

How Effectively Can Debt Covenants Alleviate Financial Agency Problems?

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What do we know about debt covenants?

Debt covenants are viewed as *value enhancing* design features as they allow a state-contingent transfer of control from shareholders to bondholders which can mitigate financial agency problems.

- ▶ In theory, covenants are *optimal* contractual features that reduce financial agency distortions
 - ▶ Aghion and Bolton (1992), Dewatripont and Tirole (1994), Rajan and Winton (1995) rationalize debt covenants.
 - ▶ Berlin and Mester (1992), Sridhar and Magee (1996), Garleanu and Zwiebel (2009) rationalize covenant tightness.

Real-life covenants (*boilerplates*) are **costly**. While they mitigate agency conflicts, can they actually increase the value of the firm?

What do we know about debt covenants?

Are covenants efficient?

- ▶ Empirical evidence on their *ex ante* effects:
 - ▶ Smith and Warner (1979) “qualitatively” assess their efficiency based on their prevalence
 - ▶ Bradley and Roberts (2004) assess their impact on the cost of debt
 - ▶ Billet, King and Mauer (2007) analyze the effect of covenant on the investment policy
- ▶ Empirical evidence on (*ex post*) consequences of violation of financial covenants:
 - ▶ Chava and Roberts (2008), effects on investment
 - ▶ Roberts and Sufi (2009), effects on debt decision
 - ▶ Nini, Smith and Sufi (2009), effect on firm's policy and governance.

How high is the cost of actual debt covenants? Given this cost, what is the **net value contribution** of covenants? How do they affect the firm's policies?

Outline

- ▶ Dynamic structural model with endogenous investment and financing (with **long-term debt** with **no covenants**) decided by shareholders, who deviate from firm value maximization.
- ▶ Calibrate the model on moments related to investment, financing/credit risk, and payout policy, and determine the size of **financial agency costs**.
- ▶ Following the empirical literature, we impose
 - ▶ covenants that restrict the debt policy (**Debt Sweeps**), or
 - ▶ control the use of proceeds from asset sales (**Asset Sweeps**),
 - ▶ or “financial” covenants (**Debt/Ebitda**)and analyze how, and how much, they mitigate financial agency costs.
- ▶ Investigate the impact of covenants on financing and investment policies, including at the point where covenants are violated.

Baseline model

Cash flow

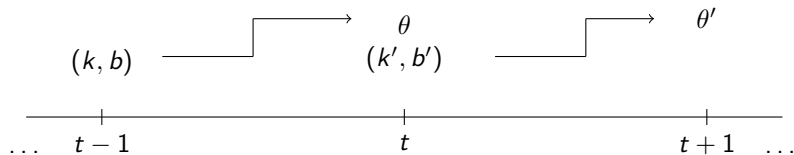
- ▶ Time is discrete and horizon infinite. Economy with a finite set of heterogeneous firms.
- ▶ Macroeconomic risk (x) and firm-specific risk (z) as AR(1) processes.
- ▶ **Stochastic discount factor** featuring **countercyclical risk premia** and **constant risk-free rate**, r .
- ▶ The firm's EBIT depends on $\theta = (x, z)$, capital stock, k , and fixed costs, ψ :

$$\pi = e^{x+z} k^\alpha - \psi, \quad \alpha < 1$$

- ▶ Capital is homogeneous and depreciates at a rate δ .
- ▶ Debt is a **consol bond** with face value $b \geq 0$ and coupon r . **No covenants**.

Baseline model

Timeline



Baseline model

Policies

At any date, given (θ, k, b) , the firm can decide to:

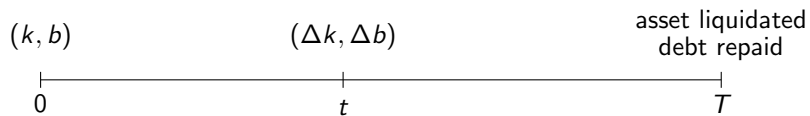
- ▶ invest or disinvest to get to $k' = (1 - \delta)k + I$ for next period.
 - ▶ If the firm disinvests ($I < 0$) the inflow is ℓI with $\ell \leq 1$ (**costly reversibility**);
- ▶ increase or reduce the debt to b' for next period.
 - ▶ If $b' < b$, debt is **repurchased at par**.
 - ▶ If $b' > b$, additional debt is issued at **market value**, and old and new debt have equal seniority (**pari passu**).
- ▶ Frictions: financial distress cost ($s \leq \ell$), equity floatation cost (λ), bankruptcy costs (ζ), debt adjustment cost (η), corporate taxes (τ).
- ▶ We find the stationary investment and financing policy and the equilibrium value of debt and equity using a standard numerical approach
 - ▶ **Firm value** maximization vs
 - ▶ **Equity value** maximization.

