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Reversals and the returns to liquidity provision

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Short-run reversals

- Recent losers outperform recent winners
  - On average
- Well documented
  - Fama (1965), Roll (1984), Jegadeesh (1990), Lehmann (1990)
- Fairly weak outside microcaps
  - Modest spreads, marginal significance
    - Gotten weaker over time; **much** weaker post-decimalization

Why are there reversals?

"The returns of short-term reversal strategies in equity markets can be interpreted as a proxy for the returns from liquidity provision"

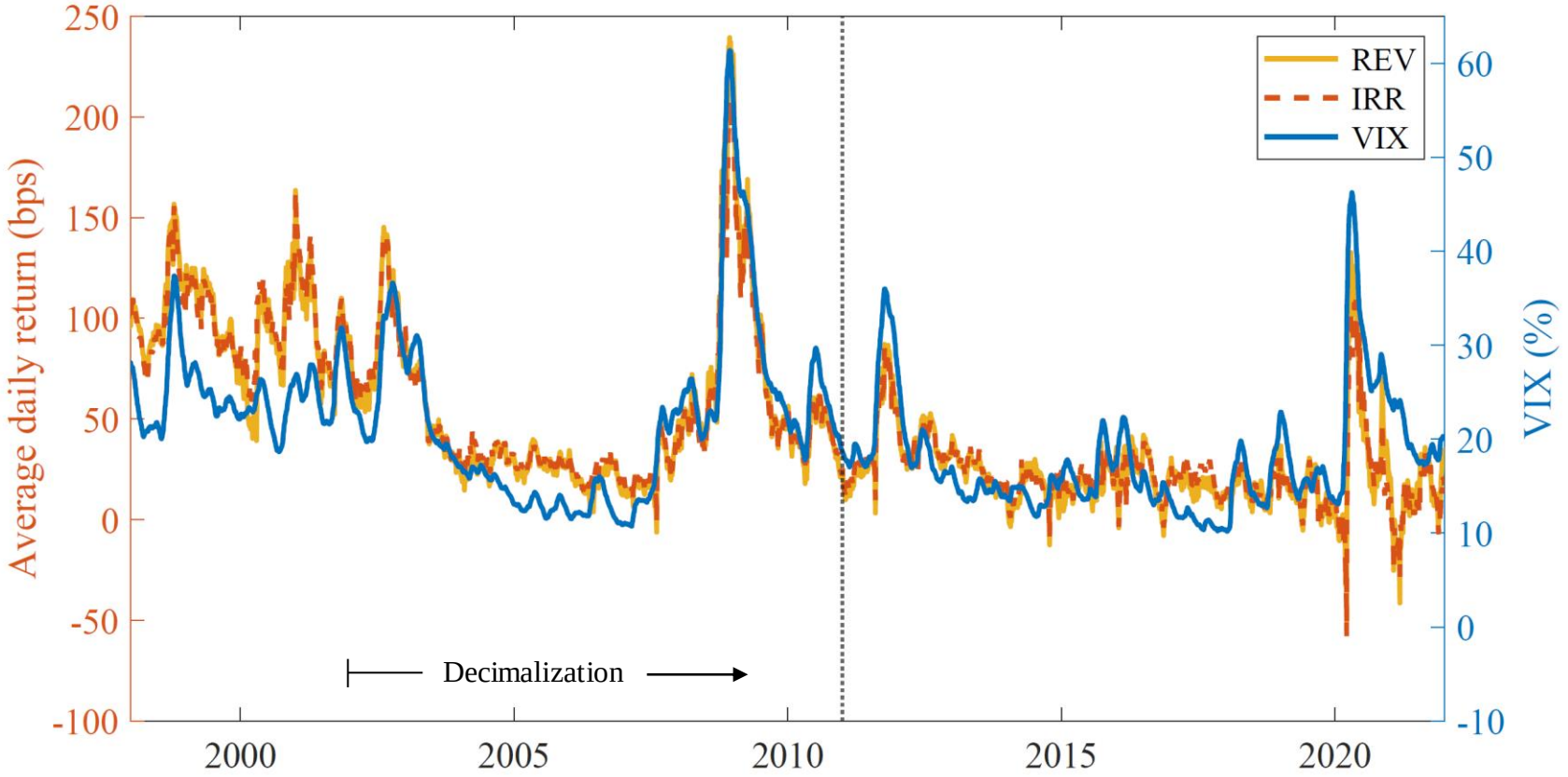
- Nagel, JF 2012

Basic intuition

- To accommodate sellers' demands…
  - …Liquidity providers must buy
    - While selling pushes prices down
- Liquidity providers expect compensation
  - Unwind (sell) later for more (on average)
    - As liquidity replenished and prices recover
    - I.e., as "losers" rise

Evidence (Nagel 2012)

- Trading more costly in volatile markets
  - So higher volatility ➔ more profitable reversals (on average)



This paper

- **Cross-sectional** implications
- If reversals proxy for the returns to liquidity provision…
  - …Then illiquidity differences **across stocks** should matter!
    - How should we even measure illiquidity?
      - It's a complicated, multi-dimensional concept
- Also, what aspect of reversal should we look at?
  - **Magnitudes,** obviously
    - Also **persistence!**

Illiquidity

- Size (small stocks are less liquid)
- Volatility
  - Drives market maker **inventory risk**
  - Strongly correlated with t-costs
    - In both the cross-section and the time-series
- Turnover
  - Less liquidity should imply less trading
    - And longer **inventory durations**

