Slow trading and stock return predictability

Allaudeen Hameed
National University of Singapore

Matthijs Lof
Aalto University

Matti Suominen
Aalto University

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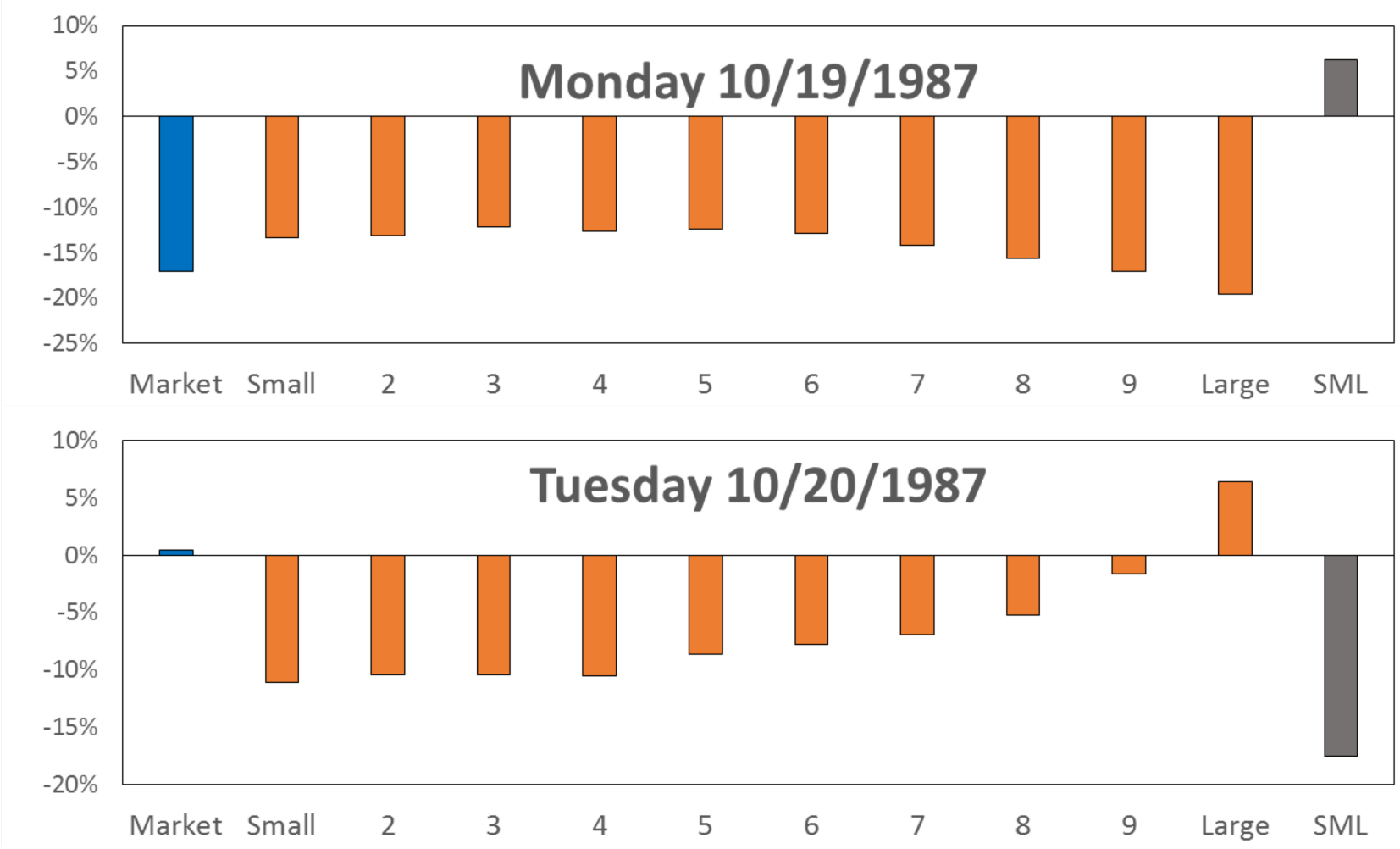
Black Monday: Returns on size deciles