Debt covenants

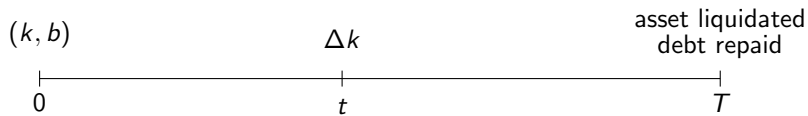
Debt contract is incomplete. However, particular events are verifiable and contractible.

- ▶ **Asset sweep:** if shareholders voluntarily disinvest ($I < 0$), the sales proceeds (ℓI) must be used to pay down existing debt: $b' - b \leq \ell I$.
 - ▶ Bradley and Roberts (2004)
- ▶ **Debt sweep:** the proceeds from new debt issuance must be used to pay back existing debt
 - ▶ Billet, King and Mauer (2007)
 - ▶ Fischer, Heinkel and Zechner (1989)
- ▶ **Debt/Ebitda:** if $b/\pi(\theta, k) > f^*$ (*technical default*), select (k', b') such that $b'/\pi(\theta, k') < f^{**}$ (with $f^* < f^{**}$) if next period's productivity is equal to θ .
 - ▶ Chava and Roberts (2008)

The intuition

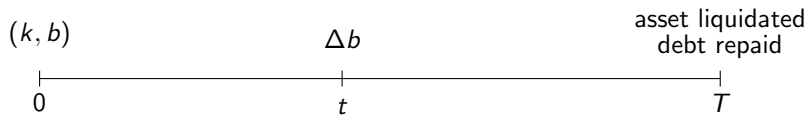


The intuition



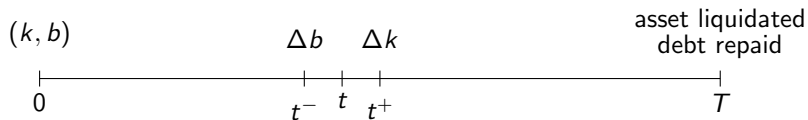
- ▶ $\Delta k \neq 0$ & $\Delta b = 0 \Rightarrow$ cashing out/underinvestment.
 - ▶ Asset sweeps \Rightarrow control asset sales.
 - ▶ Debt/EBITDA \Rightarrow constraining EBITDA mitigates cashing out

The intuition



- ▶ $\Delta b > 0$ & $\Delta k = 0 \Rightarrow$ claim dilution.
 - ▶ Debt sweeps \Rightarrow control claim dilution.
 - ▶ Debt/EBITDA \Rightarrow constrains debt increases

The intuition



- ▶ $\Delta b > 0$ & $\Delta k \neq 0 \Rightarrow$ claim dilution & cashing out/underinvestment
 - ▶ Asset sweeps
 - \Rightarrow reduce cashing out \Rightarrow lower incentive to issue more debt.
 - ▶ Debt sweeps
 - \Rightarrow constrain debt \Rightarrow reduce cashing out/underinvestment.
 - ▶ Debt/EBITDA
 - \Rightarrow constrain debt \Rightarrow reduces cashing out/underinvestment

Results

- ▶ The combined and compounding **effect of the distortions** on the investment and financing policies is **larger** than predicted by previous models, because of *long-term debt* and *convexity of agency costs* w.r.t. the state of the economy.
- ▶ **Covenants are effective** (though to varying degrees) in mitigating the value loss due to agency issues.
- ▶ They are effective **indirectly**, not simply with respect to the policy they are targeting and not solely through the flow of funds equation.
- ▶ Covenants are effective **across many states**, not simply at the points where they are binding or violated.
- ▶ Value creation is more significant for **covenants that limit the propensity to increase leverage** in low profitability states.

Model calibration

Parameters

σ_x	conditional volatility of systematic risk	1.36%
ρ_x	persistence of systematic risk	0.9224
γ_0	constant price of risk parameter	3.22
γ_1	time varying price of risk parameter	-15.30
σ_z	conditional volatility of idiosyncratic risk	15.80%
ρ_z	persistence of idiosyncratic risk	0.6857
β	time discount factor	1/1.05
α	capital share	0.50
ψ	fixed production cost	1.03
δ	annual depreciation rate	11%
τ	marginal net corporate tax rate	10%
ℓ	liquidation price for disinvestment	0.75
s	fire-sale discount for asset sales	0.60
ζ	proportional bankruptcy costs	0.60
λ	flotation cost for equity	0.06
η	debt adjustment cost	0.01
f^*	trigger for Debt/EBITDA covenant violation	2.6
f^{**}	Debt/EBITDA limit for covenant resolution	3.6