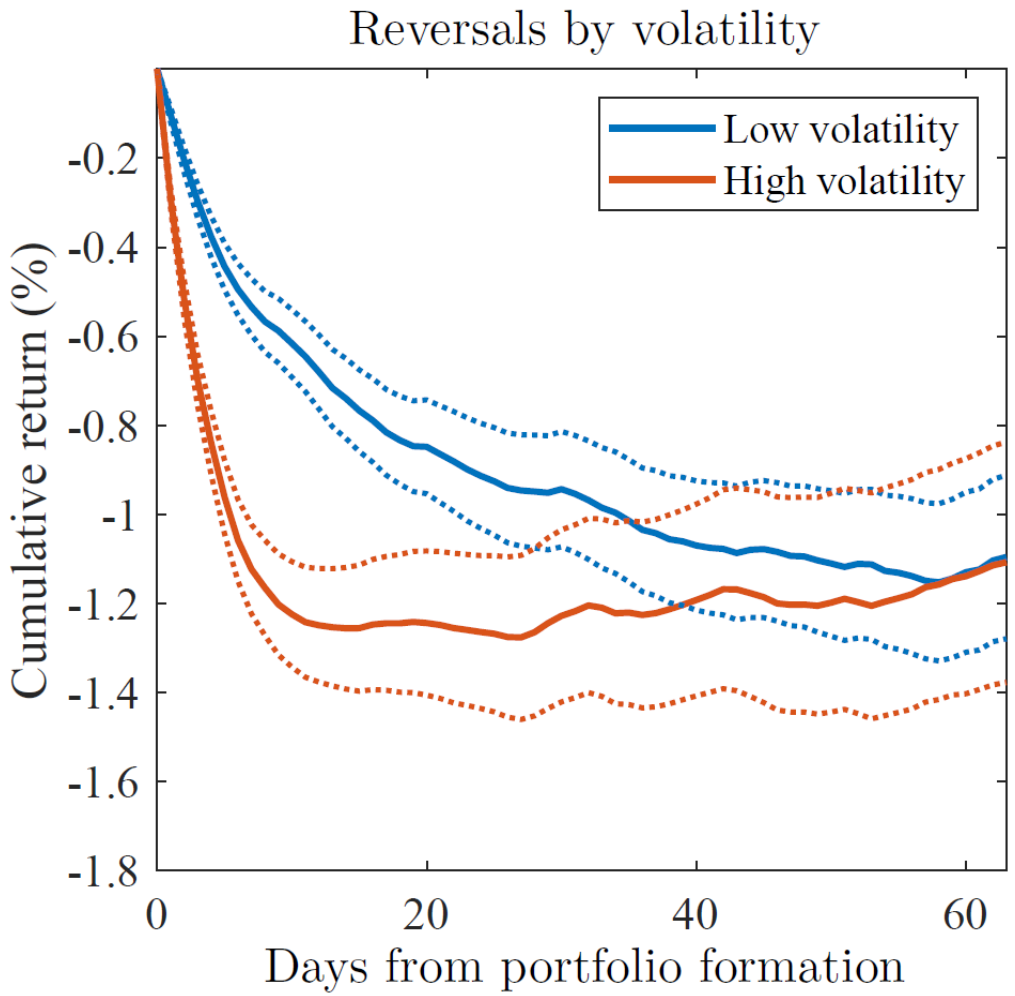
These jointly explain **more than 96%** of the average cross-sectional variation in Amihud's illiquidity measure (JFM 2002)

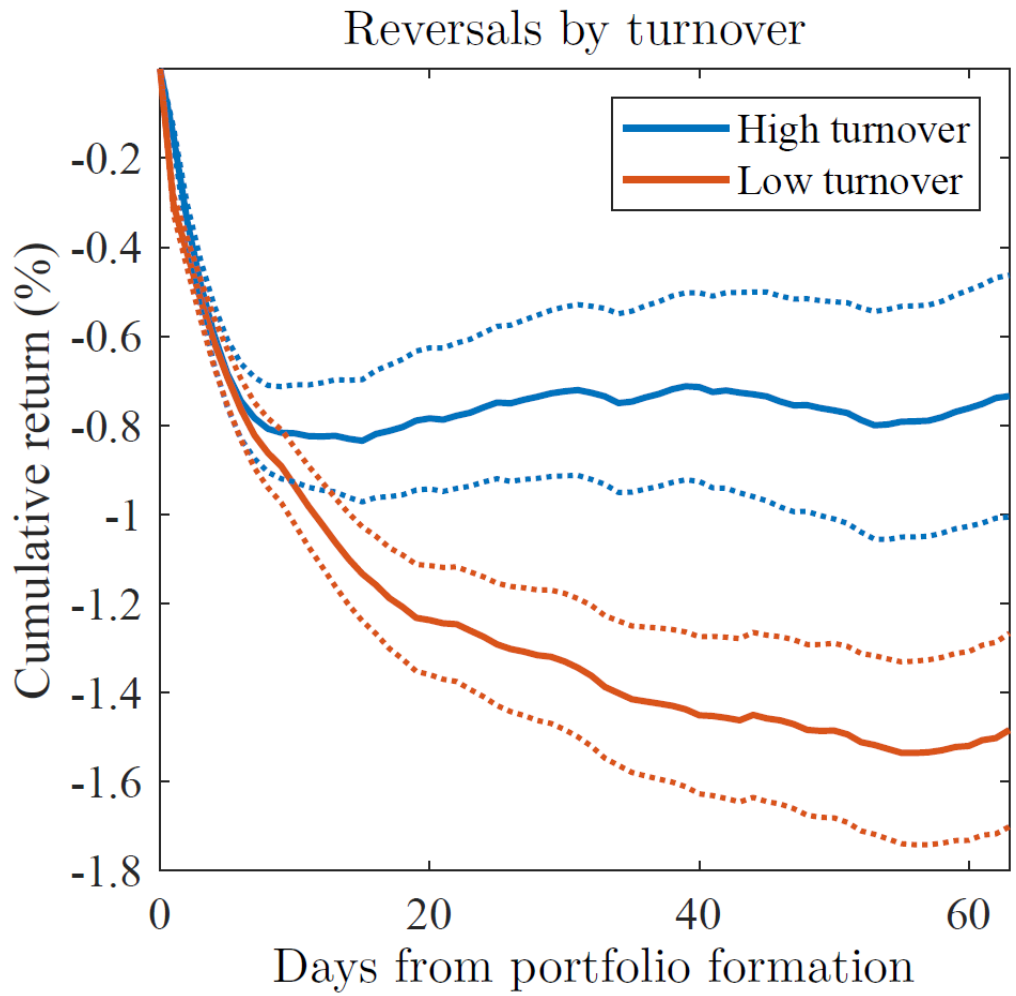
- Easily implementable empirical estimation of Kyle's lambda measure of price-impact of trading (Econometrica 1985)
- Amihud is increasing with volatility, decreasing with size and turnover

Reversals facts

- Reversals are bigger for micro-caps
  - Known…but surprisingly concentrated in the smallest stocks
- **Strong** among high-volatility stocks
  - Which expose MMs to more inventory risk
- **Persistent** for low-TO stocks
  - Where inventory durations are longer
    - **Huge variation in persistence!**
      - Should really think in “business” (or “trade”) time, not calendar time!