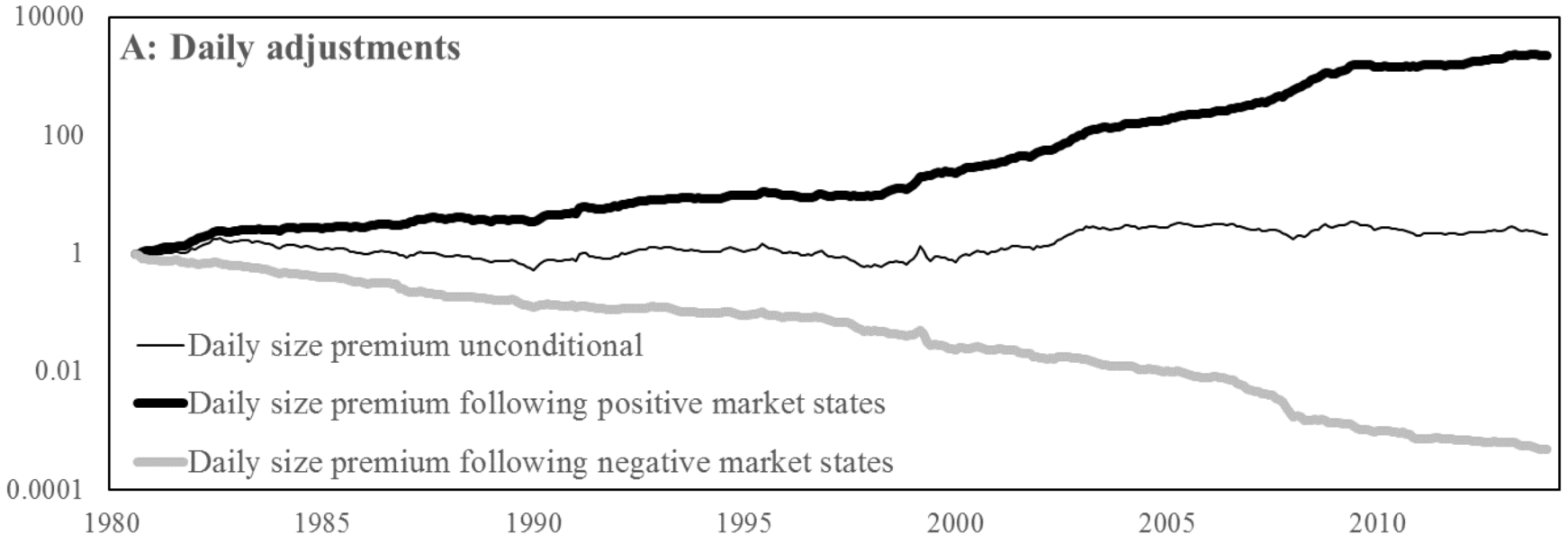


- Large-cap reversal
- Small-cap continuation

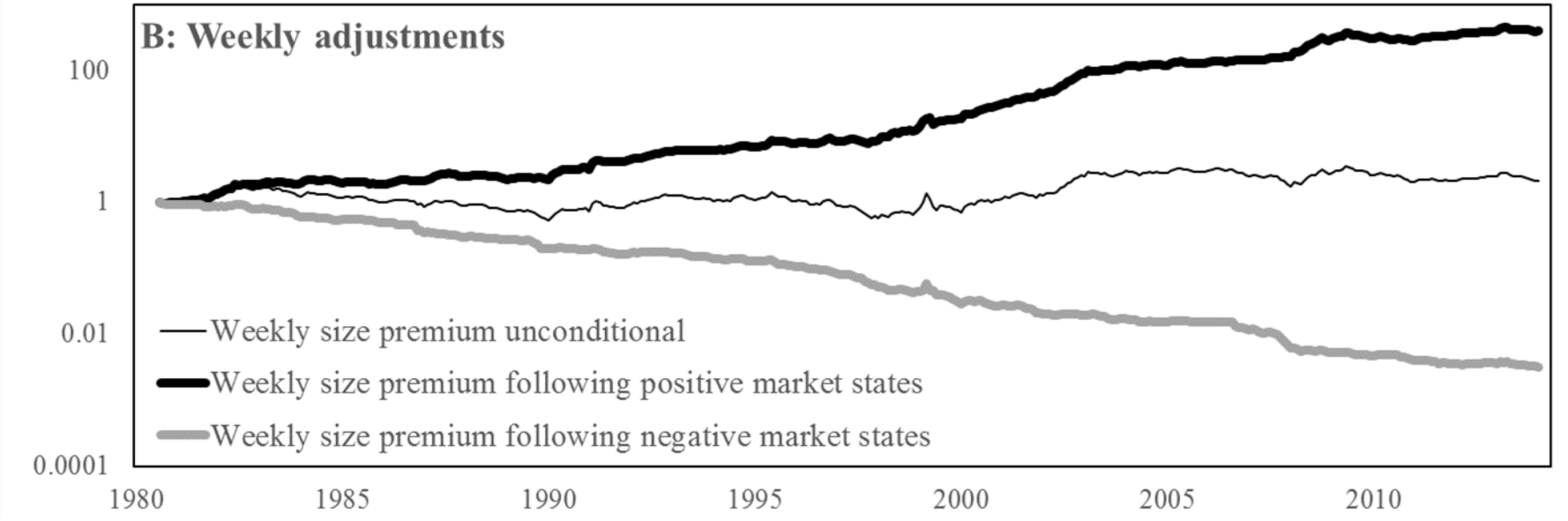
Size Premium following good/bad market days

