Exorbitant Privilege? The Bond Market Subsidy of Prospective Fallen Angels

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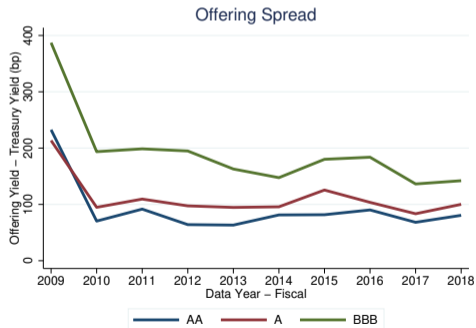Federal Reserve Stress Testing Research Conference

October 8, 2021

The boom in the BBB corporate bond market

· Non-fin. corporate debt is now the largest type of private debt ($17.6T in 2020Q3)
· Credit cycle post-GFC driven by non-financial corporate debt
· U.S. corporate bond market doubled in size in 2009–19, driven by BBB segment

US Nonfinancial Corporate Business Debt

Corporate Debt Outstanding (tn USD)

Legend: Corporate Bonds, Nonmortgage Deposits, Mortgages, Commercial Paper, Other

Source: Using data of the Board of Governors of the Federal Reserve System (US)

Corporate Bond Volume by Rating Category

Bonds (tn USD)

Legend: BBB, IG non–BBB, non–IG
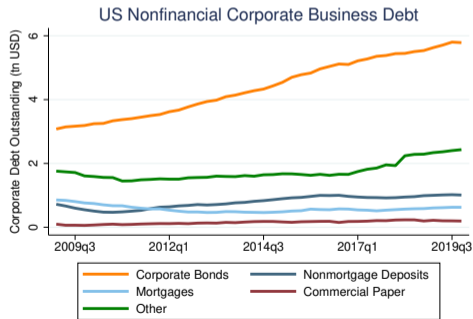
Deterioration in firm quality

· Increasing debt-to-EBITDA ratio for BBB, but not for other IG, firms
· BBB offering spreads declined from 400 bps in 2009 to 105 bps in 2018,
  moving closer to to AA and A spreads (no narrowing between A and AA spreads)

Debt / EBITDA

Offering Spread

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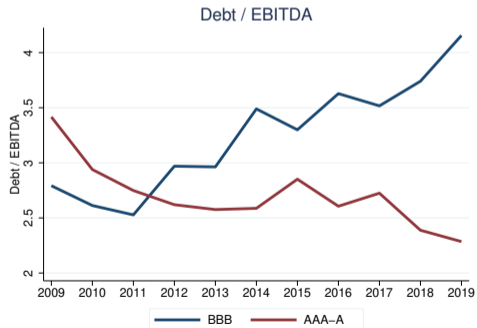
Policy makers wary of risk posed by corporate leverage

*"**Nonfinancial corporations** entered this [Covid] crisis with **enormous debt loads**, and that is a vulnerability. **They had borrowed excessively**. The borrowing spree happened because regulators had "few, if any tools to rein it in and because **low interest rates made it easier for companies to borrow**."*

Janet Yellen, March 2020

Markets

Morgan Stanley W... BBB... P...
'Fallen angels' are posing the biggest threat to the bond market...

BONDS

'Fallen angels' a...
threat to the bon...

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The Nature of th...

A consistent rule of thumb that... problems in credit cycles: Follo... outstanding has grown to ~$2.5trn today, a 22% increase since 2009. Along these lines, we see elevated downgrade activity as a "stress point" when the cycle eventually turns.

MEDIA AND TELECOMS   MAY 15, 2020 / 4:34 AM / UPDATED A YEAR AGO

Credit rating 'fallen angel' danger at record high: S&P Global

The exorbitant privilege of prospective fallen angels

Prospective fallen angels enjoy cheap funding in the bond market
- · Drop in BBB spreads driven by downgrade-vulnerable firms that deteriorated in quality
- · No privilege in the bond market pre-GFC; no privilege in the syndicated loan market

Privilege driven by demand by IG investors & ratings inflation
- · Central bank QE induces a demand for BBB bonds by IG investors
- · Prospective fallen angels meet this demand by issuing bonds to finance M&A
  - - M&A deals are value-destroying but effectively delay downgrades, prolonging rating inflation

Real effects of the exorbitant privilege
- · High sales growth at low markups $\rightarrow$ gain in market share
- · Large M&A but no effect on employment and investment
- · Negative spillover effects to competing firms

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Contribution

Credit rating inflation

· Goldstein and Huang (2020), Herpfer and Maturana (2020)

→   **Rating inflation sustains the BBB corporate bond market**

Investors' reach-for-yield behavior

· Becker and Ivashina (2015), Becker et al. (2021), Liu (2019)

→   **Mechanism based on quantities (demand for more IG debt)**

Rebalancing channel of QE

· Di Maggio et al. (2020), Krishnamurthy and Vissing-Jorgensen (2013), Gagnon et al. (2011)