WML spread from formation





Reversal refinement

- Reversals as a lens to study liquidity
  - Theory: Price moves **unrelated** to news ➔ reversals
    - Price moves on news empirically associated with continuations
- Common reversals trade against news
  - News about firm fundamentals
    - Post-earning announcement drift (PEAD)
  - News about industries
    - Short-term industry momentum (IMOM)
      - These **greatly obscure** the strength of liquidity-driven reversals!

Reversal decomposition

Panel A: Strategy average monthly excess return (%)

REV	PEAD	IMOM	IRR	IRRX
0.31	0.53	0.68	0.74	1.08
[1.68]	[5.45]	[3.57]	[5.40]	[9.35]

Panel B: Results from $\text{REV}_t = \alpha + \beta_{\text{IRRX}}\text{IRRX}_t + \beta_{\text{PEAD}}\text{PEAD}_t + \beta_{\text{IMOM}}\text{IMOM}_t + \epsilon_t$

α	β_{IRRX}	β_{PEAD}	β_{IMOM}	Adj. R^2 (%)
0.13	0.76	-0.54	-0.53	87.0
[1.73]	[27.8]	[-17.4]	[-30.4]	

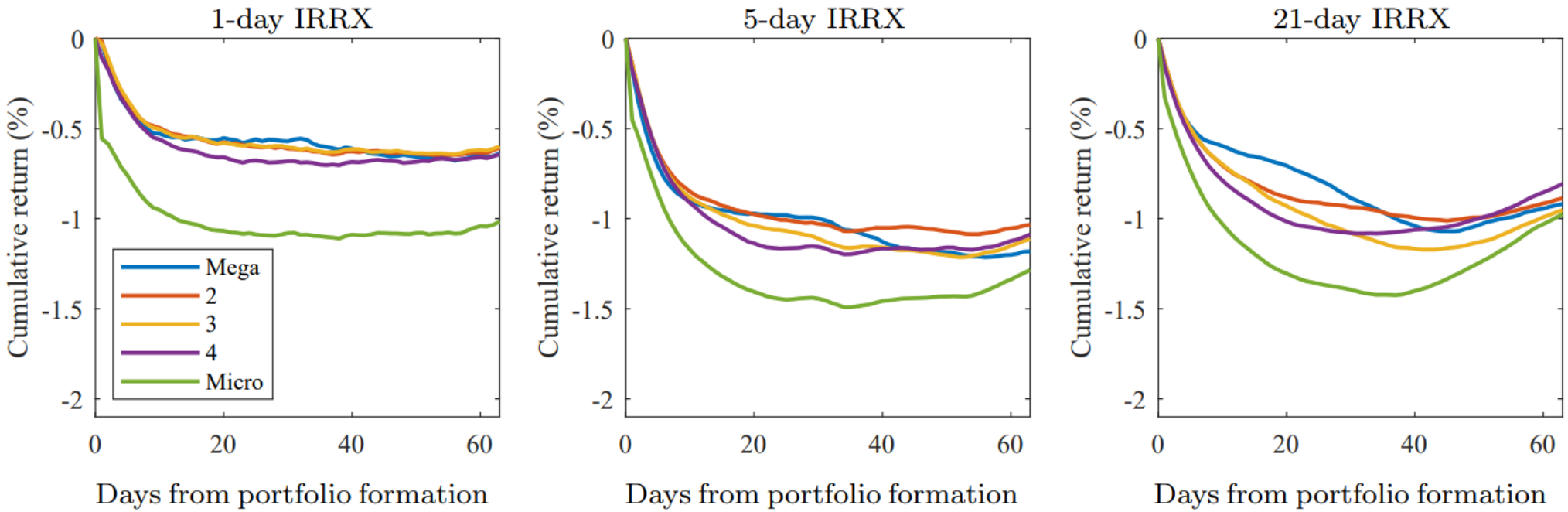
- We mostly use IRRX
  - Results robust to using REV

Illiquidity and reversals

- How do reversals vary with different aspects of illiquidity?
  - Average performance evolution over time
    - From portfolio formation
- Illiquidity measured using size, volatility, and turnover
  - Look at 1-day, 5-day, and 21-day past performance
    - I will focus mostly on 5-day past performance here
      - 1-day has clean interpretation, but results are noisy…
      - …21-day is least noisy, but interpretation is harder