Model calibration

Moments

	Firm Max	Equity Max	Asset Sweep	Debt Sweep	Debt/ Ebitda	Empirical
EBITDA/Assets	0.22	0.22	0.22	0.22	0.22	0.22
Investment Rate	0.12	0.21	0.18	0.14	0.15	0.15
Q ratio	1.97	2.12	2.04	1.95	1.98	2.10
Leverage	0.73	0.19	0.33	0.43	0.18	0.23
Credit Spread (bps)	2.20	208.55	173.28	40.54	77.77	100.00
Default (%)	0.02	3.52	2.50	0.49	1.51	1.00
Equity Dist./Assets	0.03	0.11	0.08	0.07	0.14	0.04
Violation (%)	-	-	-	-	13.91	13.00

The impact of covenants on corporate policies

		Negative		Positive		Overall
		mean	freq.	mean	freq.	mean
Firm Max	Investment	-0.55	0%	0.16	72%	0.12
	Debt change	-0.07	29%	0.13	20%	0.01
	Payout	-0.03	29%	0.05	71%	0.03
Equity Max	Investment	-0.73	2%	0.35	62%	0.21
	Debt change	-	0%	1.18	27%	0.33
	Payout	-1.00	10%	0.24	87%	0.11
Asset Sweep	Investment	-0.33	2%	0.31	59%	0.18
	Debt change	-0.26	2%	0.81	24%	0.19
	Payout	-0.53	11%	0.16	87%	0.08
Debt Sweep	Investment	-0.71	0%	0.18	76%	0.14
	Debt change	-	0%	9.67	1%	0.05
	Payout	-0.03	18%	0.09	82%	0.07
Debt/Ebitda	Investment	-0.74	1%	0.22	71%	0.15
	Debt change	-0.12	6%	6.22	3%	0.20
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The impact of covenants on corporate policies

	Median Capital	Median Debt
Zero Debt	9.38	–
Firm Max	9.94	14.40
Equity Max	8.85	2.80
Asset Sweep	8.85	3.60
Debt Sweep	9.38	7.60
Debt/Ebitda	9.38	2.80

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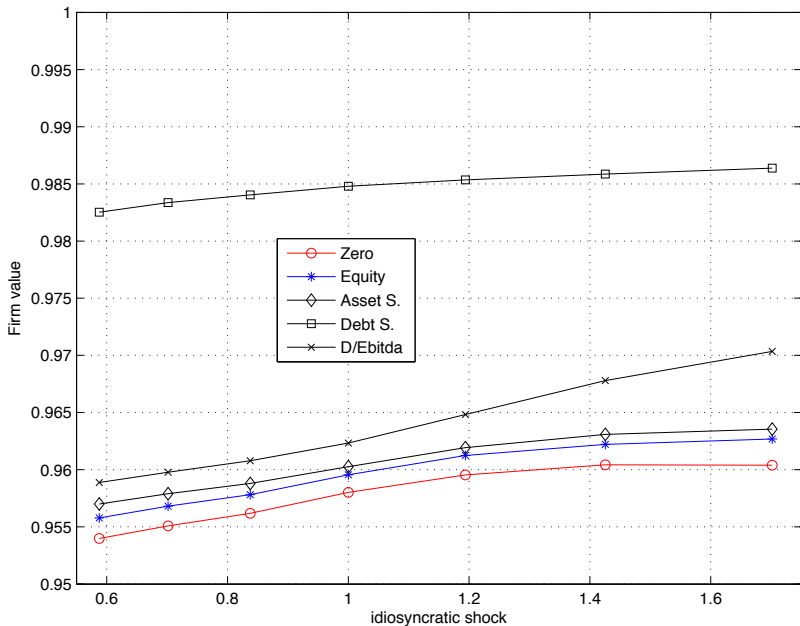
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Debt/Ebitda	9.38	2.80

The impact of covenants on firm value



The impact of covenants on firm value

	Median Value
Zero Debt	18.90
Firm Max	20.57
Equity Max	18.21
Asset Sweep	17.85
Debt Sweep	19.18
Debt/Ebitda	19.02

Policies at Debt/Ebitda covenant violation points

		Debt/Ebitda > f^*		Debt/Ebitda > f^{**}		Overall	
		negative	positive	negative	positive	negative	positive
Investment	freq.	0%	51%	0%	15%	1%	71%
	mean	-0.67	0.10	-0.66	0.08	-0.74	0.22
Debt change	freq.	37%	0%	96%	0%	6%	3%
	mean	-0.12	0.16	-0.17	4.12	-0.12	6.22
Payout	freq.	29%	71%	81%	19%	11%	88%
	mean	-0.07	0.07	-0.11	0.02	-0.09	0.16