→   **Capital misallocation in the corporate bond market**

→   **Negative spillover effects on competitors**

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Consumer products giant Newell Brands

· Prospective fallen angel since 2014

· Bond spreads 30–50 bps below the median healthy BBB firm

· Used cheap bond financing for M&A in 2014–17:
  - Including the acquisition of Jarden, announced in 2015: CAR -4.0%
  - Gross debt/EBITDA from 3x to 4.5x (committed to de-lever to 3-3.5x in 2-3Y)

· S&P ratings
  - BBB- in 2016, balance sheet implied rating B (5 notch infl.)
  - Maintained BBB- throughout 2018, whereas implied CCC+ (7 notch infl.)
  - $\rightarrow$ Downgraded to high-yield only in 2019

*"The two big rating firms have allowed some large companies to retain their IG status even though they **repeatedly missed their debt-reduction targets**." (WSJ November 2019)*

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1 **Identifying the prospective fallen angels**

2 The exorbitant privilege of prospective fallen angels

3 The origins of the exorbitant privilege

4 Real effects of the exorbitant privilege

Identifying the prospective fallen angels

· Prospective fallen angels are (i) rated BBB and (ii) vulnerable to a downgrade

· A firm is "vulnerable" if its fundamentals suggest that it might be downgraded

  1) Combine balance sheet characteristics using the Altman Z"-score (Altman, 2020)
     i.e., current and total assets and liabilities, retained earnings, EBIT, book equity

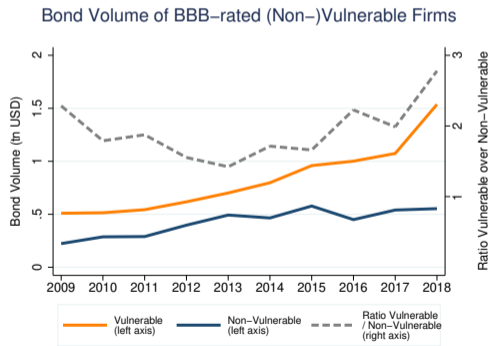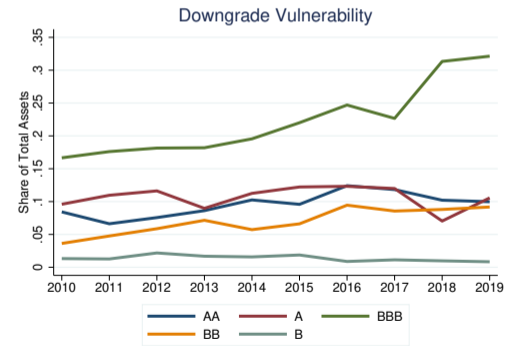 2) A firm is "vulnerable" if its Z"-score is lower than the Z"-score of the next lowest rating

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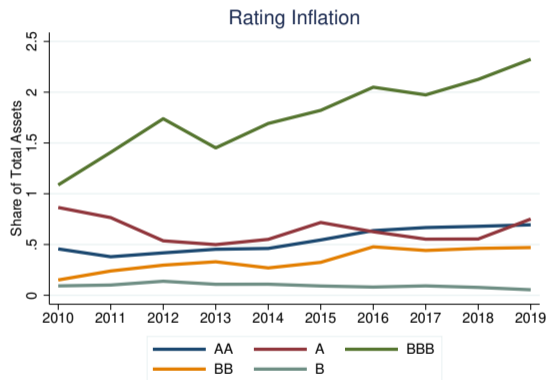
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Validating the "vulnerable" measure

1) Vulnerable firms look worse along observable dimensions ▸ Descriptive Stats
   - Lower net worth, sales growth, investments, employment growth, IC, profitability
   - Higher leverage

2) After becoming vulnerable, firms' performance deteriorates ▸ Tests
   - Decline in sales growth, investments, firm size, and employment

3) Vulnerable firms more likely to be downgraded ▸ Tests ▸ Sensitivity

4) Vulnerable firms more likely to have a negative credit watch and outlook ▸ Tests

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Increased vulnerability of the BBB corporate bond market

· Increasing share of BBB issuers likely to be downgraded based on fundamentals
· Buildup of vulnerabilities coincides with loosening of monetary policy stance

Downgrade Vulnerability

Bond Volume of BBB–rated (Non-)Vulnerable Firms

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High and increasing ratings inflation for BBB firms

- · Difference b/w credit rating notch and credit rating notch implied by Z"-score
- · Rating inflation highest for BBB-rated firms and increasing over time

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The exorbitant privilege of prospective fallen angels

