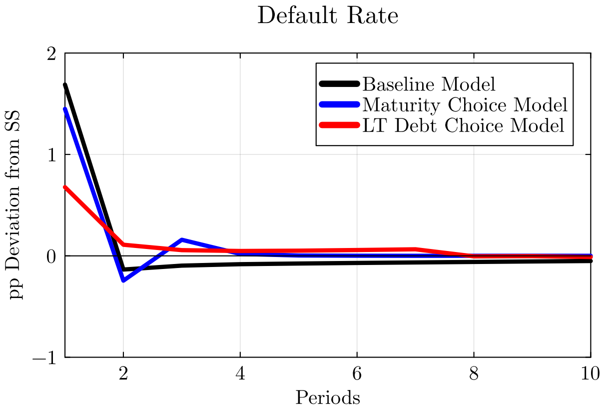
- Rolling over wall at the freeze: default $\uparrow$ 3.9 pp vs. 1.4 pp

What do standard credit-risk models miss?

- Standard models cannot capture a wall: payment concentrated *and* distant

- LT debt only: all dispersed
  (DeMarzo & He, 2021)
  $\longrightarrow$ misses 60% (100 bps)

- Maturity choice: short-dated only
  (He & Milbradt, 2016)
  $\longrightarrow$ misses 14% (25 bps)



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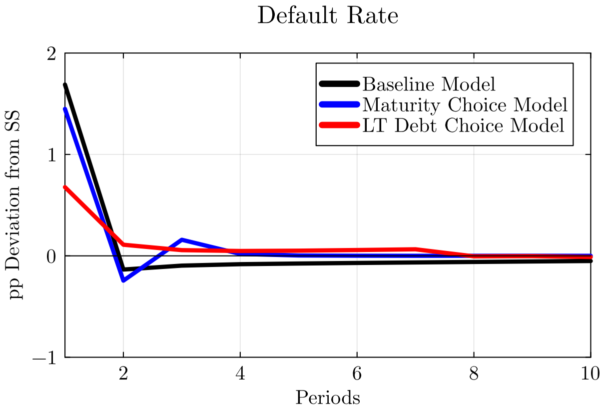

Beyond the freeze: neither can price repayment concentration

- Neither generates the 36 bps premium at *any* parameters

Conclusion

Repayment concentration is a distinct dimension of debt structure

- 48% of bond issuers have a wall, and they choose it
- Key trade-off: fixed issuance cost v. rollover risk

1. How much do maturity walls matter for firm credit risk?
   - Holding leverage fixed: $\uparrow$ default rates 30 bps (25%) & spreads 36 bps (21%)
2. Are firms less risky if it is cheaper to issue debt?
   - No — firms disperse *and* lever up; default $\uparrow$ 0.8–1.0 pp, spreads $\uparrow$ 0.9–1.2 pp
3. How exposed are wall firms when credit markets freeze?
   - Rolling a wall at the freeze $\longrightarrow$ default $\uparrow$ 3.9 pp vs 1.4 pp
   - Standard debt-structure models understate this exposure by 14–60%

Which firms are holding maturity walls?

	St. Dev of Maturity Dates		
	(1)	(2)	(3)
Leverage	0.369***	0.304***	0.300***
	(0.069)	(0.065)	(0.069)
Size	1.391***	1.219***	1.210***
	(0.111)	(0.219)	(0.219)
Age	0.196***	0.444**	0.395**
	(0.066)	(0.180)	(0.185)
Q	0.139*	-0.096	-0.198*
	(0.077)	(0.089)	(0.101)
Profit	0.124**	0.040	0.096*
	(0.054)	(0.045)	(0.052)
Cash	0.095*	0.021	0.022
	(0.057)	(0.055)	(0.058)
Fraction of Bond Debt	0.309***	0.118**	0.157***
	(0.051)	(0.046)	(0.051)
No. Bonds Outstanding	0.717***	0.701***	0.773***
	(0.121)	(0.117)	(0.127)
Interest Coverage Ratio	0.018	-0.272*	-0.219
	(0.148)	(0.156)	(0.151)
Avg. Bond Maturity	1.996***	1.161***	1.084***
	(0.077)	(0.093)	(0.103)
Observations	6477	6693	6249
R^2	0.714	0.862	0.880
Fixed Effects	Ind & Yr	Firm & Yr	Firm & Ind$\times$Yr

Who disperses their repayments?

- $\uparrow$ **Size**: $+1$ s.d. $\rightarrow$ $+1.2$ yrs
- $\uparrow$ **Age**: $+1$ s.d. $\rightarrow$ $+0.4$ yrs
- $\uparrow$ **Leverage**: $+1$ s.d. $\rightarrow$ $+0.3$ yrs

So small, young, less-levered firms hold walls

- Constraint or choice?

