Funding Liquidity Risk and the Cross-Section of Stock Returns

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Asset Pricing with Intermediation Frictions

- A growing body of theoretical work emphasizes the role of constraints in the *intermediation* sector for asset pricing.: funding risk, liquidation risk, margin risk,...

  e.g., Basak and Croitoru 2000; Kyle and Xiong 2001; Gromb and Vayanos 2002; Vayanos 2004; Brunnermeier and Pedersen 2009; Garleanu and Pedersen 2009 and 2011; He and Krishnamurthy 2012.

- Measuring how large is the effect of these frictions on the risk premium remains an open empirical question. In a large part because measuring the effect of funding risk separately from other risks is challenging. Commonly used indicators include the TED spread and the VIX index. But what else do they capture?

- Fontaine and Garcia (2012) measure the value of funding liquidity (*FL*) using a no-arbitrage model and a panel of Treasury securities.

Measuring Finding Risk and the funding liquidity premium

- We measure FL from the cross-section of Treasury bonds. No other risk factors enter the price difference between Treasury bonds with similar coupons and maturities.
- *FL* is based on deviations from no-arbitrage prices. *FL* reflects the willingness to hold the Treasury securities that can be funded most easily (in the repo market) to meet uncertain cash outflows and margin calls.

  See Duffie (1996); Vayanos and Weill (2006); Graveline and Banerjee (2013) for theory.

- Fontaine and Garcia (2012) find that *FL* is correlated with:

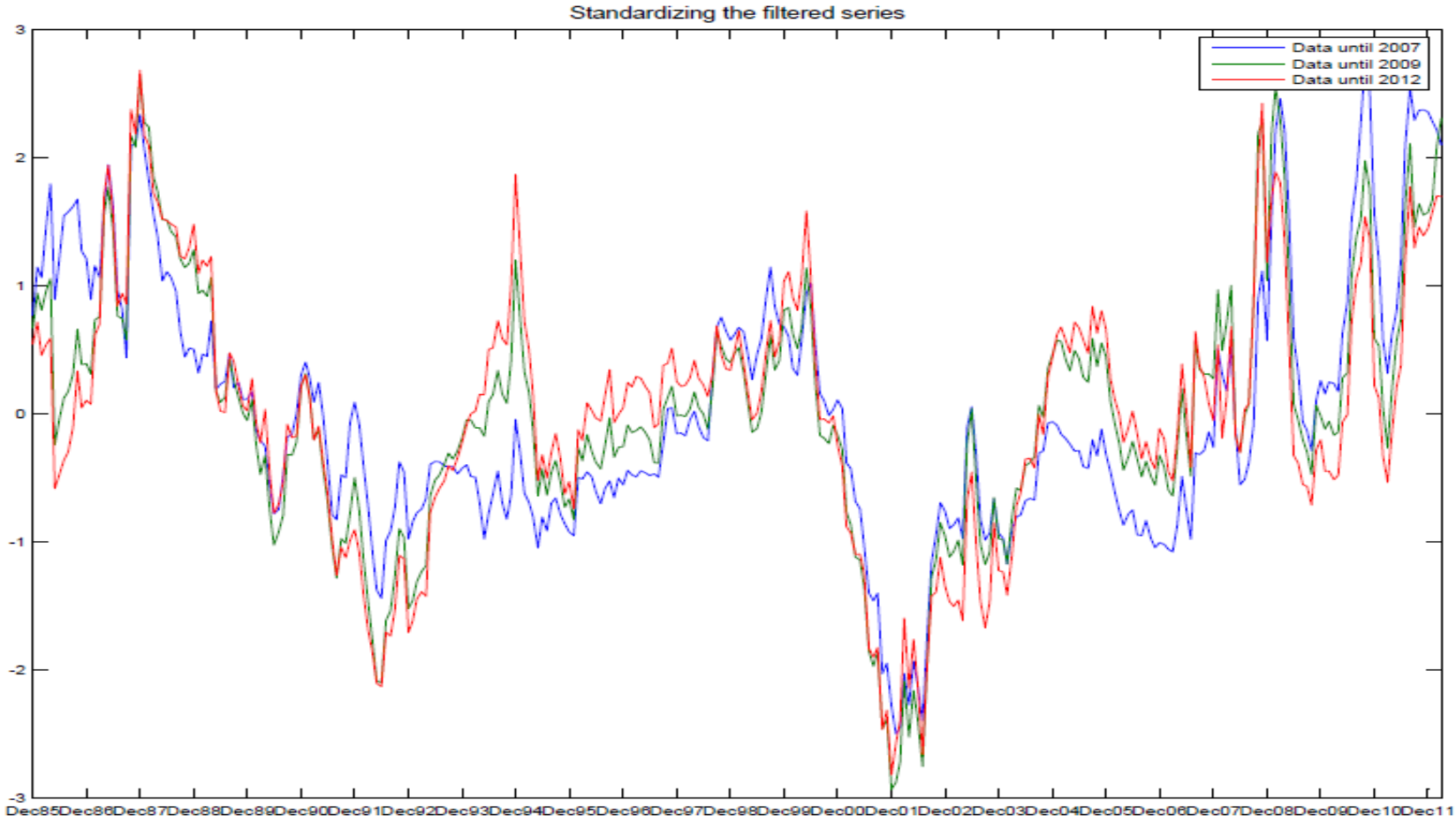
  (i) repo special rates,
  (ii) the supply of liquidity via the shadow banking sector,
  (iii) monetary aggregates.