Reversals by size

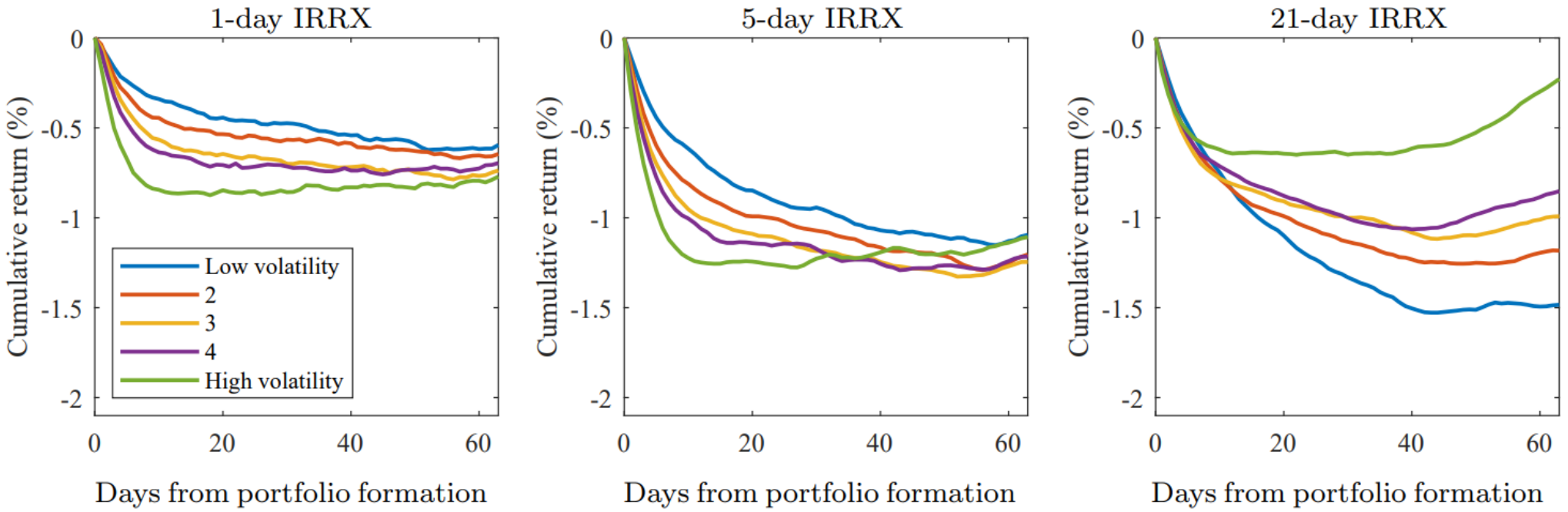
- Average WML spread from formation



  - Only stronger for microcaps (bottom ~3% of the market by cap.)
    - Limited market-making

Reversals by volatility

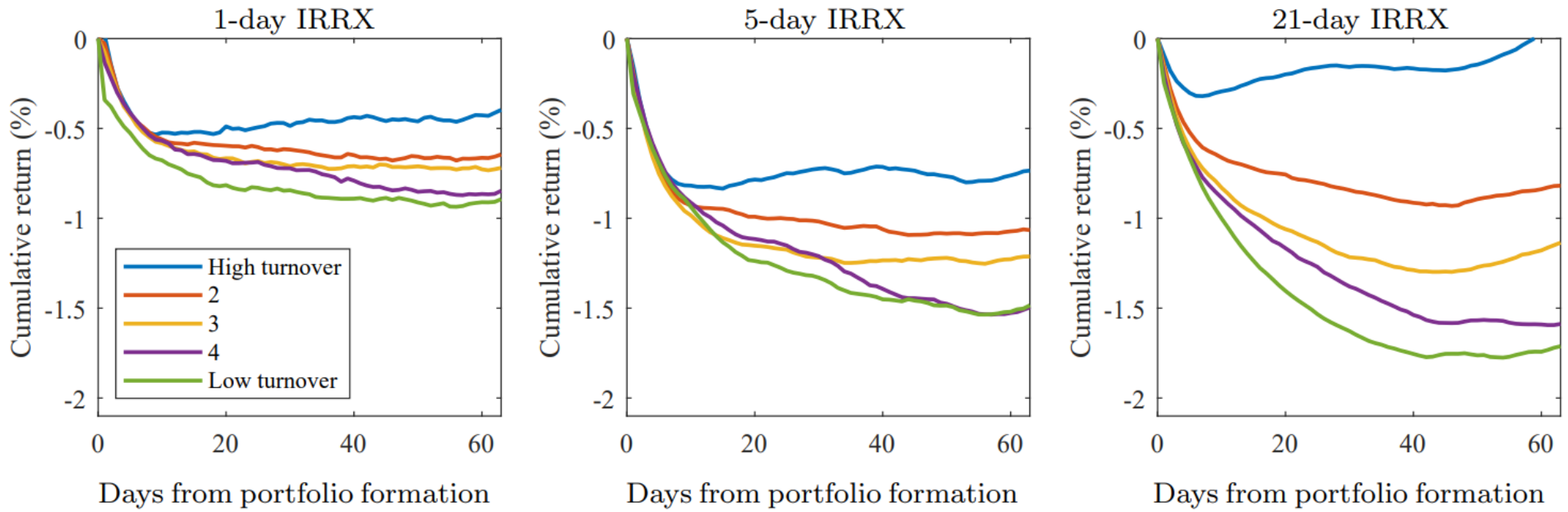
- Average WML spread from formation



- High volatility associated w/ stronger, initially faster revs
  - More volatility ➔ greater inventory risk

Reversals by turnover

- Average WML spread from formation



- Low TO ➔ longer-lived, more persistent reversals
  - Less turnover ➔ longer inventory durations