Δ Secondary market spreads between vulnerable and non-vulnerable firms
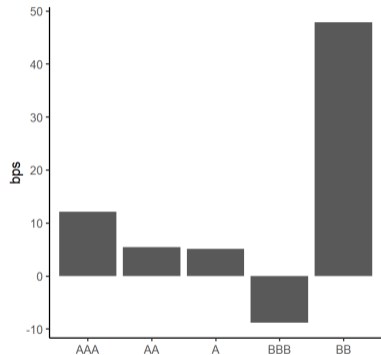
Vulnerable firms pay higher spreads
in each rating bucket, except BBB
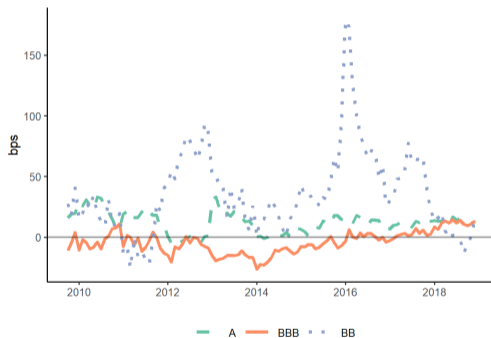
Low spreads especially in 2013–16

Compare vulnerable vs. non-vulnerable spreads

$$Spread_{biht} = \beta_1 Rating_{iht} + \beta_2 Vulnerable_{iht} + \beta_3 Rating_{iht} \times Vulnerable_{iht}$$
$$+ \mathbf{\Gamma} X_{iht-1} + \delta \times Z_b + \mu_{ht} + \epsilon_{biht}$$

· Bond b, firm i, industry h, year t
· $Spread$: Bond yield − Treasury yield (bps)
· $Rating$: indicator for each rating category (AAA, AA, A, BBB, ...)
· $Vulnerable$: indicator $= 1$ if firm is vulnerable
· Firm-level controls (size, leverage, IC), bond-level controls (maturity, liquidity...)
· All results robust to omitting firm-level controls
· Industry-year fixed effects μ

The pricing privilege of prospective fallen angels

	Spread
A	11.966
	(8.687)
BBB	48.123***
	(10.787)
BB	167.867***
	(15.366)
B	295.022***
	(21.595)
CCC	949.039***
	(103.255)
Sample	Entire
Observations	19,313
R-squared	0.755

· Spread ↑ as ratings ↓

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The pricing privilege of prospective fallen angels

	Spread
Vulnerable×AAA-AA	20.644***
	(7.986)
Vulnerable×A	-9.299
	(6.858)
Vulnerable×BBB	**-12.394****
	(5.038)
Vulnerable×BB	30.926***
	(10.354)
Vulnerable×B	51.719*
	(26.615)
Vulnerable×CCC	362.443**
	(167.369)
Sample	Entire
Observations	20,106
R-squared	0.733

· Spread ↑ as ratings ↓

· Privilege of BBB vulnerable firms

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The pricing privilege of prospective fallen angels

	Spread	Spread
Vulnerable × AAA-AA	20.644***	25.284***
	(7.986)	(9.543)
Vulnerable × A	-9.299	-6.579
	(6.858)	(8.046)
Vulnerable × BBB	**-12.394****	**-17.348*****
	(5.038)	**(6.551)**
Vulnerable × BB	30.926***	29.394***
	(10.354)	(10.785)
Vulnerable × B	51.719*	65.192**
	(26.615)	(32.992)
Vulnerable × CCC	362.443**	228.544*
	(167.369)	(138.583)
Sample	Entire	2013–16
Observations	19,313	6,489
R-squared	0.755	0.761

· Spread ↑ as ratings ↓

· Privilege of BBB vulnerable firms

... especially in 2013–16

The pricing privilege of prospective fallen angels

|	EDF 2Y	EDF 5Y
Vulnerable × AAA-A	0.195*	0.159*
	(0.107)	(0.088)
Vulnerable × BBB	0.267***	0.184***
	(0.089)	(0.068)
Vulnerable × BB	0.572***	0.406***
	(0.111)	(0.083)
Vulnerable × B	0.604***	0.452***
	(0.124)	(0.092)
Vulnerable × CCC	-0.024	-0.018
	(0.235)	(0.191)
Sample	Entire	2013–16
Observations	4,223	4,223
R-squared	0.780	0.804

· Spread ↑ as ratings ↓

· Privilege of BBB vulnerable firms
  ... especially in 2013–16

· No mispricing in equity markets

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The pricing privilege of prospective fallen angels

	Spread	All-in-drawn Spread
Vulnerable × AAA-A	11.554	27.204
	(7.953)	(16.986)
Vulnerable × BBB	25.167**	12.380*
	(11.140)	(7.118)
Vulnerable × BB	21.995	20.150***
	(13.624)	(7.169)
Vulnerable × B	44.855	40.356***
	(29.457)	(12.583)
Vulnerable × CCC	330.357***	19.176
	(65.347)	(72.021)
Sample	2002-07	Synd. loans
Observations	1,855	5,273
R-squared	0.715	0.516