- Consistent with flight-to-liquidity, higher *FL* predicts

  (i) lower risk premium on Treasury securities,
  (ii) higher risk premium on LIBOR loans, swaps, agency and corporate bonds.

Funding Liquidity Premium (FL_t)

Fontaine and Garcia (2012)



Estimated with on data up to 2007, up to 2009 or up to 2012.

This Paper:

I. Follow theory and look for the effect of funding risk across portfolios of equities sorted by their volatility and their illiquidity.

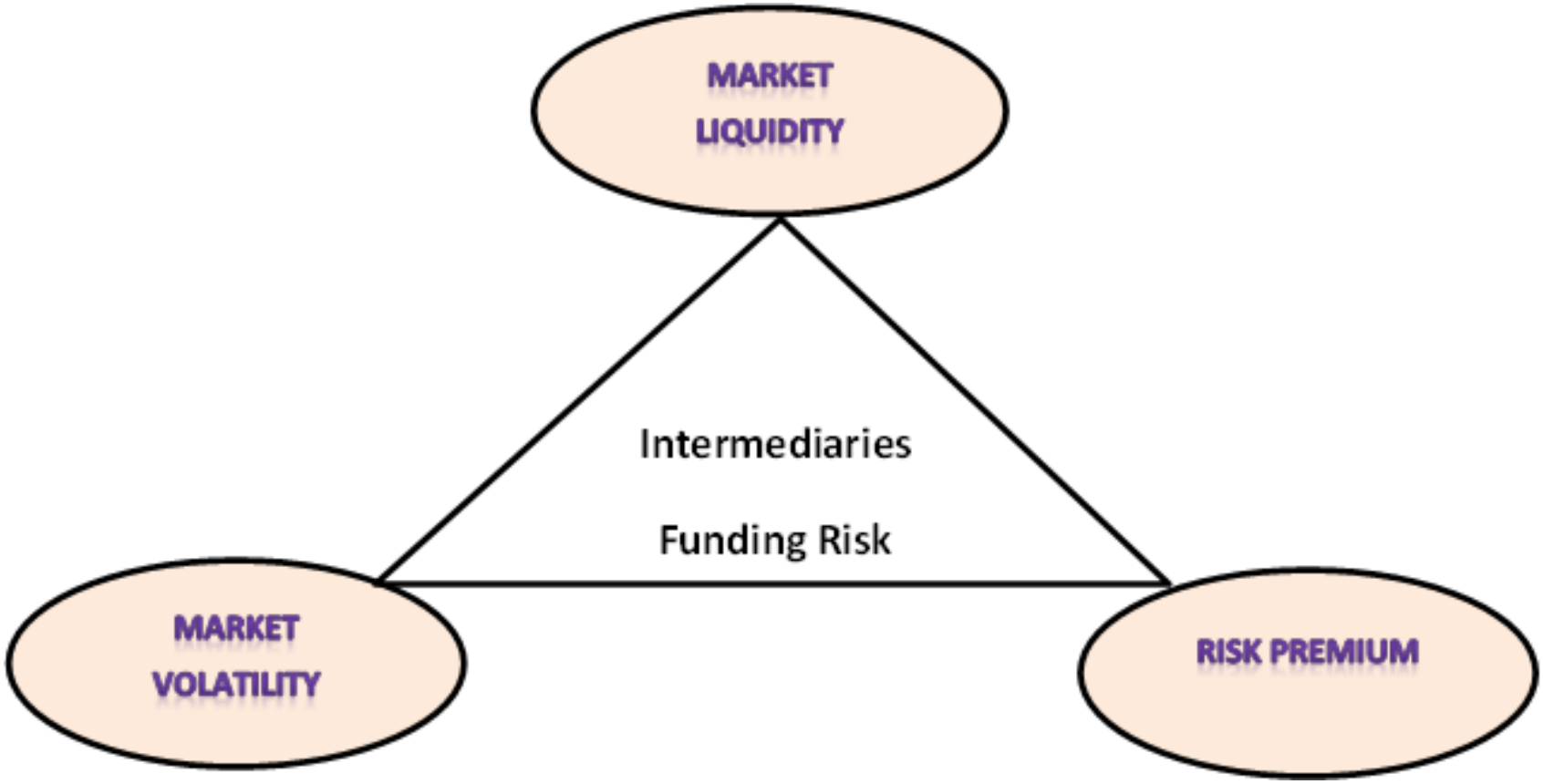
II. Show that higher funding risk is associated with a higher level and a higher dispersion of illiquidity and of volatility in the cross-section.

