

Capital Constraints and Risk-Shifting

An Instrumental Approach

Alejandro Drexler

Thomas King

FRB Chicago

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Introduction

- Classical corporate finance theory (Jensen-Meckling) argues that firm owners should increase risk when firms are close to bankruptcy.
 - Increases option value – transfers risk from equity to debtholders
 - “Risk shifting” or “asset substitution” hypothesis.
- But there are also reasons to think that managers may decrease risk.
 - Bankruptcy / reputation costs; franchise value
 - “Risk management” rather than risk shifting.

Introduction

- It is difficult to test for risk shifting because of measurement and endogeneity issues.
 - For this reason, the literature is small and with mixed results.
 - Eisendorfer (JF, 2008); Becker and Stromberg (RFS, 2012); Rauh (RFS, 2009); Gilje (RFS, 2016) are the only papers that we know to offer direct tests.
- We add to this literature with evidence from P&C firms.
 - Exogenous shocks to leverage (insurance losses)
 - Transparent measures of risk-taking (investment ratings)
 - Interesting differences in capital structure (stock vs. mutual companies)

Introduction

- Specifically,
 - (1) Instrument leverage with insurance losses.
 - (2) Test whether losses cause changes in asset composition
- Main results:
 - Overall, evidence of risk shifting. But...
 - But almost all of it occurs among mutual companies.
 - Mutuels also increase use of reinsurance.
 - Stock companies tend to rebuild capital quickly after a shock.
- Conclusion:
 - Capital structure and risk shifting interact in complex ways.
 - It may be that risk shifting is more likely when capital constraints bind.

Background

- Data:
 - Annual statutory filings on 1,023 P&C companies, 2004 – 2018.
 - Mutual companies constitute about 1/3 of the sample.
- Key variables:
 - “Risky assets” = (junk bonds + equities + alt. investments) / assets
 - “Loss ratio” = (insurance losses – recoveries)/premiums earned
 - “Leverage” = Total Liabilities/assets

Summary Statistics

	(1)			(2)		
	Mutual Companies			Stock Companies		
	mean	sd	p50	mean	sd	p50
net admitted assets billion \$	0.450	1.965	0.041	10.393	52.026	0.107
direct premiums written billion \$	0.152	0.472	0.016	3.539	17.200	0.058
adjusted capital	0.231	1.200	0.020	3.936	21.998	0.040
prop. of stock and alt. inv.	0.145	0.188	0.084	0.116	0.185	0.036
prop. of prem. ceded to non-affiliates	0.217	0.183	0.167	0.205	0.219	0.129
debt ratio	0.266	0.122	0.260	0.284	0.156	0.266
surplus notes to assets ratio	0.013	0.049	0.000	0.014	0.048	0.000
leverage	0.506	0.178	0.516	0.578	0.177	0.603
capital to assets ratio	0.494	0.178	0.484	0.422	0.177	0.397
loss ratio	0.510	0.201	0.521	0.515	0.248	0.534
proportion non-investment grade	0.008	0.030	0.000	0.015	0.047	0.000
premiums ceded over assets	0.147	0.256	0.071	0.168	0.307	0.051
rbc ratio	11.790	8.831	9.874	8.797	8.612	6.863
Observations	4402			8142		

2SLS Specification

- Our baseline model is:
 - First stage:

$$Lev_{it} = \beta Loss_{it} + f_i^{(1)} + \delta_t^{(1)} + e_{it}$$

- Second stage:

$$y_{it+s} = \gamma \hat{Lev}_{it} + f_i^{(2)} + \delta_t^{(2)} + \eta_{it}$$

for various outcome variables y .

- Parameter of interest is γ .