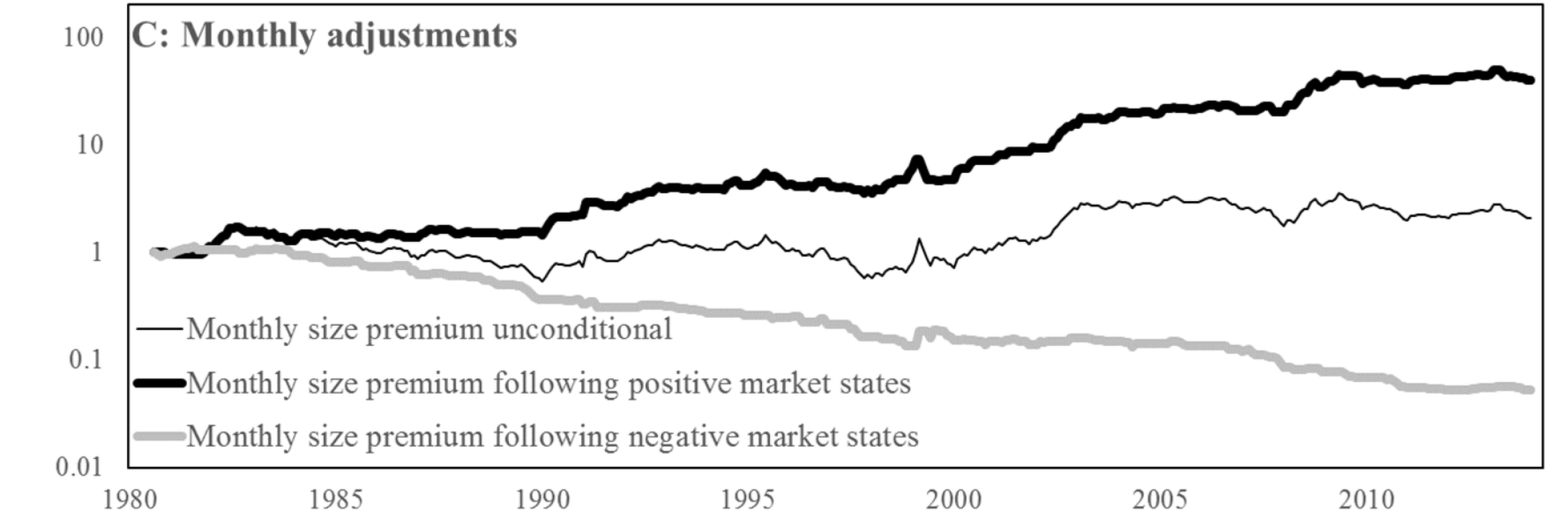
- Size premium ($R_{SML,t} = R_{S,t} - R_{L,t}$): Smallest decile-Largest decile (End-of-June Market Cap, NYSE breakpoints, *active stocks* - >200 trading days/year; >20% institutional ownership)

- Daily size premium conditional on positive/negative lagged market returns ($R_{VW,t-1}$)



Weekly/Monthly rebalancing





Slow trading and stock return predictability

Size-based returns predictable by lagged common information

- Lead-lag in large/small stock returns: Lo and MacKinlay (1990), Chordia and Swaminathan (2000)
- Prior literature: Slow adjustment of small stocks due to gradual diffusion of information - Badrinath, Kale and Noe (1995), Hou and Moskowitz (2005), Hou (2007

This paper: Predictability is **due to investors trading large stocks swiftly** and **small stocks slowly**

- Vayanos (1999, 2001), Garleanu and Pedersen (2013), Rostek and Weretka (2015): Slow trading to reduce trading costs. Sannikov and Skrzypacz (2016) predict slow trading due to monopoly power.
- ANcerno transaction data and mutual fund holding data: Lead-lag relation between trading volume of large and small stocks; splitting of small stock trades across multiple days
- Size-based returns predictable by ***mutual fund flows*** and by returns on stocks with high ***commonality in ownership***.