III. Show that higher exposure to funding risk explains the cross-section of returns across equities sorted by their illiquidity and their volatility.

IV. Show that the combination of market liquidity risk and funding liquidity risk provides particularly strong results.

V. Compare with Leverage Factor of Adrian, Etula and Muir (JF, forthcoming), closest paper to ours.

Volatility, Illiquidity and the Risk Premium



Brunnermeier and Pedersen (2009)

- Higher fundamental volatility, $\sigma^k > \sigma^l$ implies higher market price impact (illiquidity),

$$|\Lambda^k| > |\Lambda^l|.$$

- The illiquidity $|\Lambda^k|$ co-moves with funding risk ϕ:

$$Cov(|\Lambda^k|, \phi) > 0.$$

- Higher exposure to funding risk implies higher risk premium:

$$p_0^k = E_0[p_1^k] + \gamma Cov(p_1^k, \phi).$$

Portfolio Formation

- Sort equities based on their illiquidity and volatility.
- Illiquidity Sort. Form 10 equal-weighted portfolios when sorting individual stock using the Amihud illiquidity ratio ($ILLIQ_{id}$):

$$ILLIQ_{id} = \frac{|R_{id}|}{DVOL_{id}} \times 10^6 \times \frac{CAP_{i,d-1}}{CAP_{i,1}} \tag{1}$$

  where R_{id} is the return on a stock i on day d, $DVOL_{i,d}$ is the dollar value of trading volume on the same day, and $CAP_{i,d-1}/CAP_{i,1}$ is an adjustment for the growth in the market capitalization.
- Volatility Sort. Form 10 equal-weighted portfolios when sorting individual stock using last month realized stock volatility.

Summary Statistics – Illiquidity-sorted Portfolios

	Illiqu.	2	3	4	5	6	7	8	9	Liquid
Illiqu.	3.32	0.51	0.18	0.08	0.03	0.02	0.01	0.00	0.00	0.00
Vol.	2.30	2.35	2.28	2.22	2.14	2.07	2.05	2.01	1.91	1.83
Cap.	0.29	0.71	1.28	1.94	2.90	4.31	6.28	11.04	21.49	93.31
$E(R)$	1.43	1.52	1.36	1.30	1.22	1.13	1.07	1.10	0.96	0.88
β	0.71	0.83	0.87	0.89	0.91	0.93	0.95	0.97	0.97	1.00
CAPM α	0.73 (4.51)	0.71 (3.68)	0.53 (3.00)	0.45 (2.60)	0.38 (2.37)	0.30 (2.04)	0.21 (1.54)	0.26 (2.02)	0.16 (1.54)	0.09 (1.23)
FF3 α	0.52 (4.87)	0.46 (3.93)	0.29 (2.72)	0.22 (1.91)	0.17 (1.45)	0.10 (0.94)	0.04 (0.35)	0.09 (0.92)	0.04 (0.47)	0.04 (0.70)
Sharpe R.	0.26	0.22	0.19	0.18	0.17	0.16	0.14	0.15	0.14	0.13

Summary Statistics – Volatility-sorted Portfolios

	Most	2	3	4	5	6	7	8	9	Least
Illiq.	0.85	0.49	0.46	0.35	0.30	0.33	0.27	0.24	0.25	0.38
Vol.	3.04	2.69	2.47	2.30	2.16	2.01	1.89	1.73	1.58	1.33
Cap.	4.46	6.15	8.20	10.45	13.08	18.06	17.30	20.10	22.73	23.01
$E(R)$	1.56	1.41	1.26	1.28	1.19	1.12	1.11	1.06	0.97	1.02
β	1.08	1.02	0.99	0.97	0.95	0.92	0.89	0.85	0.80	0.71
CAPM α	0.55 (2.50)	0.48 (2.64)	0.36 (2.35)	0.39 (2.56)	0.34 (2.31)	0.32 (2.39)	0.32 (2.42)	0.32 (2.79)	0.28 (2.41)	0.43 (3.85)
FF α	0.34 (2.06)	0.26 (2.04)	0.16 (1.49)	0.18 (1.66)	0.13 (1.23)	0.13 (1.33)	0.13 (1.37)	0.17 (1.90)	0.13 (1.45)	0.31 (3.27)
Sharpe R.	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.18	0.17	0.23

Illiquidity, Volatility and Funding Risk.