See

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Concentration also predicts realized default and firm failure

Merton PD is a deterministic function of leverage and equity vol — does it show up in realized outcomes? (bond default in FISD, or forced delisting in CRSP)

Horizon	Maturity wall	σ_{Mat} $(+1$ s.d.)
Current year	~ 0	~ 0
Next 3–5 years	$+2.8$ to $+3.9$ pps	-0.7 to -1.5 pps
Base rate	5–8%	

Takeaway:

- No association *within* the current year — as expected of a measure of future rollover exposure
- Association grows at longer horizons
- Same result in two independent data sources, not just the model-implied measure

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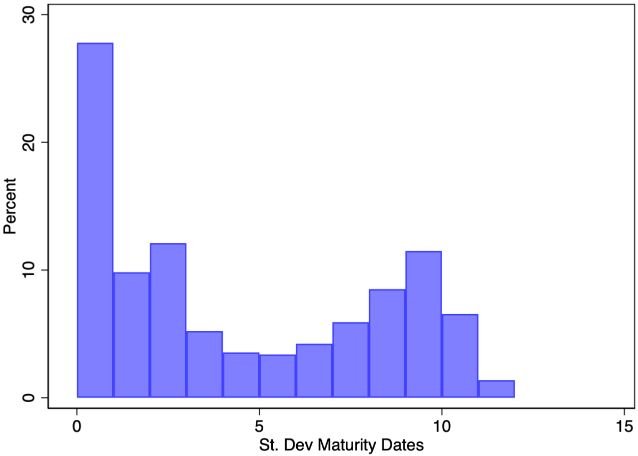
Firms concentrate debt maturity dates (weighted by firm age)



Average: 3.1 years   Median: 4.5 years

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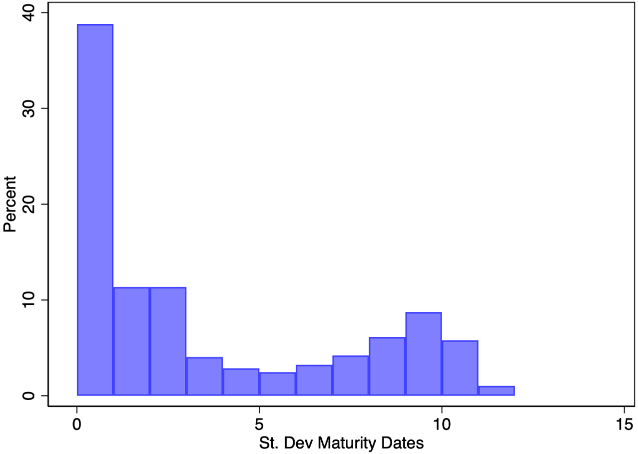
Firms concentrate debt maturity dates (weighted by firm size)



Average: 3.8 years   Median: 2.7 years

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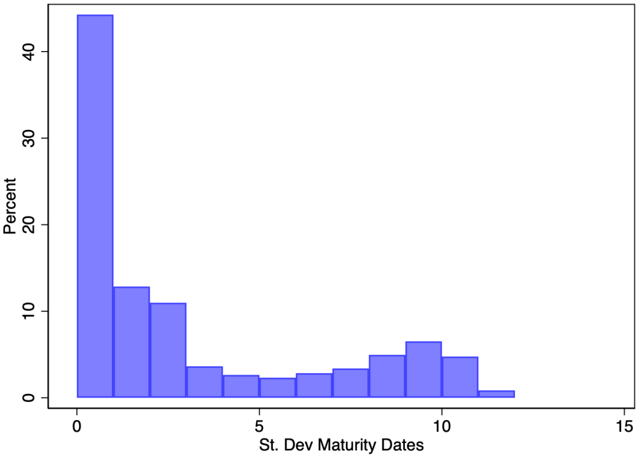
Firms concentrate debt maturity dates (weighted by firm leverage)



Average: 3.3 years Median: 1.8 years

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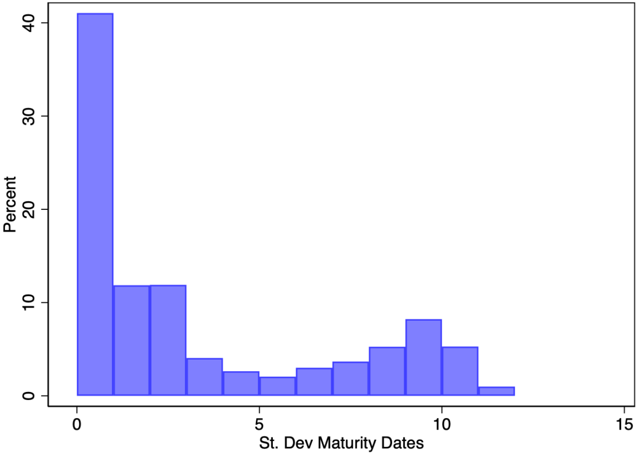
Firms concentrate debt maturity dates (weighted by bond debt pct)



Average: 3.4 years   Median: 1.9 years

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Firms infrequently issue corporate bonds