· Spread ↑ as ratings ↓

· Privilege of BBB vulnerable firms
  ... especially in 2013–16

· No mispricing in equity markets

· No privilege pre-GFC

· No privilege in synd. loans

BBB vulnerability materialized with COVID-19
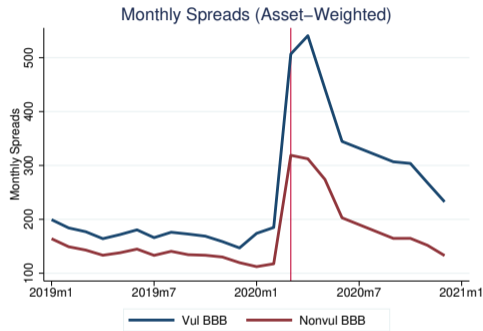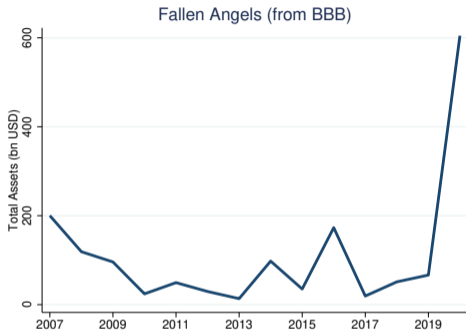
See Haddad et al. (forthcoming), Boyarchenko et al. (2021), Altman (2020)

*"The Federal Reserve is throwing a lifeline to some companies that have suddenly dropped into risky junk debt after **expanding its corporate bond buying program to include fallen angels** [...] Bonds of Ford Motor and Macy's will be eligible for the program."*

Source: Bloomberg, April 9, 2020

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QE-driven demand by IG investors

Security-level holdings by investors matched with Fed's Treasury portfolio

- LSAP Exposure$_{kt}$ is the share of k's holdings held by the Fed
  (holdings weighted by the share of amounts outstanding held by the Fed)
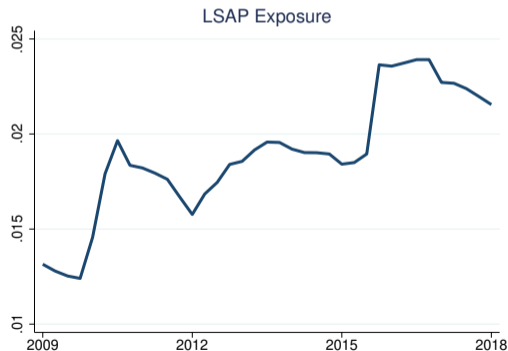
LSAP Exposure

QE-driven demand by IG investors

$$Holdings_{kjt} = \beta_1 \text{LSAP Exposure}_{kt} \times Vulnerable_{jt} + \eta_{kt} + \mu_{jt} + \epsilon_{kjt}$$

· The unit of observation is investor k, issuer j, year t
· $Holdings_{kjt}$ is log (one plus) holdings of bonds issued by j by investor k at t
· $Vulnerable_{jt}$ is an indicator=1 if issuer j is vulnerable in year t
· Investor-time fixed effects η_{kt}
· Issuer-time fixed effects μ_{jt}

QE-driven demand by IG investors

$$Holdings_{kjt} = \beta_1 \text{LSAP Exposure}_{kt} \times Vulnerable_{jt} + \eta_{kt} + \mu_{jt} + \epsilon_{kjt}$$

	$Holdings_{kjt}$	
LSAP Exposure$_{kt} \times Vulnerable_{jt}$	**1.365*****	-0.044
	(0.448)	(0.542)
Fixed Effects		
Investor k - time t	✓	✓
Issuer j - time t	✓	✓
Sample Investors	**IG**	non-IG
Sample issuers	Full	Full
Observations	1,316,637	1,153,770
R-squared	0.605	0.547

· IG investors more exposed to LSAPs demand more bonds issued by vulnerable firms

· The effect is driven by bonds issued by BBB-rated firms

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QE-driven demand by IG investors

$$Holdings_{kjt} = \beta_1 \text{LSAP Exposure}_{kt} \times Vulnerable_{jt} + \eta_{kt} + \mu_{jt} + \epsilon_{kjt}$$

	$Holdings_{kjt}$				
LSAP Exposure$_{kt}$ × $Vulnerable_{jt}$	1.365***	-0.044	0.281	0.718*	**1.939*****
	(0.448)	(0.542)	(0.946)	(0.428)	**(0.483)**
Fixed Effects					
Investor k - time t	✓	✓	✓	✓	✓
Issuer j - time t	✓	✓	✓	✓	✓
Sample Investors	IG	non-IG	Full	Full	Full
Sample issuers	Full	Full	AAA/AA	A	**BBB**
Observations	1,316,637	1,153,770	287,950	1,020,557	1,744,170
R-squared	0.605	0.547	0.726	0.673	0.616

· IG investors more exposed to LSAPs demand more bonds issued by vulnerable firms