Differences of means between sub-samples with high or low lagged Funding Liquidity risk FL_{t-1}

	Liquidity Portfolios		Volatility Portfolios	
	Illiquidity	Volatility	Illiquidity	Volatility
1	89.30	0.47	21.97	0.36
2	4.25	0.43	18.57	0.46
3	3.81	0.38	11.19	0.43
4	1.54	0.36	7.94	0.39
5	1.23	0.39	2.56	0.42
6	0.53	0.37	6.46	0.41
7	0.14	0.36	9.23	0.40
8	0.07	0.35	-2.87	0.32
9	0.04	0.33	5.94	0.32
10	0.01	0.31	3.65	0.23

Higher funding risk is associated with a higher level and a higher dispersion of illiquidity and of volatility in the cross-section.

Asset Pricing Tests

Higher funding risk exposure generates higher returns in the cross-section of equities sorted by their illiquidity and their volatility.

- Standard two-stage Fama-MacBeth regressions.
- Traded risk factors included as test assets, if applicable.
- Standard two-stage t-stats, and Shanken corrected t-stat
- R^2s and adjusted $\bar{R}^2$s are computed for all test assets. Also compute "corrected" R_c^2 and $\bar{R}_c^2$, excluding traded risk factors from the computation of the fit.
- Standard bootstrap confidence interval.

Illiquidity and Volatility Portfolios – Base models

	CAPM	FF3	ΔFL	Augmented by ΔFL	
α	4.22 (1.60) (1.59)	-0.94 (-0.96) (-0.93)	-2.39 (-0.66) (-0.47)	-3.41 (-0.93) (-0.62)	-2.45 (-2.99) (-2.37)
ΔFL			-4.22 (-2.43) (-1.73)	-4.72 (-3.43) (-2.32)	-3.23 (-3.25) (-2.60)
MKT	6.48 (1.46) (1.46)	7.49 (2.24) (2.23)		11.20 (2.20) (1.66)	8.69 (2.61) (2.54)
SMB		4.38 (1.76) (1.75)			5.59 (2.28) (2.20)
HML		4.94 (2.13) (2.12)			5.42 (2.33) (2.25)
$\bar{R}^2_c$	21.68%	60.12%	46.65%	42.75%	70.95%
R^2_c	25.80%	66.42%	49.46%	48.78%	77.07%
R^2	20.46%	84.14%	49.46%	54.58%	89.59%
C.I.	[0.12, 59.20]	[66.25, 90.79]	[17.84, 70.81]	[20.83, 72.97]	[79.73, 93.37]
$\bar{R}^2$	16.27%	81.63%	46.65%	49.53%	87.28%
C.I.	[-5.08, 57.88]	[60.26, 88.83]	[14.93, 69.49]	[9.69, 69.84]	[74.18, 91.87]

Alternative portfolio sorts

Robust to alternative measurement of (unobservable) stock characteristics.

- Sort AMEX/NYSE stocks in two sets of 10 portfolios based on illiquidity and volatility *risk*.
- Liquidity risk:

$$\beta_i^{Illiq_m, r_i} = \frac{cov(Illiq_m, r_i)}{var(Illiq_m)}.$$

- Volatility risk:

$$\beta_i^{\sigma_m, r_i} = \frac{cov(\sigma_m, r_i)}{var(\sigma_m)}.$$

- Estimated using daily data and a 5-year rolling window.

Illiquidity and Volatility Portfolios – Alternative sorts

	CAPM	FF3	ΔFL	Augmented by ΔFL	
α	-2.06 (-0.49) (-0.48)	-3.12 (-2.45) (-2.35)	-2.68 (-0.67) (-0.48)	-3.81 (-0.88) (-0.60)	-3.04 (-2.44) (-1.94)
ΔFL			-4.21 (-2.88) (-2.06)	-4.45 (-2.94) (-2.05)	-3.22 (-1.87) (-1.48)
MKT	12.76 (2.34) (2.30)	9.10 (2.72) (2.70)		11.51 (2.16) (1.65)	9.25 (2.75) (2.67)
SMB		4.41 (1.70) (1.69)			4.54 (1.74) (1.64)
HML		5.93 (2.38) (2.36)			5.84 (2.36) (2.22)
R^2	35.29%	87.91%	73.06%	75.46%	92.02%
C.I. R^2	[0.27, 76.90]	[51.98, 94.91]	[25.70, 93.51]	[33.39, 91.80]	[66.87, 97.27]
$\bar{R}^2$	31.88%	86.00%	71.56%	72.74%	90.25%
C.I. $\bar{R}^2$	[-5.04, 74.64]	[46.84, 93.88]	[16.86, 92.27]	[26.84, 91.24]	[61.24, 96.75]

Robust to alternative measurement of stock volatility and illiquidity.