	Mean	Std. Dev
Bond Issuance Frequency	0.146	0.353
Number of Bonds Issued	1.709	1.107
Time Since Last Issue (Years)	3.326	2.137
Bond Issuance Size ($M)	448.130	362.719
Bond Amount Outstanding ($M)	1,474.353	2,737.262
Bond Issuance to Amount Outstanding	0.432	0.334
Bond Issuance to Legacy Bond Debt	1.082	8.124
Number of Bonds Issued Last 5 Years	1.181	2.293
Number of Bonds Issued Last 10 Years	2.073	3.637
Number of Bonds Issued Last 20 Years	3.082	5.143

Firms issue bonds infrequently:

- 15% of obs feature a bond issuance
- Avg bonds issued in last 10 years is 2.1

Firms issue large amounts

- New issuance is 43% of amount outstanding
- ≈110% of maturing legacy debt: largely a rollover

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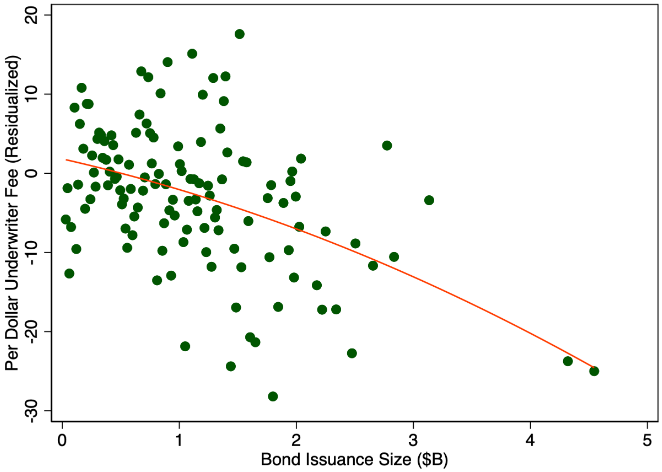
Economies of scale robust to firm and bond controls



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Do firms behave differently before large repayment dates?

	Cash	Investment	$\mathbf{1}_{\text{Buyback}}$
s_1	-0.002	0.007	-0.241***
	(0.007)	(0.008)	(0.052)
s_2	-0.003	0.002	-0.228***
	(0.008)	(0.008)	(0.051)
s_3	-0.002	0.003	-0.217***
	(0.007)	(0.008)	(0.049)
s_4	-0.006	0.002	-0.253***
	(0.007)	(0.008)	(0.048)
s_5	-0.007	0.002	-0.222***
	(0.006)	(0.007)	(0.048)
Fixed Effects	Firm & Year	Firm & Year	Firm & Year
Additional Controls	Yes	Yes	Yes

Note: s_m is share of long-term debt due in m years

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How has the literature modeled long-term debt?

Modeling long-term debt with exponentially declining maturity structure:

- Hatchondo and Martinez (JIR, 2009); Arellano and Ramanarayanan (JPE, 2012); Aguiar et. al (ECMA, 2019)
- He and Xiong (JF, 2012); Dangl & Zechner (RFS, 2021); DeMarzo & He (JF, 2021); Jungherr and Schott (RED, 2021); Jungherr et. al (R&R ReSTUD, 2023)

Modeling long-term debt randomly maturing "lumpy" bond:

- Geelen (R&R JF, 2019); Gomes and Schmid (JF, 2021); Chen et al (JFE, 2021)

Closest papers   Back to main slides

Closest papers, and how I differ

- **Choi, Hackbarth, Zechner (2018, 2021)**
  - Establish dispersion as a capital-structure margin
  - I measure *spacing*, not just shares
  - I study *consequences*, not determinants
- **Huang, Oehmke, Zhong (2019)**
  - Optimal schedule from a private-information friction
  - Mine is a fixed issuance cost, disciplined by estimation
- **Chaderina (2023)**
  - Endogenous dispersion, but near-term and distress-driven
  - My wall is long-term debt at a *distant* horizon

Back

(Continuing) Firm's Problem

$$V(\mathcal{S}) = \max_{\{b'_D, b'_C\}} \left\{ \psi(d) + \overbrace{\varepsilon(b'_D, b'_C)}^{\text{Manager Pref. Shock}} + \beta \mathop{\mathbb{E}}_{\{y', \eta'\}} \max \left\{ V(\mathcal{S}'), 0 \right\} \right\}$$