· The effect is driven by bonds issued by BBB-rated firms

QE-driven demand by IG investors

$$Holdings_{kjt} = \beta_1 \text{LSAP Exposure}_{kt} \times Vulnerable_{jt} + \eta_{kt} + \mu_{jt} + \epsilon_{kjt}$$

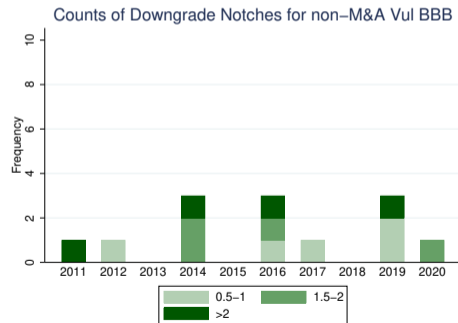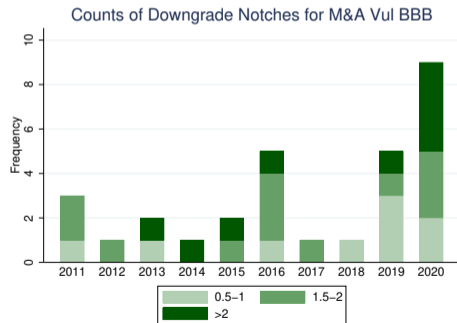|	$Holdings_{kjt}$						
LSAP Exposure$_{kt}$ × $Vulnerable_{jt}$	1.365***	-0.044	0.281	0.718*	1.939***	**2.171*****	-0.243
	(0.448)	(0.542)	(0.946)	(0.428)	(0.483)	**(0.658)**	(0.979)
Fixed Effects							
Investor k - time t	✓	✓	✓	✓	✓	✓	✓
Issuer j - time t	✓	✓	✓	✓	✓	✓	✓
Sample Investors	IG	non-IG	Full	Full	Full	**IG**	non-IG
Sample issuers	Full	Full	AAA/AA	A	BBB	**BBB**	BBB
Observations	1,316,637	1,153,770	287,950	1,020,557	1,744,170	549,619	220,531
R-squared	0.605	0.547	0.726	0.673	0.616	0.621	0.644

· IG investors more exposed to LSAPs demand more bonds issued by vulnerable firms

· The effect is driven by bonds issued by BBB-rated firms

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Demand for IG bonds met by supply of prospective fallen angels

· Prospective fallen angels meet this demand by issuing bonds to finance M&A

· M&A deals of vulnerable BBB rated firms characterized by:

   ▸ Regs 1.4 pp lower cumulative abnormal returns upon announcement

   ▸ Regs a reduction in Tobin's Q and productivity

   ▸ Regs an increase in the net debt/EBITDA

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M&A to prolong ratings inflation

- After 5Y, among vulnerable BBB: 9% of M&A issuers and 26% of non-M&A issuers downgraded
- Conditional on eventually being downgraded, M&A extends the time before downgrade by 3Y
- Issuers' promises to delever post-M&A regularly broken
- Vulnerable BBB M&A firms downgraded more in 2020 than non-M&A firms.

Counts of Downgrade Notches for M&A Vul BBB

Counts of Downgrade Notches for non-M&A Vul BBB

0.5–1   1.5–2
>2

QE-driven demand increases M&A holdings in vulnerable BBB

$$Holdings_{kjt}^{(non)M\&A} = \beta_1 \text{LSAP Exposure}_{kt} \times Vulnerable_{jt} + \eta_{kt} + \mu_{jt} + \epsilon_{kjt}$$

	$Holdings_{kjt}^{M\&A}$			
LSAP Exposure$_{kt} \times Vulnerable_{jt}$	0.233	-0.133	**2.009*****	-0.593
	(0.969)	(0.597)	**(0.636)**	(0.500)
Fixed Effects				
Investor k - Time t	✓	✓	✓	✓
Issuer j - Time t	✓	✓	✓	✓
Sample issuers	AAA/AA	A	**BBB**	HY
Observations	239,536	1,020,557	1,744,170	1,745,994
R-squared	0.635	0.477	0.512	0.566

· High exposure investors demand more bonds of vulnerable BBB firms that fund M&A
· Demand for M&A bonds higher than for non-M&A bonds

QE-driven demand increases M&A holdings in vulnerable BBB

$$Holdings_{kjt}^{(non)M\&A} = \beta_1 \text{LSAP Exposure}_{kt} \times Vulnerable_{jt} + \eta_{kt} + \mu_{jt} + \epsilon_{kjt}$$

|	$Holdings_{kjt}^{M\&A}$				$Holdings_{kjt}^{nonM\&A}$
LSAP Exposure$_{kt}$ × $Vulnerable_{jt}$	0.233	-0.133	2.009***	-0.593	**1.191***
	(0.969)	(0.597)	(0.636)	(0.500)	**(0.664)**
Fixed Effects					
Investor k - Time t	✓	✓	✓	✓	✓
Issuer j - Time t	✓	✓	✓	✓	✓
Sample issuers	AAA/AA	A	BBB	HY	**BBB**
Observations	239,536	1,020,557	1,744,170	1,745,994	1,744,170
R-squared	0.635	0.477	0.512	0.566	0.522