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	mean	-0.07	0.07	-0.11	0.02	-0.09	0.16

Investment regression

	Firm Max		Equity Max		Debt/Ebitda	
Constant	-0.994 (-47.33)	-1.000 (-49.63)	-1.052 (-31.48)	-1.049 (-40.29)	-1.077 (-18.33)	-1.061 (-17.39)
EBITDA/Asset	1.820 (69.74)	1.823 (65.38)	1.673 (35.83)	1.589 (38.87)	1.327 (13.49)	1.253 (15.19)
Q-ratio	0.033 (1.38)	0.033 (1.39)	0.427 (26.62)	0.431 (29.23)	0.465 (14.31)	0.460 (13.58)
Book Leverage	0.444 (24.30)	0.443 (24.64)	-0.140 (-8.36)	-0.091 (-5.28)	0.008 (0.63)	0.052 (5.47)
Debt/EBITDA > f^*	-0.001 (-0.14)		0.001 (0.03)		0.039 (3.80)	
Debt/EBITDA > f^{**}		0.004 (1.14)		-0.074 (-1.30)		0.013 (1.67)
Observations	979750	979750	915462	915462	952375	952375
adjusted-R ²	0.828	0.828	0.580	0.589	0.564	0.557

Leverage regression

	Firm Max		Equity Max		Debt/Ebitda	
Constant	0.050 (15.00)	0.051 (11.93)	0.009 (2.42)	0.013 (3.79)	0.016 (4.04)	0.013 (3.06)
Lagged Leverage	0.953 (153.35)	0.949 (105.69)	0.966 (30.06)	0.954 (39.55)	0.931 (55.95)	0.945 (44.17)
Δ EBITDA/Asset	-0.792 (-34.47)	-0.788 (-31.22)	-0.092 (-15.07)	-0.087 (-14.11)	-0.117 (-5.69)	-0.129 (-6.73)
Investment/Asset	-0.170 (-22.37)	-0.169 (-22.74)	-0.002 (-4.20)	-0.003 (-6.12)	-0.014 (-0.83)	-0.012 (-0.61)
Debt/EBITDA > f^*	0.054 (0.15)		0.046 (2.32)		-0.004 (-1.10)	
Debt/EBITDA > f^{**}		0.006 (1.84)		0.070 (2.57)		-0.042 (-21.81)
Observations	979750	979750	915462	915462	952375	952375
adjusted-R ²	0.931	0.931	0.889	0.895	0.715	0.723

Payout regression

	Firm Max		Equity Max		Debt/Ebitda	
Constant	0.229 (9.85)	0.209 (8.83)	0.865 (17.56)	0.869 (23.29)	1.009 (24.50)	0.980 (21.10)
EBITDA/Asset	0.108 (9.56)	0.122 (10.53)	-0.836 (-10.98)	-0.719 (-8.81)	-0.432 (-1.94)	-0.358 (-1.92)
Q-ratio	0.100 (7.27)	0.101 (7.10)	-0.314 (-9.79)	-0.321 (-11.47)	-0.412 (-11.78)	-0.400 (-9.59)
Book Leverage	-0.289 (-23.11)	-0.291 (-21.52)	0.113 (3.62)	0.040 (1.22)	-0.091 (-5.09)	-0.139 (-7.34)
Debt/EBITDA > f^*	-0.000 (-0.14)		0.040 (0.58)		-0.084 (-2.63)	
Debt/EBITDA > f^{**}		0.020 (9.06)		0.164 (1.46)		-0.170 (-8.42)
Observations	979750	979750	915462	915462	952375	952375
adjusted-R ²	0.687	0.690	0.184	0.211	0.188	0.204

Conclusions

- ▶ Distortions in investment policies have been the focus of the literature on structural models of financial agency conflicts.
- ▶ Distortions in financing policies have been largely overlooked, but they can also be significant, and have an indirect effect on further exacerbating investment distortions.
- ▶ Likewise, debt covenants designed to mitigate a specific policy distortion, have effects also on the other policy distortion.
- ▶ Covenants alter policies more generally, even in states distant from the covenant violation states.
- ▶ Indirect costs of debt covenants can therefore be very large, as sometimes they unnecessarily constraining the firm's policy.
- ▶ Covenants on debt policy perform relatively better than covenants constraining investment/asset policy.

Thank you!