Subject to:

$$d = \overbrace{(y - \underbrace{c_F}_{\text{Production Cost}} - \tilde{c}(b_D + b_C))(1 - \tau)}^{\text{After tax income}} - \overbrace{(\lambda b_D + \eta b_C)}^{\text{Debt repaid}}$$

$$+ \underbrace{q_D(b'_D, b'_C, y) I_D}_{\substack{\text{Dispersed debt} \\ \text{issuance revenue}}} + \underbrace{q_C(b'_D, b'_C, y) I_C}_{\substack{\text{Concentrated debt} \\ \text{issuance revenue}}} - \underbrace{c_I(\mathbb{1}_{I_D > 0} + \mathbb{1}_{I_C > 0})}_{\text{Debt issuance cost}}$$

$$I_D = b'_D - (1 - \lambda) b_D$$
$$I_C = b'_C - (1 - \eta) b_C$$

$$\psi(d) = \begin{cases} d & \text{if } d \geq 0 \\ d - \underbrace{\alpha d^2}_{\text{Eq. issuance Cost}} & \text{if } d < 0 \end{cases}$$

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Lender's Problem

Debt is priced by rep lender making zero-profits in expectation

- $\delta(\mathcal{S}')$: default decision in state $\mathcal{S}' \equiv (b'_D, b'_C, y', \eta')$
- $\mathcal{R}(b_D, b_C, y) = \min\left[1, \chi \tilde{V}(y)/(b_D + b_C)\right]$: lender's recovery value in default

Price of unit of dispersed debt

$$q_D(b'_D, b'_C, y) = \beta \underset{\{y',\eta'\}}{\mathbb{E}} \left\{ (1 - \delta(\mathcal{S}')) \Big(\overbrace{\tilde{c} + \lambda}^{\text{Payment tomorrow}} + \overbrace{(1-\lambda) q_D(b''_D, b''_C, y')}^{\text{Expected future revenue to lender}} \Big) + \delta(\mathcal{S}') \mathcal{R}(b'_D, b'_C, y') \right\}$$

Price of unit of concentrated debt

$$q_C(b'_D, b'_C, y) = \beta \underset{\{y',\eta'\}}{\mathbb{E}} \left\{ (1 - \delta(\mathcal{S}')) \Big(\overbrace{\tilde{c} + \eta}^{\text{Payment tomorrow}} + \overbrace{(1-\eta) q_C(b''_D, b''_C, y')}^{\text{Expected future revenue to lender}} \Big) + \delta(\mathcal{S}') \mathcal{R}(b'_D, b'_C, y') \right\}$$

where $Pr(\eta = 1) = \lambda$

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Equilibrium Definition

A recursive Markov equilibrium is a set of value and policy functions $\{V^*, b_D^*, b_C^*\}$ and debt prices $\{q_D^*, q_C^*\}$ such that:

1. Given prices q_D^* and q_C^*, firms optimize yielding V^*, b_D^*, and b_C^*
2. The default decision is consistent with firm decision rules
3. Debt prices q_D^* and q_C^* are such that the representative lender expects to earn zero profits
4. Stationary distribution of firms determined by firm decision rules and law of motion for y and η
    - Mass of defaulting firms are replaced with an equal mass of firms with $b_D = 0$, $b_C = 0$, $\eta = 1$ and $y \sim \bar{G}$

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Mapping the model to the data

Model is estimated on annual FISD & Compustat data from 1995 - 2019

- Parameters divided into externally calibrated and internally estimated

- Externally calibrated parameters are chosen outside model
  - Estimate income process to capture underlying asset value fluctuations
  - Income is mapped to annual sales data
  - $log(y') = \rho_y log(y) + \sigma_y \varepsilon_y, \quad \varepsilon_y \sim \mathcal{N}(0,1)$
  - Average maturity $1/\lambda$ is matched to average maturity of corp. bonds

- Internally estimated parameters are jointly estimated via SMM
  - Match empirical moments important for debt issuance, rollover, and concentration
  - Construct model equivalent St. Dev of Debt Maturity Dates

Mapping b_D & b_C to σ_{Mat}

Model Estimation

Parameter	Description	Value	SE	Target/Reference	Data	Model
Externally Calibrated						
β	Discount factor	0.960	–	4% Annual Risk Free Rate	–	–
$\tilde{c}$	Per-period coupon payment	$1/\beta - 1$	–	Eqm price of riskless debt is 1	–	–
τ	Corporate tax rate	0.300	–	Hennessy & Whited (2007)	–	–
ρ_y	Persistence: income shock	0.660	–	Auto-correlation of log sales	0.66	0.66
σ_y	St. dev: income shock	0.310	–	Log sales volatility	0.31	0.31
$1/\lambda$	Average Maturity of debt	8.300	–	Avg. debt maturity	8.30	8.30
Internally Estimated						
c_f	Fixed cost of production	0.967	0.244	Default rate (%)	1.13	1.20
α	Equity issuance cost	0.011	0.002	Avg. debt to income	2.22	2.12
σ_ε	St. dev: pref. shock	0.001	0.000	St. dev debt to income	5.36	5.34
χ	Lender recovery fraction	0.093	0.040	Avg. credit spread	1.87	1.70
c_l	Fixed debt issuance cost	0.003	0.001	Avg. dispersion maturity dates	2.61	2.62
				Avg. underwriter fee (%)	0.79	0.75

Model fit: Leverage Distribution   Model fit: σ_{Mat} Distribution   Model fit: Underwriter Fee Distribution   Back to main slides