Overview

- Evidence of slow trading
- Mutual fund flows and return predictability
- Connected stocks and return predictability
- Size premium predictability

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Splitting trades

- Suppose that investor *f* trades stock *i* in periods *t* and t+1 (both k day periods), and its net trades on both periods *are on the same side*. Then:
-

$$split_{f,i,t,k} = 1$$

- Sample averages of *split* for small and large stocks (Ancerno data: 2000-2010)

A: Probability of splitting trades

k	1	2	3	4	5	10	20
Small stocks (Dec 1-5)	86 %	81 %	79 %	77 %	76 %	72 %	68 %
Large stocks	72 %	70 %	69 %	69 %	68 %	66 %	64 %
Small-Large	14 % ***	11 % ***	10 % ***	9 % ***	8 % ***	5 % ***	4 % ***
	(10.38)	(7.37)	(6.57)	(6.23)	(5.76)	(5.30)	(4.80)

B: Determinants of splitting trades	All (k=1)	Buy (k=1)	Sell (k=1)	All (k=5)	Buy (k=5)	Sell (k=5)
	$split_{f,i,t+1}$	$split_{f,i,t+1}$	$split_{f,i,t+1}$	$split_{f,i,t+5}$	$split_{f,i,t+5}$	$split_{f,i,t+5}$
$Size_{i,t}$	-0.020 ***	-0.021 ***	-0.016 ***	-0.021 ***	-0.023 ***	-0.015 ***
	(-7.47)	(-10.53)	(-4.94)	(-8.77)	(-9.99)	(-6.18)
$R_{i,t}$	0.008	0.045 *	-0.034 **	0.004	0.015	-0.009
	(0.90)	(1.95)	(-2.15)	(0.92)	(1.17)	(-0.92)
$Order\ size_{f,i,t}$	0.186 ***	0.198 ***	0.236 ***	0.111 ***	0.129 ***	0.135 ***
	(10.02)	(10.24)	(9.88)	(9.9)	(11.22)	(13.34)
Observations	6987102	3605829	3605829	4640298	2438467	2438467
Adj. R^2	0.14	0.14	0.14	0.14	0.14	0.14
Institution fixed effects	yes	yes	yes	yes	yes	yes
Date fixed effects	yes	yes	yes	yes	yes	yes

C: Time series patterns

	Small stocks (k=1)		Large stocks (k=1)		Small stocks (k=5)		Large stocks (k=5)	
	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
	$\%split_{t+1}$	$\%split_{t+1}$	$\%split_{t+1}$	$\%split_{t+1}$	$\%split_{t+5}$	$\%split_{t+5}$	$\%split_{t+5}$	$\%split_{t+5}$
Intercept	0.566 ***	0.583 ***	0.417 ***	0.643 ***	0.516 ***	0.625 ***	0.569 ***	0.365 ***
	(13.96)	(18.44)	(14.49)	(28.12)	(10.05)	(17.07)	(12.87)	(10.16)
AR(1)	0.359 ***	0.337 ***	0.429 ***	0.116 ***	0.323 ***	0.282 **	0.267 ***	0.460 ***
	(7.78)	(9.34)	(10.93)	(3.67)	(4.61)	(2.21)	(4.54)	(9.07)
$R_{VW,t}$	0.303 ***	-0.255 ***	0.039	-0.191	0.389 *	-0.288 ***	-0.110	-0.014
	(2.58)	(-2.66)	(0.32)	(-1.56)	(1.9)	(-3.09)	(-0.61)	(-0.16)
Observations	2763	2763	2763	2763	552	552	552	552
Adj. R^2	0.128	0.113	0.184	0.013	0.105	0.209	0.068	0.020

Trading delay within institutions

- ANcerno database: Transactions by a large sample of US institutional investors (2001-2010).
  - Pucket and Yan (2011): ~8% of CRSP volume