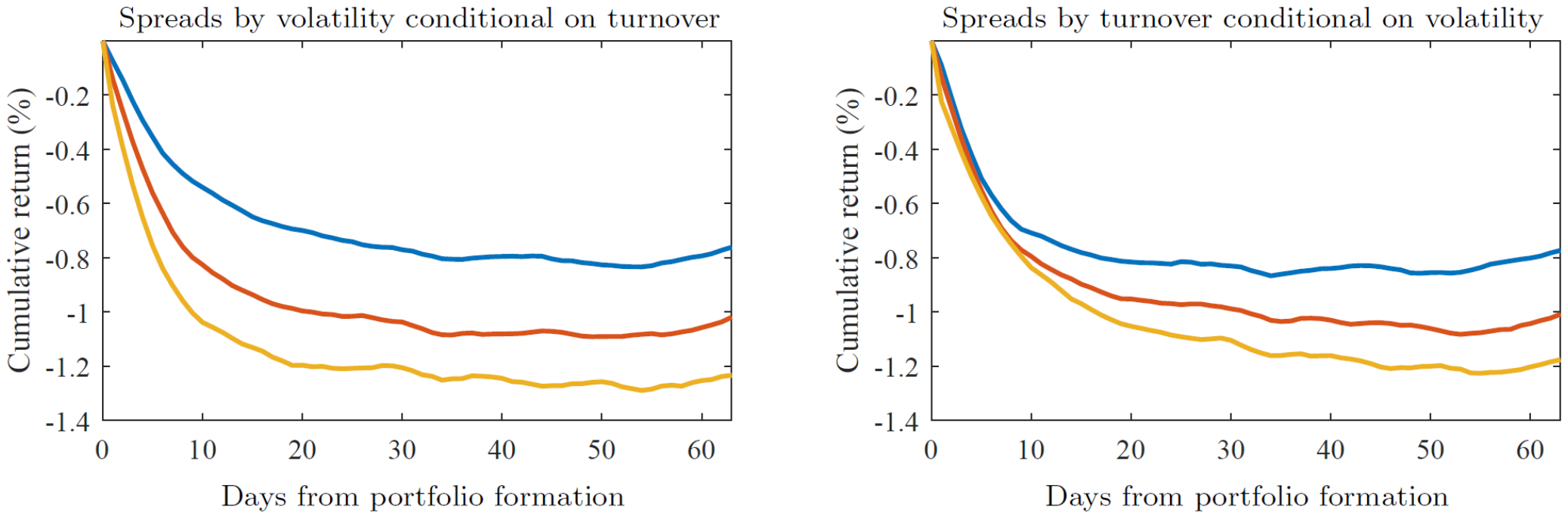
Should really "hold all else equal"

- When studying impact of one aspect of illiquidity…
  - …Should control for other aspects
    - Our measures are correlated
      - Volatility and turnover are positively correlated
      - Small stocks tend to be more volatile and trade less
- Use propensity-matched sorting procedure (N-M 2015)
  - Within each of the three FF (2016) size universes…
  - …Match on either volatility or turnover
    - Sort on the other

Results with controls

- Consistent (even cleaner) results
  - Though less variation in past performance

Panel B: Small cap conditional winner-minus-loser spreads by volatility (left) and turnover (right)

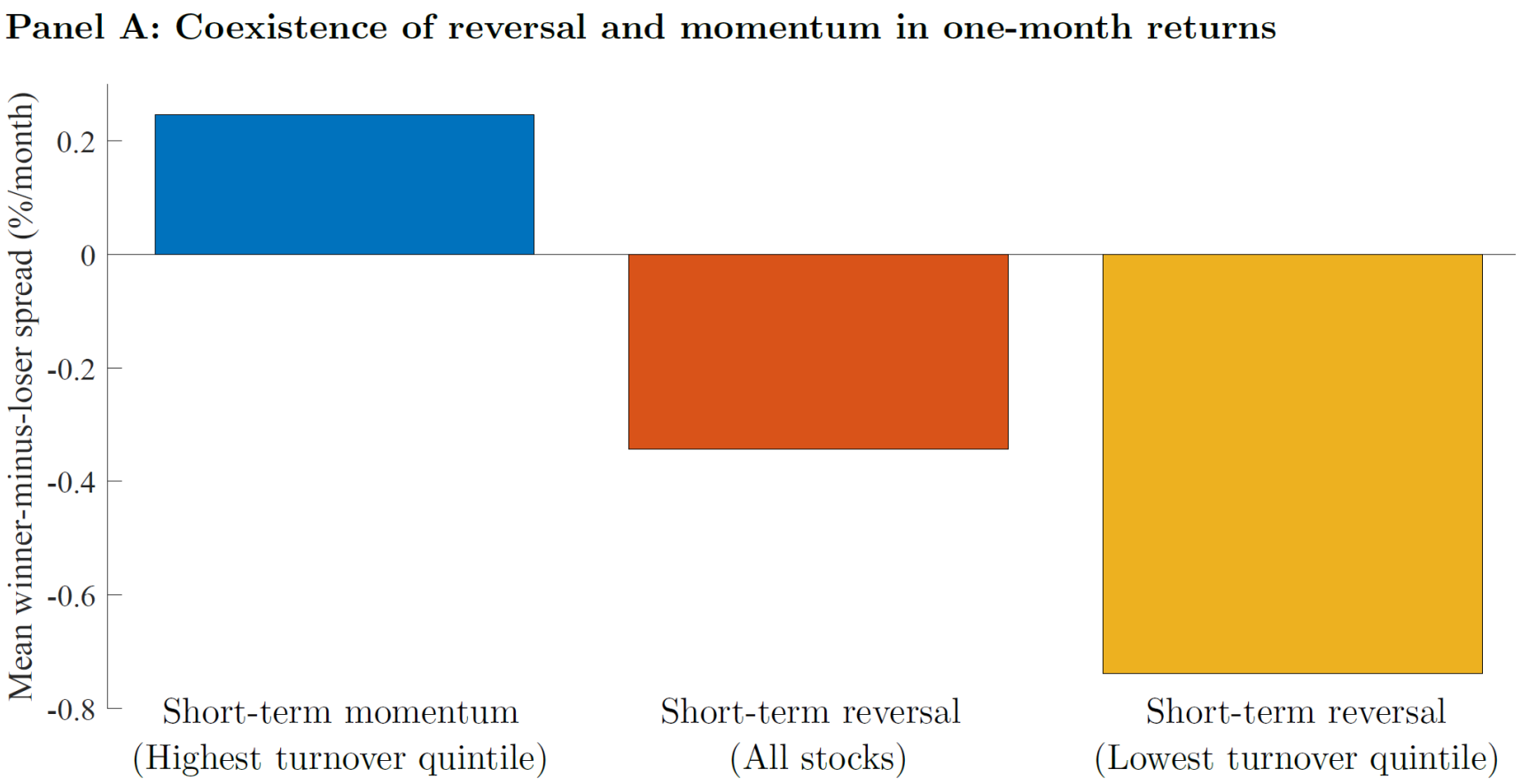


Implications

- These patters explain several results in the literature
  - Connecting results that were seemingly unrelated
- Yield different, more nuanced interpretations of these older results
  - Some of which are very different from the current common understanding