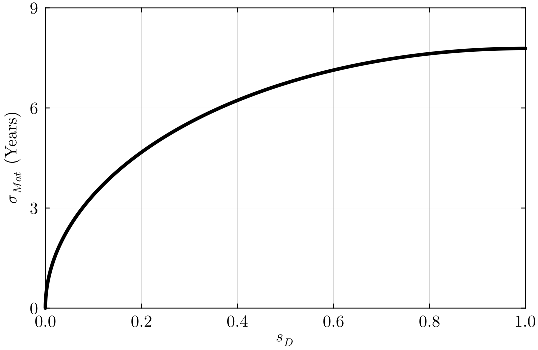
Constructing σ_{Mat} in the model

Let

$$s_D = \frac{b_D}{b_D + b_C}$$

The mapping from s_D to σ_{Mat} is

$$\sigma_{Mat} = \frac{\sqrt{(1-\lambda)(2s_D - s_D^2)}}{\lambda}$$



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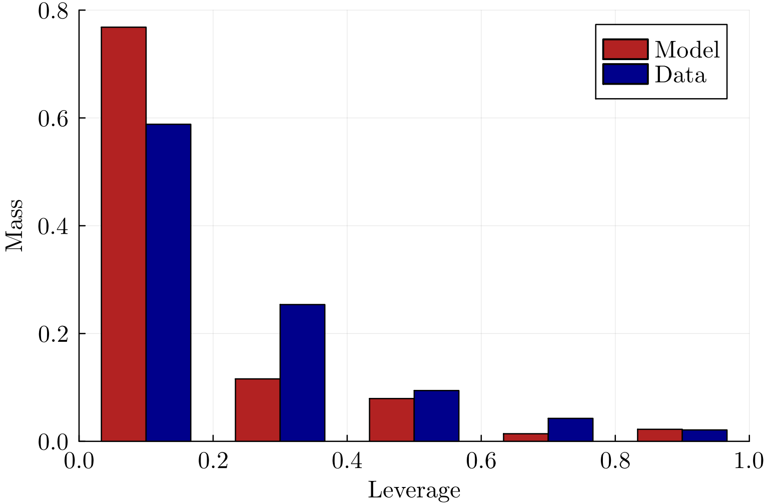
Model Fit: Market Leverage Distribution



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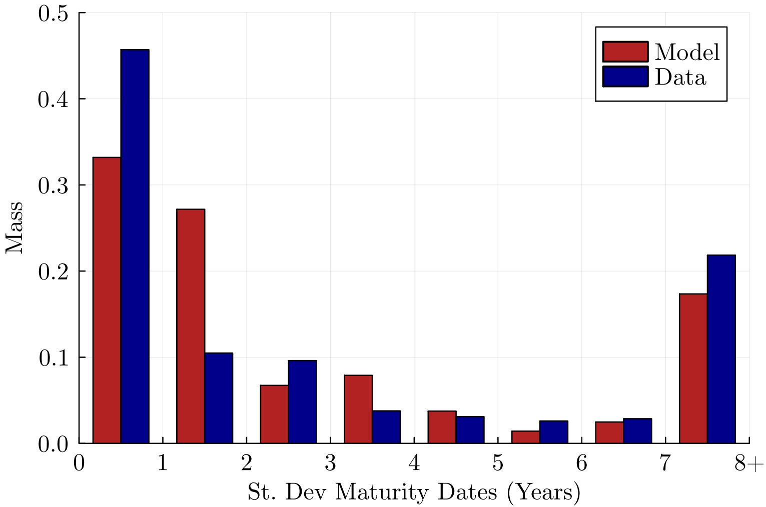
Model Fit: St. Dev of Maturity Dates Distribution



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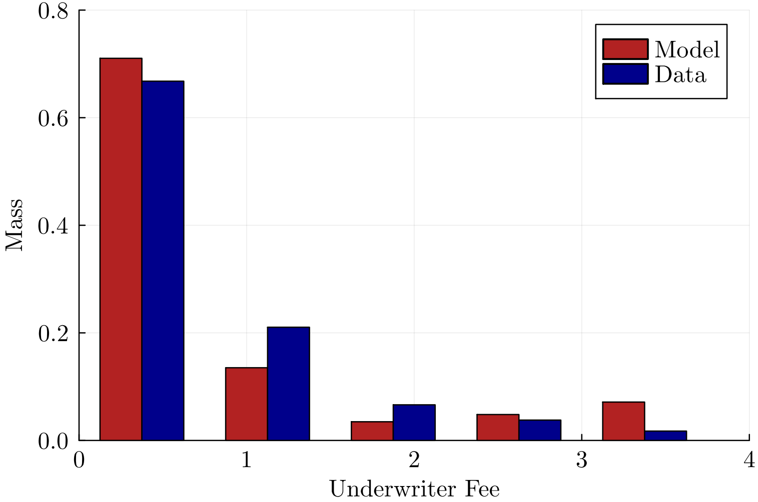
Model Fit: Underwriter Fee Distribution