· High exposure investors demand more bonds of vulnerable BBB firms that fund M&A

· Demand for M&A bonds higher than for non-M&A bonds

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4. Real effects of the exorbitant privilege

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Prospective fallen angels increase their market share
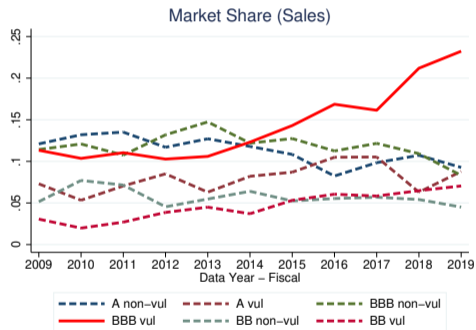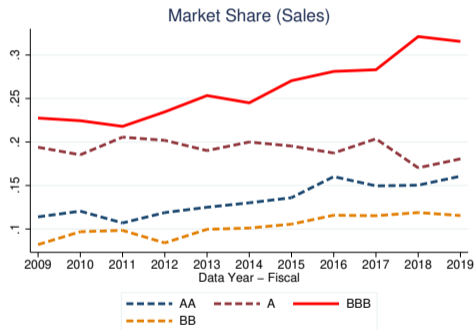
Real effects of the exorbitant privilege

- **Direct effects** for vulnerable BBB firms ▸ Regs
  - Higher sales growth at lower markups $\rightarrow$ gain in market share
  - Larger M&A deals
  - No effect on investment or employment

- **Spillover effects** to competing non-vulnerable firms ▸ Regs
  - Lower sales growth at lower markups
  - Lower investment and employment growth
  - Consistent with spillovers found in zombie lending literature (Caballero et al., 2008, Acharya et al., 2019)

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Conclusion

· Persistent sharp increase in BBB market raises concerns about prospective fallen angels

· Prospective fallen angels obtain exorbitant privilege of subsidized bond financing

· Privilege driven by QE-induced demand in IG investors

· Prospective fallen angels engage in value-destroying M&A to prolong rating inflation

· Subsidy allows prospective fallen angels to expand with adverse spillovers to competitors

· Results reminiscent of
  - the rating inflation in the MBS market in run-up to the GFC
  - the consequences of subsidized zombie lending

Appendix

Using Altman Z" to find vulnerable firms

$$Vulnerable_{it} = \begin{cases} 1, & \text{if } Z''_{it} < Z''(next\,lower\,rating\,bucket) \\ 0, & \text{otherwise} \end{cases}$$

where

$$Z" = 6.56 \times \frac{Current\,Assets - Current\,Liabilities}{Total\,Assets}$$
$$+ 3.26 \times \frac{Retained\,Earnings}{Total\,Assets}$$
$$+ 6.72 \times \frac{EBIT}{Total\,Assets} + 1.05 \times \frac{Book\,Value\,of\,Equity}{Total\,Liabilities}$$

▸ Back

Issuer-level, bond-level, and holdings-level (2009–2018)

Issuer-level data: 5,864 issuers
· Debt capital structure from Capital IQ
· Firm characteristics from Compustat
· Credit ratings from Thomson Reuters

Bond-level data: 3,140 issues by 910 issuers
· Primary market data from Mergent FISD
· Secondary market data from TRACE

Holdings-level data: 3,140,892 issuers and 569 investors
· Security quarterly holdings data from eMAXX Bond Holders

→ We combine the data at various levels: **bond, firm, investor**
  · Considering 5864 firms, 1130 issuers and 569 investors
  · Over the years 2009–2018

Validating the "vulnerable" measure

	Vulnerable	Non-Vulnerable	Difference
Total Assets	24,114	10,988	13,126***
Leverage	0.403	0.354	0.049***
EBITDA/Assets	0.104	0.132	-0.028***
Interest Coverage	7.747	13.114	-5.367***
Sales Growth	0.038	0.056	-0.017***
CAPX	0.188	0.225	-0.037***
Employment Growth	0.008	0.036	-0.027***
Net Worth	0.183	0.248	-0.066***

Firms' performance deteriorates once classified as vulnerable

$$Y_{iht+q} = \beta_q \times Enter\,Vuln_{iht} + \gamma_q \times Vuln_{iht} + \eta_q \times X_{iht+q} + \mu_{ht+q} + \epsilon_{iht+q}$$
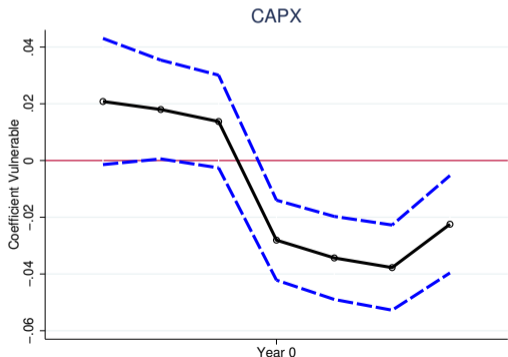
1) Emp Growth