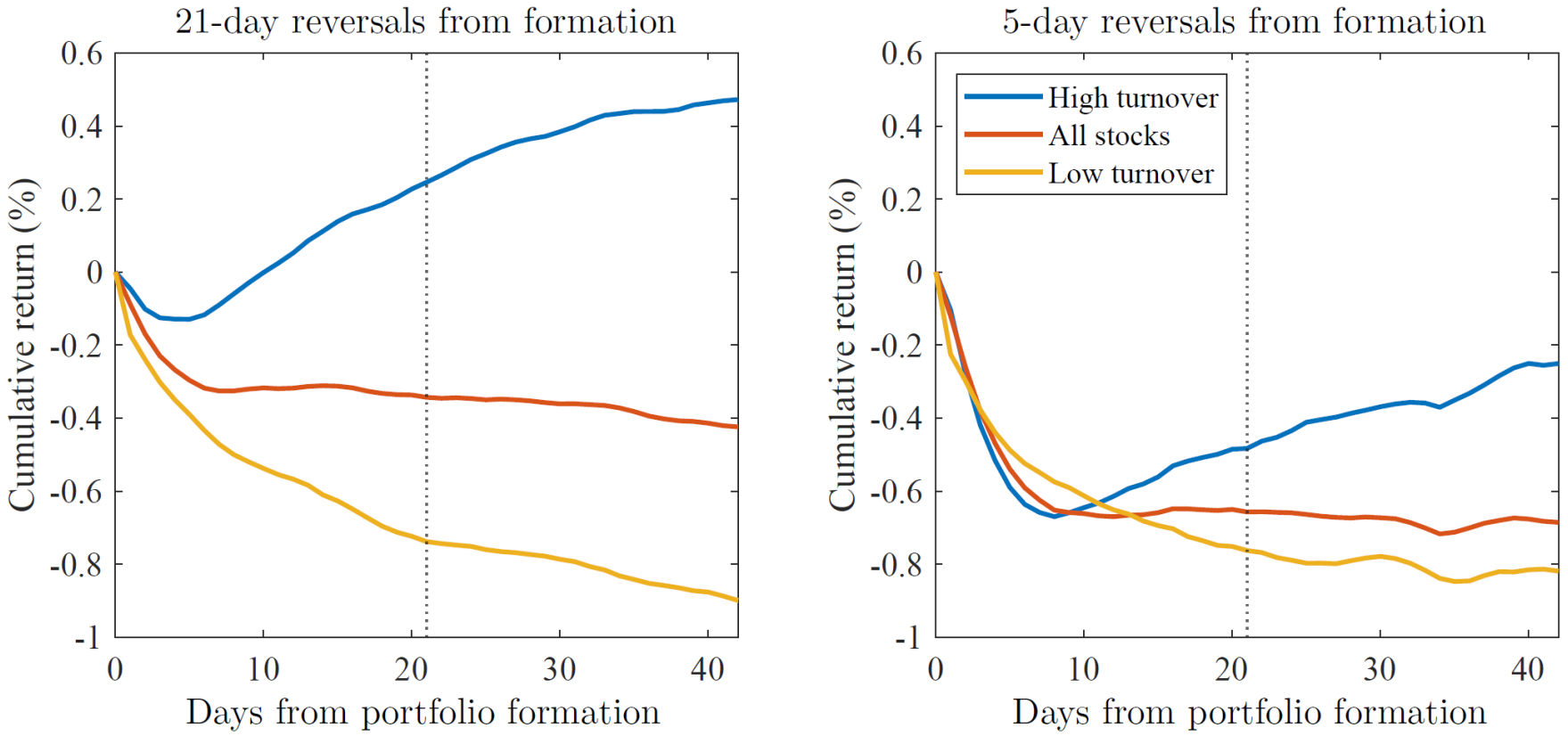
Related results I

- Medhat and Schmeling (RFS 2022)