Alternative Liquidity Risk proxies

Robust to including alternative liquidity proxies

- Market liquidity proxies
  - (i) Aggregate market Amihud ratio.
  - (ii) Pastor-Stambaugh market liquidity factor (PS).
- Funding liquidity proxies
  - (i) LIBOR to T-bill spread (TED) – see Gârleanu and Pedersen (2009).
  - (ii) Betting-against-Beta factor (BAB) – see Frazzini and Pedersen (2012).

Illiquidity and Volatility Portfolios – Alternative risk proxies

α	-2.39 (-0.66) (-0.47)	-0.13 (-0.04) (-0.03)	-0.71 (-0.17) (-0.11)	0.92 (1.95) (1.33)	-2.72 (-0.69) (-0.50)
ΔFL	-4.22 (-2.43) (-1.73)	-3.59 (-2.84) (-2.18)	-5.00 (-3.36) (-2.15)	-3.33 (-2.93) (-2.02)	-4.02 (-2.57) (-1.87)
BAB		7.65 (1.95) (1.66)			
Am			0.46 (1.05) (0.67)		
PS				-0.35 (-2.55) (-1.75)	
TED					-0.94 (-0.75) (-0.55)
R^2	49.46% [17.84, 70.81]	39.25% [9.29, 63.16]	50.63% [17.16, 73.68]	94.14% [85.86, 98.34]	49.57% [13.26, 67.68]
$\bar{R}^2$	46.65% [14.93, 69.49]	32.50% [0.03, 57.83]	44.82% [8.43, 71.18]	93.49% [84.54, 98.18]	43.63% [6.55, 64.59]

The combination of market liquidity risk and funding liquidity risk provides a particularly good fit.

Illiquidity and Volatility Portfolios – Funding Liquidity and Market Liquidity – Sub-samples