Emp Growth

Firms' performance deteriorates once classified as vulnerable

$$Y_{iht+q} = \beta_q \times Enter\,Vuln_{iht} + \gamma_q \times Vuln_{iht} + \eta_q \times X_{iht+q} + \mu_{ht+q} + \epsilon_{iht+q}$$

1) Emp Growth

2) Investment
   (CAPX/Fixed Assets)

CAPX

Firms' performance deteriorates once classified as vulnerable

▸ Back

$$Y_{iht+q} = \beta_q \times Enter\,Vuln_{iht} + \gamma_q \times Vuln_{iht} + \eta_q \times X_{iht+q} + \mu_{ht+q} + \epsilon_{iht+q}$$

1) Emp Growth
2) Investment
   (CAPX/Fixed Assets)
3) Sales Growth

Sales Growth

Firms' performance deteriorates once classified as vulnerable

$$Y_{iht+q} = \beta_q \times Enter\,Vuln_{iht} + \gamma_q \times Vuln_{iht} + \eta_q \times X_{iht+q} + \mu_{ht+q} + \epsilon_{iht+q}$$
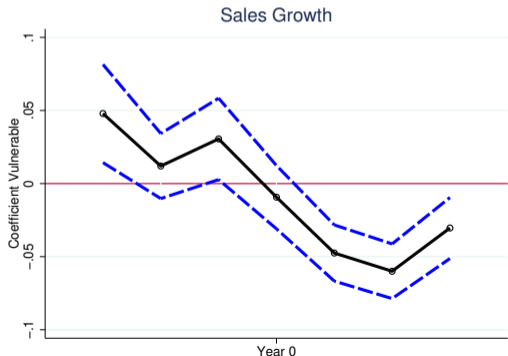
1) Emp Growth
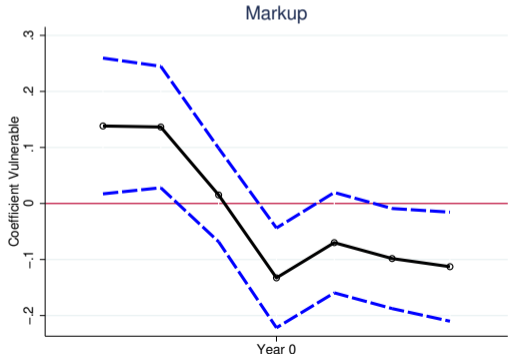
2) Investment
   (CAPX/Fixed Assets)

3) Sales Growth

4) Markup

Markup

Vulnerable firms more likely downgraded and put on watch/outlook

$$Y_{iht+1} = \beta_1 \times Vulnerable_{iht} + \gamma \times X_{iht} + \eta_{ht} + \epsilon_{iht+1}$$

- Firm i, industry h, year t
- *Vulnerable*: indicator=1 if firm is vulnerable in year t
- Industry-year fixed effects η
- LHS variables: negative watchlist/outlook, downgrade by at least one rating category (i.e. a firm that has a rating of A+, A, A- is downgraded to at least BBB+)

Vulnerable firms more likely downgraded and put on watch/outlook

$$Y_{iht+1} = \beta_1 \times Vulnerable_{iht} + \gamma \times X_{iht} + \eta_{ht} + \epsilon_{iht+1}$$

	Negative Watch	Negative Watch	Downgrade	Downgrade
Vulnerable	0.078***	0.043**	0.021***	0.018***
	(0.018)	(0.018)	(0.005)	(0.005)
Size		0.017**		0.003*
		(0.007)		(0.002)
Leverage		0.131**		0.016
		(0.055)		(0.015)
IC Ratio		-0.010***		-0.000**
		(0.001)		(0.000)
Industry-Year FE	✓	✓	✓	✓
Observations	9,056	8,973	9,431	9,341
R-squared	0.118	0.150	0.094	0.097

· 4.3pp more likely to be put on neg watch/outlook; 1.8pp to be downgraded

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Downgrade sensitivity across rating categories
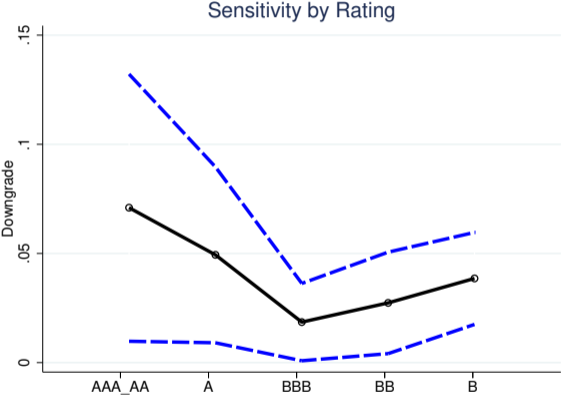
M&A destroys value