Really just reversal persistence…

Panel B: Reversal performance from formation by turnover

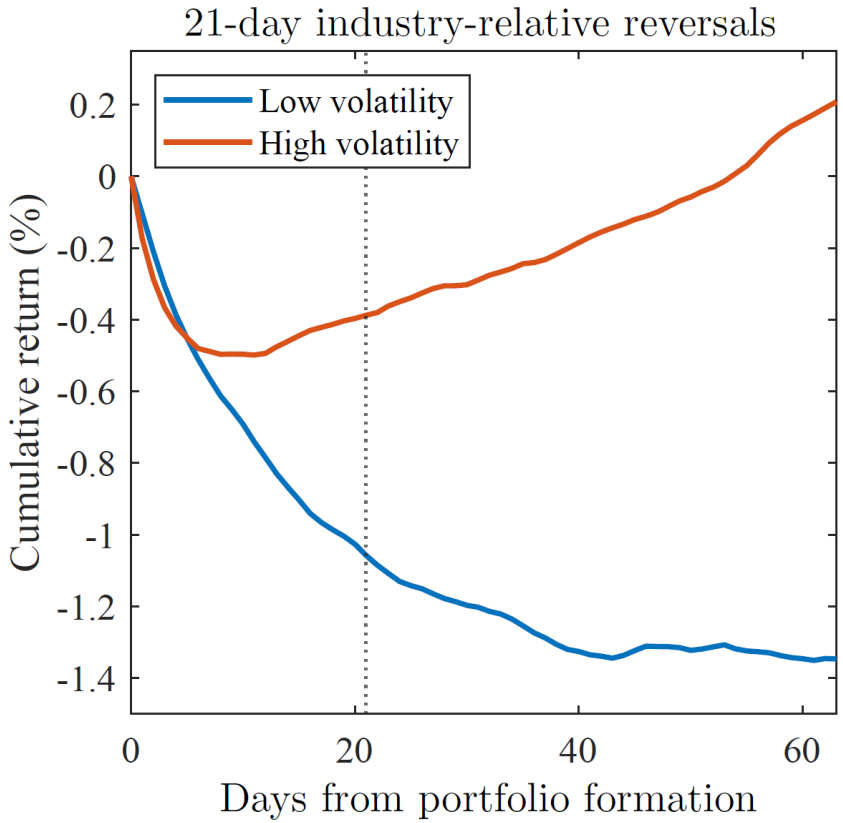


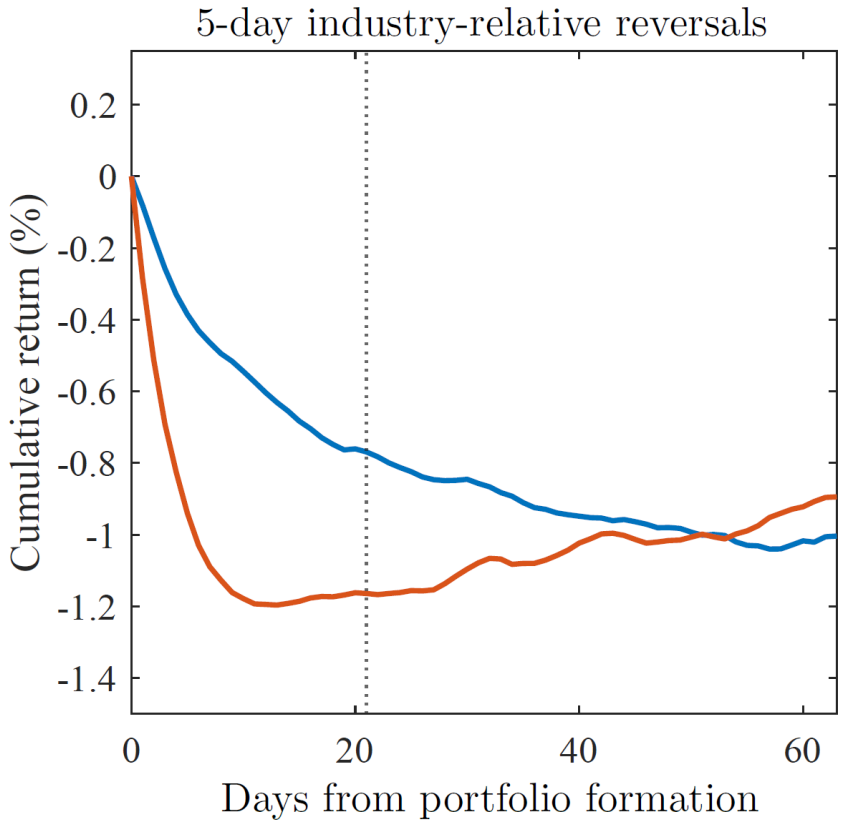
- Also related results of Avramov, Chordia, and Goyal (2006)

Related results II

- Novy-Marx and Velikov (2016)
  - Strong 1-month industry-relative reversals among **low-volatility** stocks
    - Much stronger than in high-volatility
      - Surprising because they are more liquid and cheaper to trade
- Kozak, Nagel, and Santosh (2020)
  - Low-volatility IRRs: Single most important anomaly for an SDF identified by machine learning techniques

Frequency mis-match…





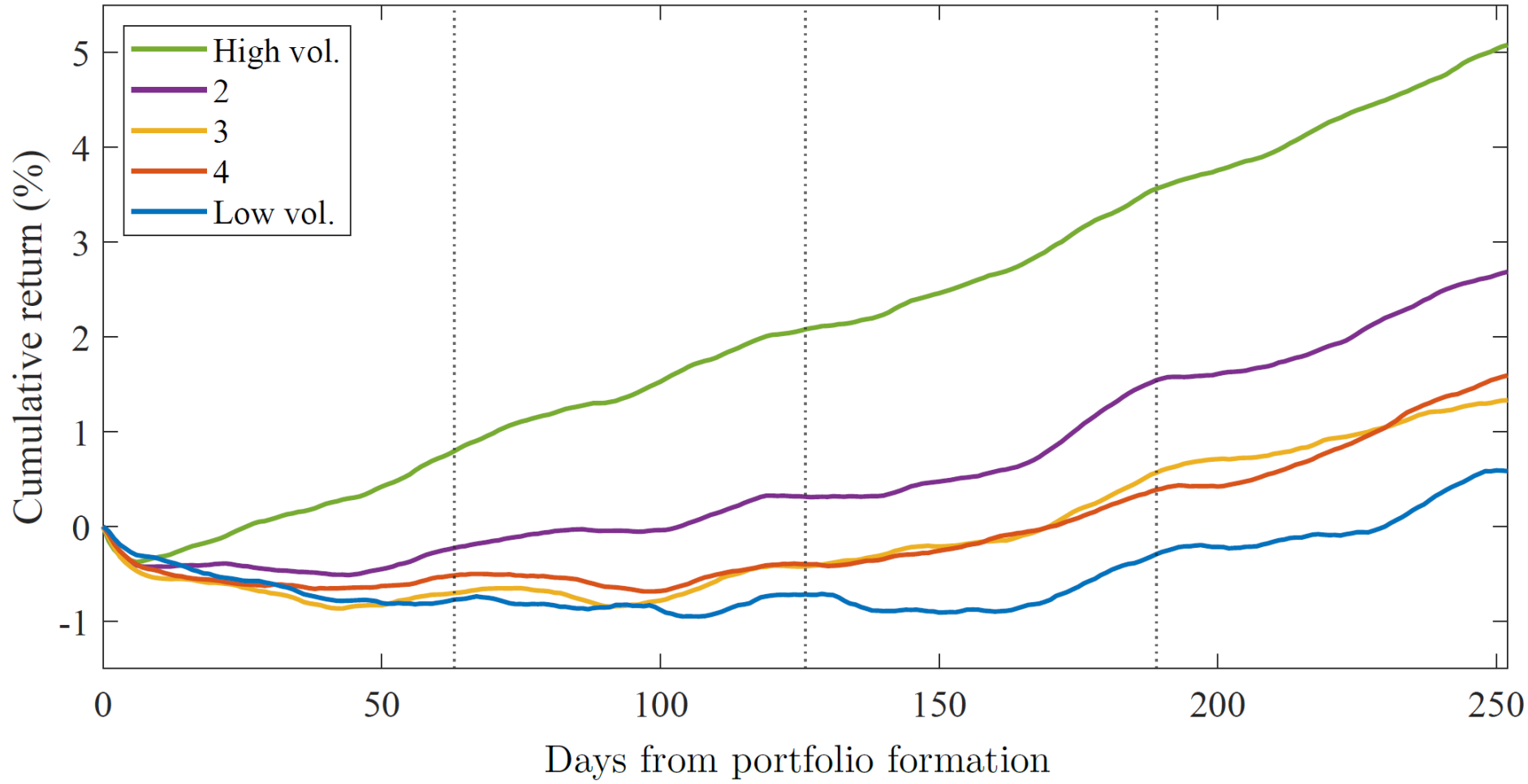
- One-month horizon is too long for the high-vol. IRR
  - Which are actually much stronger (a complete misunderstanding)!