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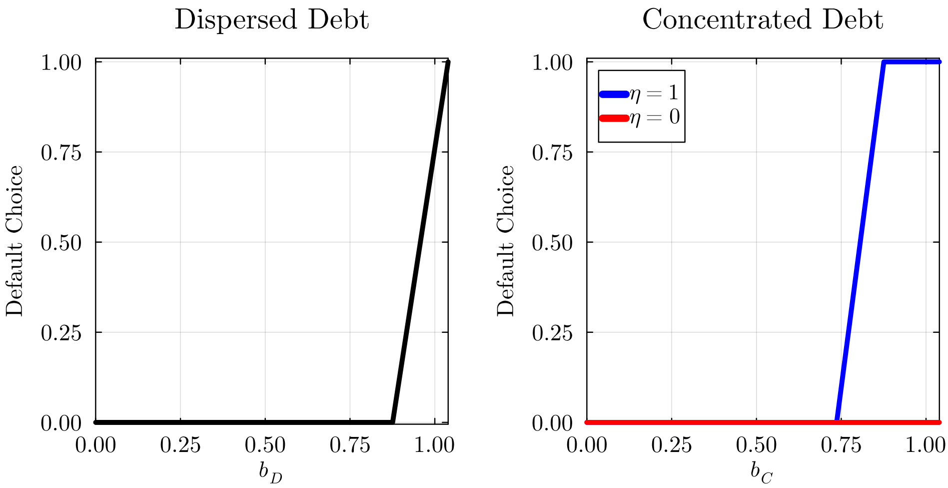
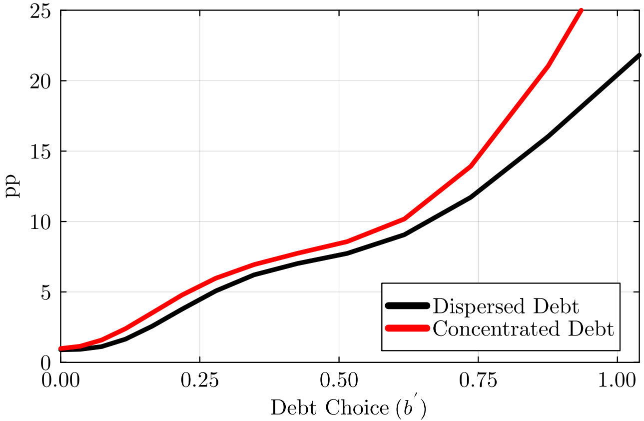
Default behavior depends on debt payment concentration choice



Firm w/ b_C cannot sustain as high a level of debt as b_D

Dispersed debt payments $\longrightarrow$ lower interest rates



Takeaway: Interest rates price in firm def. risk $\longrightarrow$ borrowing cost $b_C >$ borrowing cost b_D

Bond Price Eqs   Back to main slides

Lender's Problem

Debt is priced by rep lender making zero-profits in expectation

- $\delta(\mathcal{S}')$: default decision in state $\mathcal{S}' \equiv (b'_D, b'_C, y', \eta')$
- $\mathcal{R}(b_D, b_C, y)$: lender's recovery value in default

Price of unit of dispersed debt

$$q_D(b'_D, b'_C, y) = \beta \mathop{\mathbb{E}}_{\{y', \eta'\}} \left\{ (1 - \delta(\mathcal{S}')) \Big(\overbrace{\tilde{c} + \lambda}^{\text{Payment tomorrow}} + \overbrace{(1-\lambda) q_D(b''_D, b''_C, y')}^{\text{Expected future revenue to lender}} \Big) + \delta(\mathcal{S}') \mathcal{R}(b'_D, b'_C, y') \right\}$$

Price of unit of concentrated debt

$$q_C(b'_D, b'_C, y) = \beta \mathop{\mathbb{E}}_{\{y', \eta'\}} \left\{ (1 - \delta(\mathcal{S}')) \Big(\overbrace{\tilde{c} + \eta}^{\text{Payment tomorrow}} + \overbrace{(1-\eta) q_C(b''_D, b''_C, y')}^{\text{Expected future revenue to lender}} \Big) + \delta(\mathcal{S}') \mathcal{R}(b'_D, b'_C, y') \right\}$$

where $Pr(\eta = 1) = \lambda$

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Firms do not act constrained as a payment approaches

	Cash	Investment	Buyback Debt
% Debt Due in 1 Year	-0.002	0.007	-0.241***
	(0.007)	(0.008)	(0.052)
% Debt Due in 2 Years	-0.003	0.002	-0.228***
	(0.008)	(0.008)	(0.051)
% Debt Due in 3 Years	-0.002	0.003	-0.217***
	(0.007)	(0.008)	(0.049)
% Debt Due in 4 Years	-0.006	0.002	-0.253***
	(0.007)	(0.008)	(0.048)
% Debt Due in 5 Years	-0.007	0.002	-0.222***
	(0.006)	(0.007)	(0.048)
Observations	6657	6676	6793
Fixed Effects	Firm & Year	Firm & Year	Firm & Year

Takeaway: a firm bound by a wall should hoard cash, cut investment, or retire debt early. None of that shows up — and the buyback loadings are negative.