(a) Liquidity Portfolios

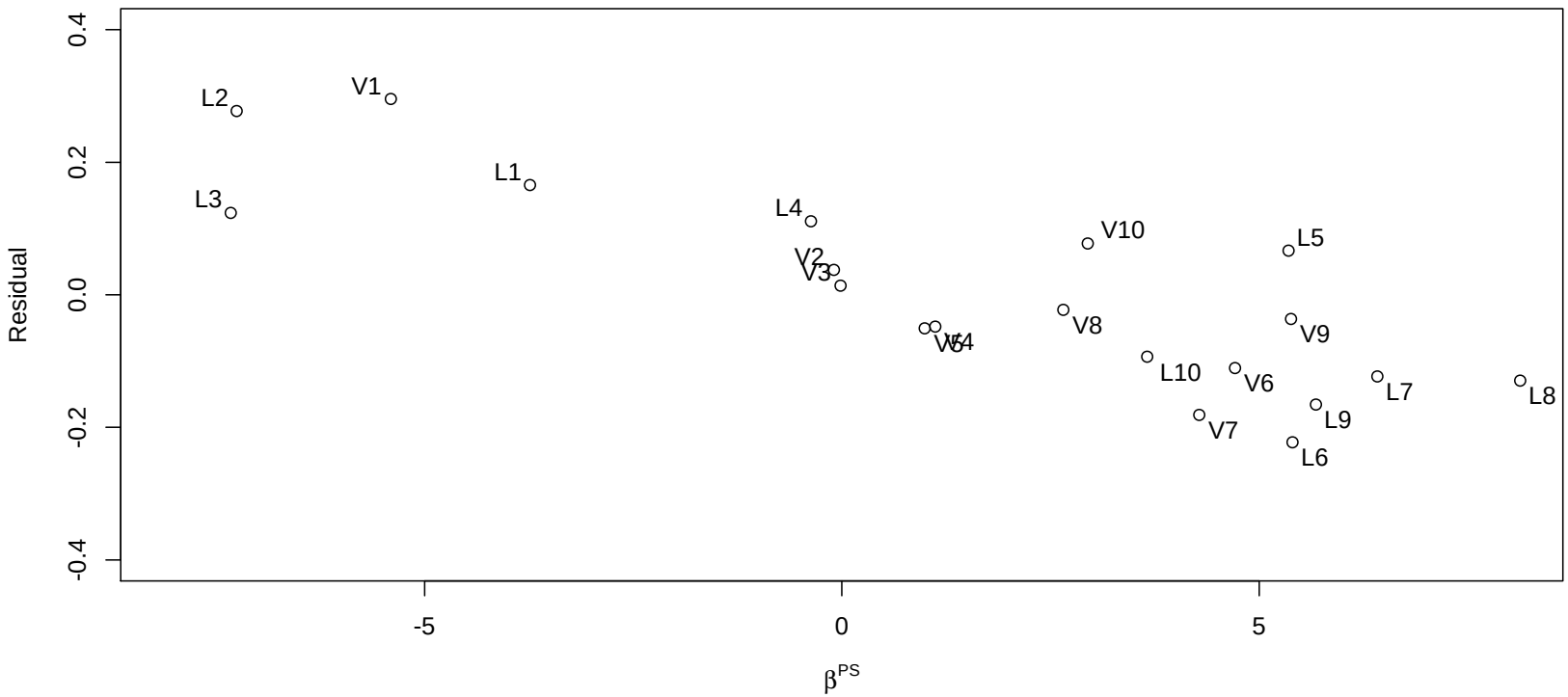
		Illiquid	2	3	4	5	6	7	8	9	Liquid
Lo Liq	β^{FL}	-7.32 (-5.17)	-7.81 (-4.31)	-7.61 (-4.17)	-6.93 (-3.70)	-6.72 (-3.97)	-7.7 (-4.46)	-6.73 (-4.02)	-7.07 (-4.33)	-5.93 (-4.11)	-5.05 (-3.58)
	β^{PS}	-3.59 (-0.31)	-16.41 (-1.12)	-18.48 (-1.25)	-10.01 (-0.66)	0.77 (0.06)	7.26 (0.52)	6.48 (0.48)	5.19 (0.39)	6.08 (0.52)	4.03 (0.35)
Hi Liq	β^{FL}	-0.16 (-0.14)	0.09 (0.07)	0.43 (0.35)	-0.03 (-0.02)	-0.15 (-0.13)	-0.46 (-0.41)	-0.7 (-0.60)	-0.19 (-0.18)	-0.37 (-0.36)	-0.72 (-0.74)
	β^{PS}	-31.26 (-3.05)	-25.88 (-2.06)	-21.63 (-1.85)	-15.42 (-1.33)	-10.82 (-0.95)	-15.65 (-1.48)	-9.60 (-0.87)	-8.36 (-0.82)	-8.94 (-0.94)	-7.17 (-0.78)
All	β^{FL}	-3.18 (-4.46)	-3.33 (-3.83)	-3.17 (-3.62)	-2.83 (-3.22)	-3.02 (-3.71)	-3.56 (-4.34)	-3.1 (-3.78)	-3.22 (-4.11)	-2.76 (-3.89)	-2.36 (-3.39)
	β^{PS}	-3.74 (-0.58)	-7.25 (-0.93)	-7.32 (-0.93)	-0.37 (-0.05)	5.35 (0.73)	5.40 (0.73)	6.42 (0.87)	8.13 (1.15)	5.68 (0.89)	3.66 (0.58)

Illiquidity and Volatility Portfolios – Funding Liquidity and Market Liquidity – Sub-samples

(b) Volatility Portfolios

		Volatile	2	3	4	5	6	7	8	9	Stable
Lo Liq	β^{FL}	-8.27	-8.65	-7.64	-7.73	-7.43	-6.85	-6.91	-5.86	-5.59	-4.26
		(-3.40)	(-4.30)	(-4.16)	(-4.11)	(-4.24)	(-4.30)	(-4.44)	(-4.32)	(-4.53)	(-4.41)
	β^{PS}	-18.89	-8.17	-4.85	-5.63	-3.45	3.15	2.85	2.99	9.62	3.78
		(-0.96)	(-0.50)	(-0.33)	(-0.37)	(-0.24)	(0.24)	(0.23)	(0.27)	(0.96)	(0.48)
Hi Liq	β^{FL}	0.44	0.56	-0.02	0.02	-0.29	-0.91	-0.55	-0.38	-0.46	-0.58
		(-0.26)	(-0.40)	(-0.01)	(0.01)	(-0.24)	(-0.83)	(-0.54)	(-0.40)	(-0.58)	(-0.79)
	β^{PS}	-26.32	-21.09	-24.39	-16.19	-13.09	-13.34	-10.57	-12.99	-9.65	-6.46
		(-1.64)	(-1.61)	(-1.94)	(-1.36)	(-1.16)	(-1.29)	(-1.12)	(-1.45)	(-1.30)	(-0.94)
All	β^{FL}	-3.35	-3.49	-3.45	-3.27	-3.2	-3.32	-3.24	-2.6	-2.52	-2.19
		(-2.95)	(-3.54)	(-3.84)	(-3.65)	(-3.85)	(-4.31)	(-4.39)	(-3.90)	(-4.20)	(-4.50)
	β^{PS}	-5.41	-0.10	-0.02	1.12	0.99	4.71	4.28	2.65	5.38	2.95
		(-0.53)	(-0.01)	(-0.00)	(0.14)	(0.13)	(0.68)	(0.64)	(0.44)	(1.00)	(0.67)

Interaction between Funding and Market Liquidity Risk



Alternative Test Assets

Robust in other asset classes.