First stage: Instrumenting leverage

	(1)	(2)	(3)
1 % winsorized loss ratio	0.119*** (0.005)	0.120*** (0.004)	0.134*** (0.007)
HD (high-debt dummy)		0.087*** (0.002)	0.092*** (0.005)
HP (high policy liab. dummy)		0.076*** (0.003)	0.081*** (0.005)
HS (high surplus notes dummy)		0.052*** (0.003)	0.068*** (0.006)
losa ratio X HD			-0.009 (0.008)
losa ratio X HP			-0.008 (0.008)
loas ratio X HS			-0.031*** (0.010)
Constant	0.494*** (0.005)	0.393*** (0.005)	0.386*** (0.006)
Observations	13,579	12,544	12,544
R-squared	0.079	0.269	0.270
Number of groups	1,023	969	969
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
r2	0.0811	0.467	0.471
F-test	46.75	169.8	152.1

Second stage: Capital Ratio

all				
	year-end	one year	two years	three years
leverage	-1.000*** (0.000)	-0.985*** (0.033)	-0.882*** (0.045)	-0.672*** (0.054)
Observations	12,544	11,605	10,710	9,885
Number of groups	969	922	856	815
mutual				
	year-end	one year	two years	three years
leverage	-1.000*** (0.000)	-1.087*** (0.048)	-0.993*** (0.063)	-0.804*** (0.073)
Observations	4,402	4,126	3,861	3,607
Number of groups	280	271	261	255
stock				
	year-end	one year	two years	three years
leverage	-1.000*** (0.000)	-0.937*** (0.043)	-0.824*** (0.060)	-0.604*** (0.074)
Observations	8,142	7,479	6,849	6,278
Number of groups	689	651	595	560

Second stage: Premiums ceded to reinsurers

all				
	year-end	one year	two years	three years
leverage	0.610***	0.567***	0.464***	0.236***
	(0.073)	(0.075)	(0.079)	(0.081)
Observations	12,468	11,535	10,641	9,825
Number of groups	968	921	856	815
mutual				
	year-end	one year	two years	three years
leverage	0.953***	1.163***	1.047***	0.413***
	(0.118)	(0.130)	(0.129)	(0.124)
Observations	4,394	4,116	3,852	3,598
Number of groups	279	270	261	255
stock				
	year-end	one year	two years	three years
leverage	0.466***	0.288***	0.163	0.141
	(0.094)	(0.096)	(0.103)	(0.106)
Observations	8,074	7,419	6,789	6,227
Number of groups	689	651	595	560

Second stage: % of risky assets

	year-end	one year	two years	three years
leverage	0.098*	0.120*	0.080	0.068
	(0.054)	(0.062)	(0.067)	(0.072)
Observations	12,544	11,605	10,710	9,885
Number of groups	969	922	856	815
mutual				
	year-end	one year	two years	three years
leverage	0.336***	0.353***	0.380***	0.478***
	(0.101)	(0.113)	(0.119)	(0.129)
Observations	4,402	4,126	3,861	3,607
Number of groups	280	271	261	255
stock				
	year-end	one year	two years	three years
leverage	-0.010	0.002	-0.078	-0.142
	(0.066)	(0.075)	(0.082)	(0.088)
Observations	8,142	7,479	6,849	6,278
Number of groups	689	651	595	560

Second stage: RBC ratio

all				
	year-end	one year	two years	three years
leverage	-27.482*** (2.394)	-33.634*** (2.640)	-34.541*** (2.996)	-28.006*** (3.095)
Observations	12,138	11,245	10,388	9,599
Number of groups	964	915	846	805
mutual				
	year-end	one year	two years	three years
leverage	-40.292*** (4.165)	-47.079*** (4.453)	-52.622*** (5.443)	-42.531*** (4.923)
Observations	4,171	3,910	3,661	3,421
Number of groups	277	266	254	248
stock				
	year-end	one year	two years	three years
leverage	-22.499*** (2.990)	-27.740*** (3.322)	-25.586*** (3.633)	-20.355*** (3.996)
Observations	7,967	7,335	6,727	6,178
Number of groups	687	649	592	557

Additional results

- Results are the same using only “catastrophic” losses (95th percentile)
- Results are not driven by firm size.
 - But large mutuals regain capital more slowly than small mutuals and also do more risk shifting.
- No clear pattern across liability composition.
 - But stock-company results are driven by firms with high policyholder liabilities

Conclusion

- We find evidence for risk shifting among P&C insurers, using exogenous insurances losses as instrument.
- However, the results are driven by mutual companies.
 - After a shock, stock companies rebuild capital quickly (presumably by issuing stock).
 - Mutual companies rely more on reinsurance but increase the riskiness of assets.
- Results suggest a subtle interplay between capital constraints and risk-shifting incentives.
 - A possible reason for mixed results in previous literature.