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Walls survive among firms that plainly *can* disperse

	All	Inv. grade	Large	Old
Share with a maturity wall	0.48	0.21	0.13	0.21
ΔPr(wall) per $+1$ s.d. leverage	-0.115	-0.205	-0.153	-0.137

- Within every group, it is the less-levered firms that choose walls

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No inference rests on the wall cutoffs

	Prevalence (% issuers)			Spread gap (bps)			Default gap (pp)		
Principal threshold	1yr	2yr	3yr	1yr	2yr	3yr	1yr	2yr	3yr
$\geq$ 50%	57.9	64.4	73.3	90	85	82	4.3	4.9	4.7
$\geq$ 60%	46.7	52.9	60.8	90	93	91	4.4	5.0	4.8
$\geq$ 2/3	42.3	47.5	54.7	97	102	99	4.5	4.9	4.9
$\geq$ 75%	40.0	44.5	50.5	93	102	107	4.4	4.9	5.1
$\geq$ 80%	39.0	43.2	48.4	90	100	107	4.4	4.8	5.0

- Prevalence moves *smoothly* as the definition loosens (39% $\rightarrow$ 73%)
- Risk gaps are nearly flat: 80–110 bps in spreads, 4.2–5.1 pp in default
- The 2/3, 2-year cell used in the paper is representative of the whole grid

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σ_{Mat} vs. the Herfindahl index

	Credit rating (higher $=$ safer)				
	All firms			Multi-bond	
	(1)	(2)	(3)	≥ 2	≥ 3
Repayment dispersion (σ_{Mat})	0.573***		0.467***	0.427***	0.375***
	(0.067)		(0.074)	(0.077)	(0.082)
Herfindahl index		-0.412***	-0.182**	-0.337***	-0.502***
		(0.073)	(0.082)	(0.091)	(0.110)
Observations	9851	9881	9817	7096	5423
R^2	0.740	0.736	0.740	0.727	0.722

- σ_{Mat} survives controlling for the HHI, including among multi-bond firms
- HHI captures unequal *shares*; σ_{Mat} also captures how far apart the dates lie

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Doesn’t shelf registration kill the fixed cost?

Concern: most large issuers use shelf registration, so the fixed cost can be spread over many takedowns “pay-as-you-go”

Doesn’t shelf registration kill the fixed cost?

Concern: most large issuers use shelf registration, so the fixed cost can be spread over many takedowns “pay-as-you-go”

Response:

- Shelf saves on the one-time SEC *registration* step
- But the costs that dominate the underwriter fee recur with each takedown:
  - the underwriting spread itself
  - legal and due-diligence work
  - demand discovery and placement — every bond has its own terms and investor base
- The underwriter spread I plot is the realized fee per issue, net of whichever registration route the firm uses
- It still falls steeply with issue size $\longrightarrow$ a substantial per-issuance fixed component survives shelf registration

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External validation: predictors of repayment dispersion

	St. Dev Maturity Dates	
	Data	Model
St. Dev Maturity Dates$_{t-1}$	0.749	0.890
Leverage	0.182	0.189
Sales	-0.071	-0.033
Additional Firm Controls	Yes	–

- Both untargeted: same regression run in the data and in simulated model data
- Model reproduces the persistence of the dispersion choice
- And the signs & magnitudes on leverage $(+)$ and revenue $(-)$

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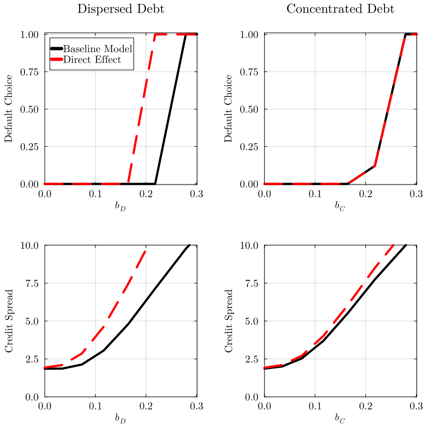
Direct effect of maturity walls: mechanism



- Firms holding dispersed debt can no longer sustain as much once forced into a wall $\longrightarrow$ default threshold shifts left, spreads rise
- Firms already holding concentrated debt barely change