(i) Momentum portfolios – Linked to funding liquidity risk in e.g., Asness, Moskowitz and Pedersen (JF, 2013).

(ii) Market Beta portfolios – Linked to funding conditions in e.g., Frazinni and Pedersen (2012).

(iii) Size and Book-to-Market portfolios.

It is natural to ask how much of the returns dispersion can be traced to funding shocks, if any.

$\Rightarrow$ Price-of-risk estimates are robust

$\Rightarrow$ The combination of market liquidity risk and funding liquidity risk provides particularly good fit.

Alternative test assets – All 75 Portfolios

Alternative Proxies

α	0.07 -0.02 -0.01	10.19 -3.39 -3.39	8.67 -2.37 -2.34	10.62 -3.16 -2.49	7.12 -3.35 -3.25
ΔFL	-3.24 (-1.91) (-1.52)				
BAB		-0.49 (-0.12) (-0.12)			
Am			-0.27 (-0.52) (-0.51)		
PS				-0.37 (-3.24) (-2.58)	
TED					-1.31 (-1.32) (-1.28)
R^2	28.46% [0.05, 53.92]	0.22% [0.02, 41.90]	1.45% [0.01, 34.79]	36.73% [0.25, 57.59]	12.30% [0.02, 41.32]

Alternative test assets – All 75 Portfolios Augmented Models

α	-2.11 (-0.65) (-0.46)	0.76 -0.17 -0.12	2.27 -1.51 -1.14	3.84 (2.23) (1.91)
ΔFL	-4.17 (-3.54) (-2.55)	-4.01 (-2.44) (-1.74)	-2.66 (-2.27) (-1.73)	-2.51 (-1.71) (-1.47)
BAB	11.21 -2.99 -2.46			
Am		0.54 -1.22 -0.88		
PS			-0.28 (-2.88) (-2.22)	
TED				0.33 (0.35) (0.30)
R^2	35.63% [2.07, 64.03]	32.20% [0.94, 58.91]	65.19% [7.39, 75.36]	22.78% [0.89, 54.81]

Alternative test assets – 50 Portfolios excluding Value Augmented Models

α	1.43 (0.51) (0.42)	0.42 (0.12) (0.09)	1.29 (1.43) (1.07)	4.06 (2.96) (2.32)
ΔFL	-2.90 (-2.41) (-2.01)	-3.90 (-2.22) (-1.62)	-3.06 (-2.54) (-1.91)	-3.10 (-2.07) (-1.63)
BAB	4.79 (1.25) (1.12)			
Am.		0.40 (0.94) (0.69)		
PS			-0.25 (-2.43) (-1.83)	
TED				1.20 (1.33) (1.06)
R^2	33.10% [1.53, 75.03]	41.66% [1.50, 71.69]	80.99% [16.24, 84.06]	32.86% [1.54, 68.12]

Summary

- We have seen that
  - (i) Funding shocks are associated with risk in the stock market: higher level and dispersion of illiquidity and volatility.
  - (ii) Robust and significant price of risk estimate between -3% and -4%.
  - (iii) The spread across βs is 1.5 across illiquidity portfolios, implying a risk premium between 4% and 6% annualized.
  - (iv) Exposures to funding liquidity risk and market liquidity risk seems to play a very significant role in stock markets.

Broker-Dealer Leverage (BD)

- Adrian, Etula and Muir (JF) : Broker-dealer leverage may measure the tightness of borrowing constraints or funding liquidity (Brunnermeier and Pedersen, 2009).
- This interpretation gives rise to pro-cyclical leverage (the margin spiral) and is potentially an important source of macro-economic risk.
- However, they find that leverage shocks are largely uncorrelated with the shocks to the Pastor-Stambaugh (2003) liquidity factor, challenging the theoretical predictions that funding liquidity and market liquidity are intertwined. They also find that they are only weakly related to volatility.
- Intermediation-based theory predicts that volatility, illiquidity and risk premia go hands in hand. A challenge to theory?
- We find that leverage is priced in Value portfolios and that funding risk is priced in Volatility, Size and Illiquidity portfolios.