Related results III

- Arena, Haggard, and Yan (2008)
  - Momentum stronger for high-volatility stocks
- Novy-Marx (2012)
  - Momentum primarily driven by **intermediate horizon** past performance…
    - I.e., by stock returns over the **first half** of the preceding year
  - …Not recent past performance
    - Stock returns over the last six months matters much less

Long-run WML spreads

- Based on 1-month past stock performance



Connection/refinement

- Figure suggests results of Novy-Marx (2012) should be concentrated in low volatility stocks
  - Where the reversal is persistent
- For low vol., no MOM for ~6 months
  - So large difference in short- and intermediate-horizon MOM
- For high vol., MOM almost right away
  - So little difference in short- and intermediate-horizon MOM
    - More generally, disparity should be decreasing with volatility

Differences by volatility

		NYSE volatility quintile					
	All	Low	2	3	4	High	H−L
$MOM_{12,7}$	0.87	0.68	0.77	0.73	1.01	0.96	0.28
	[4.57]	[3.54]	[4.01]	[3.68]	[4.32]	[4.59]	[1.16]
$MOM_{6,2}$	0.22	-0.30	-0.25	0.14	0.49	1.17	1.48
	[1.03]	[-1.10]	[-1.18]	[0.57]	[2.01]	[5.07]	[4.66]
Diff.	0.65	0.98	1.02	0.60	0.53	-0.21	-1.20
	[2.86]	[3.06]	[3.80]	[2.11]	[1.92]	[-0.89]	[-3.27]

- Unconditional difference in Novy-Marx (2012) driven by low-volatility stocks
  - Strong short-run momentum among high vol. stocks, but not among low vol. stocks

Implications for trading

- Understanding liquidity ➔ Better execution
  - Don’t demand liquidity when it’s particularly expensive
    - Duh!
- Simple implementation: IRRX screens
  - Delay some underlying strategy’s trades if they would trade against IRRX
    - Can illustrate basic idea using several simple common underlying base strategies

IRRX screens

- Yields a small exposure to IRRX
  - At negative costs!
    - Exposure and cost reduction increasing in underlying strategy's TO
  - Illustrate using relatively low turnover strategies
    - That already employ TO mitigation techniques (buy/hold spreads)
      - So modest (but robust) results
- A lot more work can be done here!
  - Should exploit differences in reversal persistence
    - Can employ "accelerators" as well as screens

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Gains from IRR screens

Portfolio	Annualized compound net excess return (%/year)	Gains from IRRX Screen (bps/year)			Gains from REV Screen (bps/year)		
		Net	Gross	T-Costs	Net	Gross	T-Costs
Big	7.44	3.06	2.98	0.08	2.22	1.94	0.28
		[2.01]	[1.91]	[1.46]	[1.11]	[0.94]	[4.05]
Small	9.25	3.76	3.32	0.43	-1.49	-2.80	1.31
		[1.24]	[1.10]	[3.01]	[-0.71]	[-1.32]	[4.00]
Growth	7.19	24.17	23.31	0.87	11.40	8.33	3.07
		[3.60]	[3.44]	[2.67]	[1.33]	[0.96]	[8.07]
Value	8.99	35.69	32.73	2.96	-3.50	-8.72	5.22
		[2.16]	[1.95]	[2.96]	[-0.37]	[-0.92]	[4.52]
Robust Profitability	9.90	7.15	4.84	3.39	1.68	-1.90	4.55
		[0.93]	[0.65]	[1.46]	[0.24]	[-0.28]	[1.94]
Conservative Investment	8.99	66.60	62.53	4.07	42.67	39.93	2.74
		[3.35]	[3.10]	[2.50]	[1.62]	[1.50]	[1.15]
Momentum Winners	9.51	50.81	40.26	10.55	79.13	80.87	-1.74
		[1.95]	[1.53]	[6.42]	[2.58]	[2.60]	[-0.78]

Conclusion

- Cross-sectional implications of illiquidity on the returns to liquidity provision
  - Micro-cap stocks ➔ Stronger reversals
  - High volatility stocks ➔ Strong initial reversals
  - Low turnover stocks ➔ Long-lived reversals
    - These three illiquidity variables capture basically all the cross-sectional variation in Amihud's (2002) popular illiquidity measure

Conclusion

- Accounting for this large predictable variation in reversal **magnitudes** and **persistence:**
  - Helps explain seemingly disparate results in the literature on reversals and momentum
    - Importance of looking at phenomena at the **appropriate frequency**
  - Should **reduce the cost** of demanding liquidity
    - And increase the compensation for providing it!

Conclusion

- Commonly constructed reversals greatly attenuated by trading against two news-related effects
  - Post-earnings-announcement drift
  - Industry momentum
- Basic results all hold beyond the US