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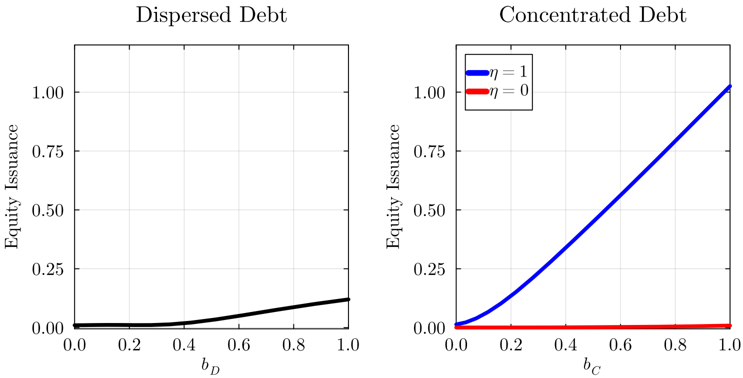
Dispersed debt smooths required repayments across states



- Dispersed debt spreads principal repayments across states
- Smaller repayment needs reduce costly equity injections
- Benefit strongest when debt levels are high or firm income is low

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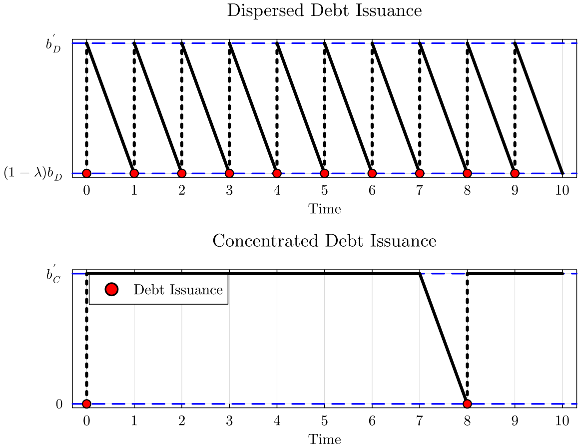
Concentrated debt avoids repeated small issuances



- Dispersed debt amortizes every period $\longrightarrow$ frequent top-ups to stay at target leverage
- Each issuance triggers the fixed cost
- Concentrated debt holds leverage at target while returning to market rarely

Why not just issue b_D infrequently? The firm can — but b_D amortizes mechanically at λ, so leverage drifts below target and the firm forgoes the tax shield. Only b_C holds leverage at target *and* keeps issuance rare.

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Is the model's leverage response too big?

Counterfactual implies an elasticity of bond leverage to issuance costs of ≈ -2.3

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Counterfactual implies an elasticity of bond leverage to issuance costs of ≈ -2.3

A historical benchmark: 1999 Gramm–Leach–Bliley repeal of Glass–Steagall

- Let commercial banks enter bond underwriting
- Average underwriter fees fell $\approx$13%
- Aggregate bond debt among public issuers more than tripled
- Bond-debt-to-income rose 66–80%

$\longrightarrow$ implied elasticity of -3.6 to -4.1

Is the model's leverage response too big?

Counterfactual implies an elasticity of bond leverage to issuance costs of ≈ -2.3

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  $\longrightarrow$ implied elasticity of -3.6 to -4.1

So the model's response is, if anything, conservative

Suggestive, not causal: the post-1999 expansion also reflects falling rates and the secular shift from loans to bonds, so it overstates the share attributable to issuance costs alone.

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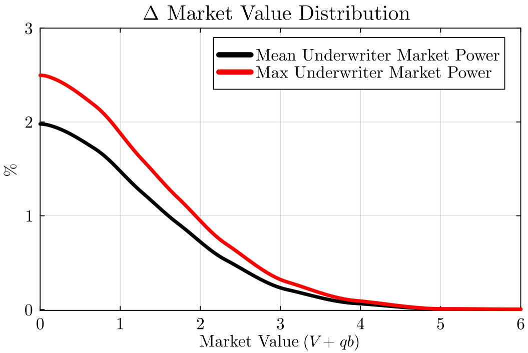
Removing underwriter rents raises firm value



- All firms gain weakly; the smallest firms gain most
- Average market value rises 0.85% (mean rents) to 1.01% (max rents)
- But with walls gone, all firms pay the fixed cost more often: PDV of future issuance costs rises 10%

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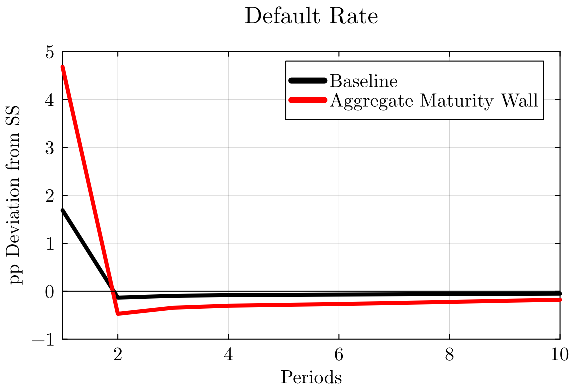
Backup: aggregate maturity wall during a freeze



Aggregate maturity wall (η common across firms) $\longrightarrow$ 299 bps (178%) higher default rate

Not in the current draft – for Q&A only.

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