	(1) CARs	(2) Tobin's Q	(3) Productivity	(4) Net Debt/EBITDA
Vulnerable $\times BBB$	-0.014***	-0.234**	-0.140**	0.376*
	(0.005)	(0.093)	(0.067)	(0.212)
Vulnerable	0.005	-0.036	0.026	-0.263
	(0.004)	(0.073)	(0.048)	(0.183)
BBB	-0.000	0.117*	0.088*	-0.222*
	(0.002)	(0.071)	(0.047)	(0.125)
Controls	✓	✓	✓	✓
Industry-Year FE	✓	✓	✓	✓
Sample	M&A Rated	M&A Rated	M&A Rated	M&A Rated
Observations	2,566	2,621	2,540	2,622
R-squared	0.057	0.441	0.563	0.470

The direct effects of the exorbitant privilege

$$Y_{iht+1} = \beta_1 Vulnerable_{iht} + \beta_2 Vulnerable_{iht} \times BBB_{iht} + \gamma X_{iht} + \eta_{ht} + \mu_i + \epsilon_{iht+1}$$

	Emp Growth	CAPX	Sales Growth	Markup	Deal Size
Vulnerable × BBB	0.020	0.012	0.047***	-0.101**	0.032**
	(0.014)	(0.008)	(0.015)	(0.043)	(0.013)
Vulnerable	-0.027**	-0.016**	-0.014	0.031	-0.024***
	(0.011)	(0.006)	(0.010)	(0.026)	(0.008)
Industry-Year FE	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓
Observations	7,613	7,815	7,857	7,856	8,408
R-squared	0.360	0.745	0.475	0.930	0.284

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Spillover effects to other firms

$$Y_{iht} = \beta_1 Non-Vulnerable_{iht}$$
$$+ \beta_2 Non-Vulnerable_{iht} \times Share\ VulnerableBBB_{ht-1} + \eta_{ht} + \epsilon_{iht}$$

- Following zombie literature: Caballero et al., 2008, Acharya et al., 2019
- Firm i, industry h, year t
- $Non-Vulnerable$: dummy=1 if firm is non-vulnerable
- $Share\ VulnerableBBB$: asset-weighted share of vulnerable BBB firms in a given industry at $t-1$
- Industry-year fixed effects η

  Analyze firms within the same industry-year
- LHS variables: Employment Growth, Investment, Sales Growth, Markup

Negative spillovers from presence of prospective fallen angels

$$Y_{iht} = \beta_1 \times Non-Vulnerable_{iht}$$
$$+ \beta_2 \times Non-Vulnerable_{iht} \times Share\ VulnerableBBB_{ht-1} + \eta_{ht} + \epsilon_{iht},$$

	Emp Growth	CAPX	Sales Growth	Markup
Non-Vulnerable IG	0.013	0.029**	-0.003	0.570**
	(0.008)	(0.011)	(0.008)	(0.261)
Non-Vulnerable IG	-0.090**	-0.112***	-0.089**	-1.555**
× Share Vulnerable BBB	(0.042)	(0.041)	(0.038)	(0.767)
Industry-Year FE	✓	✓	✓	✓
Firm-level Controls	✓	✓	✓	✓
Observations	6,923	7,113	7,121	7,121
R-squared	0.112	0.318	0.278	0.256

Spillover effects (placebo)

$$Y_{iht} = \beta_1 \times Non-Vulnerable_{iht}$$
$$+ \beta_2 \times Non-Vulnerable_{iht} \times Share\ Vulnerable_{ht-1} + \eta_{ht} + \epsilon_{iht},$$

	Emp Growth	CAPX	Sales Growth	Markup
Non-vulnerable IG	0.023	0.019*	0.003	0.363
	(0.014)	(0.010)	(0.012)	(0.219)
Non-vulnerable IG	-0.040	-0.009	-0.022	0.087
$\times$ Share Vulnerable	(0.030)	(0.023)	(0.025)	(0.336)
Industry-Year FE	✓	✓	✓	✓
Firm-level Controls	✓	✓	✓	✓
Observations	6,923	7,113	7,121	7,121
R-squared	0.112	0.318	0.278	0.256

Economic magnitude of spillover effects

Investment Loss

Industry	Δ Vul BBB	Inv. Loss
SIC 21: Tobacco Products	39.7pp	4.5p
SIC 24: Lumber & Wood Products	47.1pp	5.3pp
SIC 37: Transportation Equipment	66.7pp	7.5pp

Employment Loss

Industry	Δ Vul BBB	Emp Loss
SIC 21: Tobacco Products	39.7pp	3.6pp
SIC 24: Lumber & Wood Products	47.1pp	4.3pp
SIC 37: Transportation Equipment	66.7pp	6.1pp

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