Illiquidity and Volatility-sorted Portolios

	CAPM	FF3	LevFct	ΔFL	Augmented by ΔFL		
α	3.83 (1.35)	-0.95 (-1.06)	12.90 (2.75)	1.12 (0.39)	2.96 (1.01)	-1.21 (-1.42)	2.09 (0.82)
ΔFL				-1.63 (-2.12)	-2.32 (-2.90)	-2.00 (-2.62)	-1.56 (-2.12)
LevFct			-40.42 (-1.43)				-8.19 (-0.38)
MKT	6.62 (1.36)	8.52 (2.33)			2.82 (0.63)	7.97 (2.18)	
SMB		4.98 (2.19)				4.98 (2.19)	
HML		4.59 (1.52)				4.46 (1.47)	
R^2	21.49%	81.01%	7.90%	69.23%	81.87%	84.67%	69.80%
$\bar{R}^2$	17.36%	78.01%	2.78%	67.52%	79.86%	81.26%	66.24%

Quarterly returns (to match LevFct frequency).

10x10 Size and Book-to-Market portfolios (double-sort)

	CAPM	FF3	LevFct	ΔFL	Augmented by ΔFL		
α	27.82	19.89	1.93	-4.64	9.82	18.83	-2.42
	(2.65)	(4.51)	(0.40)	(-0.67)	(1.47)	(4.72)	(-0.37)
ΔFL				-1.87	-1.40	-1.05	-1.09
				(-2.09)	(-1.84)	(-1.35)	(-1.49)
LevFct			99.54				75.55
			(2.65)				(3.11)
MKT	-18.52	-16.88			-4.95	-13.75	
	(-1.89)	(-2.47)			(-0.70)	(-2.42)	
SMB		5.82				4.22	
		(1.94)				(1.58)	
HML		2.47				-2.60	
		(0.52)				(-0.67)	
R^2	16.11%	69.90%	46.70%	35.79%	41.32%	75.01%	52.16%
$\bar{R}^2$	15.27%	68.98%	46.16%	35.13%	40.13%	73.99%	51.18%

10 Size Portfolios

	CAPM	FF3	LevFct	ΔFL	Augmented by ΔFL		
α	17.00	-3.12	11.22	-3.48	6.36	-3.29	-1.94
	(3.82)	(-3.33)	(3.65)	(-0.72)	(1.10)	(-3.55)	(-0.40)
ΔFL				-2.46	-2.28	-2.59	-2.43
				(-2.66)	(-2.48)	(-3.95)	(-2.62)
LevFct			-15.92				-20.95
			(-0.62)				(-0.83)
MKT	-7.77	10.08			-0.89	9.30	
	(-1.29)	(2.70)			(-0.13)	(2.49)	
SMB		6.63				6.24	
		(2.87)				(2.70)	
HML		5.25				5.30	
		(1.70)				(1.72)	
R^2	3.59%	83.38%	1.13%	71.90%	84.23%	91.58%	74.79%
$\bar{R}^2$	-7.13%	77.84%	-11.23%	68.38%	80.29%	87.37%	67.59%

10 Book-to-Market Portfolios

	CAPM	FF3	LevFct	ΔFL	Augmented by ΔFL		
α	25.91	-3.44	2.15	-2.39	18.41	-0.14	-3.06
	(4.61)	(-2.54)	(0.38)	(-0.45)	(3.62)	(-0.07)	(-0.57)
ΔFL				-1.61	-2.09	-4.22	-1.01
				(-1.82)	(-2.74)	(-3.28)	(-1.13)
LevFct			111.95				110.32
			(3.42)				(3.34)
MKT	-14.52	8.02			-13.40	4.61	
	(-2.29)	(2.19)			(-2.12)	(1.91)	
SMB		2.82				0.01	
		(1.15)				(0.00)	
HML		10.32				6.24	
		(3.05)				(1.75)	
R^2	37.65%	61.57%	85.49%	9.02%	90.83%	68.22%	87.32%
$\bar{R}^2$	30.72%	48.76%	83.68%	-2.35%	88.54%	52.34%	83.70%

Conclusions

- Confirm an important theoretical connection between illiquidity, volatility and funding risk.
- Intermediary funding shocks expose investors to higher risk:
  - (i) raising the level of illiquidity and volatility,
  - (ii) raising the dispersion of illiquidity and volatility,
- This risk is priced: exposures to funding risk explain the dispersion of returns in the cross-section of illiquidity- and volalitity-sorted stocks,
- Results are robust to
  - (i) alternative sort strategies,
  - (ii) alternative liquidity factors,
  - (iii) alternative test assets,
  - (iv) quarterly returns,
  - (v) independent sorts vs. double-sort.
- Main addition in progress : Construct a ΔFL mimicking portfolio.