Discussion of
Foley-Fisher, Narajabad, and Verani, "Who Limits Arbitrage?"

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Overview

- Short-selling constraints are an important limit to arbitrage.
  - But typically assumed exogenous.
- This paper considers how the cost of short-selling is determined.
  - Thereby how price-informativeness is determined.
  - Punchline: it's related to the risk tolerance of securities lenders.

- Nice paper on important and under-studied topic in this literature.
- Intriguing mechanism; impressive use of data.

Theory: overview

- Traders:
  - Informed/strategic and "chartists"
  - One long and one short, depending on relative signals
  - Shorting involves a cost r.
- Sec lenders:
  - Strategic and non-strategic
  - Strategic reinvest cash in risky project
  - Their risk aversion (ρ) determines quantity of lending
- Rebate rate clears the market.
  - Lower ρ ➔
    smaller r ➔
    more sec lending ➔
    more shorting ➔
    more-informative price

Theory: minor questions

- Strong restrictions on sec lenders:
  - Can't sell or buy securities.
  - Can't invest at risk-free rate.
- Risk tolerance is exogenous.
  - FF-N-V (2018): Mat. trans. of reinvestments a hedge against IR risk on balance sheet.
  - But this is risk *management*, not risk taking.
- What about haircuts?
- No attention to counterparty risk.

Theory: market structure

- Strategic sec lenders can influence prices, essentially exerting market power.
- Is this plausible?

Bond-Insurer-Year Data	Obs	Mean	St. Dev.	p25	Median	p75
% lendable held ($Market\ share_{ijt}$)	335,710	0.07	0.11	0.01	0.03	0.08
HHI of life insurers' holdings (HHI_{it})	335,710	0.17	0.26	0.03	0.07	0.19

… not really.

Theory: market structure

- Does this matter for the authors? Probably not!
- Bond supply with strategic behavior:

$$x = \frac{\ell_n}{2}\left(1 + \sqrt{1 + \frac{4\tau_R}{\rho_s \ell_n}}\right) r$$

- Without strategic behavior:

$$x = \left(\ell_n + \frac{\tau_R}{\rho_s}\right) r$$

  - Still linear in *r*; slope still depends inversely on risk tolerance.
  - In fact, not clear that you need the "non-strategic" lenders at all.

Evidence: overview

- Builds on dataset compiled in authors' previous paper.
- Merge data on (1) sec lending; (2) insurer reinvestments; (3) bond trades
- Two main tests of theory:
  - Are riskier sec lenders more willing to lend bonds with higher rebates?
  - Do bonds held by riskier sec lenders have more informative prices?

Evidence: measurement

- "Price-informativeness" is measured as estimated inverse bid-ask spread from TRACE (Dick-Nielsen,2009).
  - This is usually regarded as a measure of liquidity.
  - Authors also use trading volumes.

- "Risk tolerance" is measured as fraction of reinvestments w/maturity > 1 year.
  - Other dimensions of risk?
  - What factors cause these differences?
  - What about risk in the rest of the insurer's business?

Evidence: main results

Dependent variable: $Loan_{ijt}$	(1)	(2)	(3)	(4)	(5)
Reinvestment risk$_{jt}$	0.099***	0.103***	0.107***	0.107***	0.111***
	(0.009)	(0.013)	(0.009)	(0.030)	(0.009)
Reinvestment risk$_{jt}$ × *Rebate*$_{it}$	0.220***	0.273***	0.205***	0.205***	0.036
	(0.016)	(0.030)	(0.019)	(0.061)	(0.024)

- (Mostly) validates model's predictions for supply.

Dependent variable: *Price informativeness*$_{it}$	(1)	(2)	(3)	(4)	(5)
Reinvestment risk index$_{it}$	0.285***				
	(0.064)				
Reinvestment risk index$_{it}$		0.359***	0.380***	0.347**	0.347*
		(0.130)	(0.128)	(0.161)	(0.191)

- Consistent with predictions for price informativeness...

  … but may also be consistent with other stories…

Evidence: reverse causality?

- Main result: liquidity depends on riskiness of sec lenders.
  - But market participants may care about liquidity when deciding which bonds to borrow/lend.
  - Short sellers may demand higher rebates for less-liquid bonds.

- There is some evidence of this for dealers sec financing…

Evidence: reverse causality?

Financing rates *depend on* liquidity.

Net fraction of dealers tightening sec financing rates as a function of:

	By Asset Class							Pooled			
	Agency MBS	IG Corp	HY Corp	ABS	CMBS	Priv. RMBS	Equities	5 asset classes	6 asset classes	5 asset classes	6 asset classes
Demand	0.05 (0.12)	0.00 (0.24)	0.72*** (0.22)	0.39 (0.24)	0.37* (0.20)	0.28* (0.15)	-0.06 (0.10)	0.19*** (0.07)	0.21*** (0.06)	0.09 (0.06)	0.07 (0.05)
Liquidity	-0.62*** (0.17)	-0.47** (0.19)	-0.69*** (0.14)	-0.29** (0.13)	-0.54*** (0.15)	-0.54*** (0.16)	--	-0.52*** (0.06)	-0.52*** (0.06)	-0.22*** (0.06)	-0.23*** (0.06)
Realized vol.	0.31 (0.36)	0.24 (0.26)	0.20 (0.14)	-0.21 (0.77)	0.19 (0.48)	--	0.03 (0.04)	0.01 (0.10)	--	0.07 (0.09)	--
Dealer excess CDS	-0.02 (0.09)	0.05 (0.10)	-0.08 (0.10)	0.14 (0.11)	0.04 (0.14)	0.18 (0.14)	0.12 (0.08)	0.04 (0.05)	0.06 (0.04)	--	--
CDX	-0.13 (0.19)	0.10 (0.21)	0.25 (0.20)	-0.05 (0.25)	-0.01 (0.28)	-0.20 (0.28)	-0.18 (0.16)	-0.05 (0.09)	-0.07 (0.09)	--	--
VIX	0.51 (0.39)	-0.13 (0.48)	0.19 (0.47)	0.36 (0.45)	0.48 (0.54)	0.25 (0.57)	0.75 (0.48)	0.22 (0.20)	0.23 (0.18)	--	--
MOVE	-0.18 (0.17)	-0.08 (0.18)	-0.22 (0.17)	-0.05 (0.16)	-0.24 (0.22)	-0.16 (0.21)	-0.04 (0.12)	-0.06 (0.07)	-0.08 (0.07)	--	--
Asset Class F.E.	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes
Time F.E.	--	--	--	--	--	--	--	No	No	Yes	Yes
Adj R^2	0.28	0.38	0.65	0.63	0.65	0.38	-0.03	0.47	0.47	0.76	0.77
Obs	35	35	30	30	30	30	35	160	190	160	190

Breach, T., and King, T. B., 2018. "Securities Financing and Asset Markets: New Evidence" FRB Chi. WP 2018-13 (Nov.).

Evidence: reverse causality?

- How do we know the causality goes this way?
  - Additional SCOOS questions ask about the reasons for changing terms.
  - Instrument using these reported reasons—identify changes that are *not* due to liquidity.
  - Those changes have no *correlation* with liquidity.

- A story like this could be contributing to the authors' results.
  - Instrument?

Conclusion

- Interesting paper
- Thanks