- Define the following variables (institution-date observations)
- $\boldsymbol{TURN_{f,t}}$: Transaction volume by institution *f* as % of market capitalization in week t

- $\boldsymbol{\%Decilex_{f,t}}$: Fraction of Decile x stocks (x=6,…,10=large) in total transaction volume by institution *f.*

- $\boldsymbol{\%Small_{f,t}}$: Fraction of small stocks (Deciles 1-5) in total transaction volume by institution *f.*
  - ~8% (34%) of USD volume (#transactions)

- Regress fractions($\boldsymbol{\%small_{f,t}}$, $\boldsymbol{\%Decilex_{f,t}}$) on lagged aggregate turnover ($\boldsymbol{TURN_{f,t}}$)

Trading delay within institutions

	$\%Small_{f,t}$	$\%Decile6_{f,t}$	$\%Decile7_{f,t}$	$\%Decile8_{f,t}$	$\%Decile9_{f,t}$	$\%Large_{f,t}$
$TURN_{f,t-1}$	0.16 ***	0.02	0.00	-0.02 *	-0.04 ***	-0.11 ***
	(4.40)	(1.26)	(-0.08)	(-1.71)	(-2.70)	(-3.44)
$TURN_{f,t-2}$	0.08 **	0.01	-0.01	-0.01	-0.02	-0.05 *
	(2.07)	(0.73)	(-1.28)	(-0.41)	(-1.18)	(-1.83)
$TURN_{f,t-3}$	0.06 *	0.00	0.00	-0.01	-0.02 *	-0.03
	(1.94)	(0.18)	(0.13)	(-0.72)	(-1.65)	(-1.10)
$TURN_{f,t-4}$	0.08	0.01	0.00	-0.02	-0.02	-0.05
	(1.46)	(0.27)	(0.27)	(-1.02)	(-0.93)	(-1.41)
Observations	83246	83246	83246	83246	83246	83246
Adj. R^2	0.59	0.22	0.20	0.20	0.26	0.56
Institution fixed effects	yes	yes	yes	yes	yes	yes
Date fixed effects	yes	yes	yes	yes	yes	yes

- High trading activity ***within institutions*** predicts relatively high activity in small stocks
- 1 s.d. ↑ in $\boldsymbol{TURN_{f,t}}$ predicts ~1.7% ↑in $\boldsymbol{\%Small_{f,t}}$
- Robustness: Side-specific volume, #transactions, weekly data

Table 3: ANcerno volume and return predictability

This table reports the result of regressing the returns of baskets of stocks traded by an institution, on the lags of previously traded stocks by the same institution. $R_{f,t}^{SmallBuy}$ ($R_{f,t}^{SmallSell}$) is the return on the portfolio of small stocks purchased (sold) by institution f during period t, weighted by transaction size. $R_{f,t}^{LargeBuy}$ and $R_{f,t}^{LargeSell}$ are defined in the same way for large stocks. The regression include date and institution fixed effects. Then regressions in Panel A (B) are estimated with daily (weekly) data. Data is from ANcerno and CRSP and covers the years 2000-2010.

B: Weekly	$R_{f,t}^{SmallBuy}$	$R_{f,t}^{SmallSell}$	$R_{f,t}^{LargeBuy}$	$R_{f,t}^{LargeSell}$
$R_{f,t-1}^{SmallBuy}$	0.026 ***		0.000	
	(2.71)		(-0.03)	
$R_{f,t-1}^{LargeBuy}$	0.022 **		0.021 *	
	(2.13)		(1.92)	
$R_{f,t-1}^{SmallSell}$		0.035 ***		0.005
		(3.83)		(1.27)
$R_{f,t-1}^{LargeSell}$		0.026 *		-0.001
		(1.85)		(-0.87)
Observations	35951	35346	35582	34997
Adj. R^2	0.440	0.407	0.504	0.480
Date fixed effects	yes	yes	yes	yes
Institution fixed effects	yes	yes	yes	yes

Mutual Fund Scandal: A natural experiment

- 25 fund families accused of illegal trading activities: Experience outflows from September 2003 (Kisin, 2011; Anton and Polk, 2014)
- Diff-in-Diff: Holdings (in log(shares)) by scandal and non-scandal funds before and after September 2003

A: One quarter Diff-in-Diff (2003Q2-2003Q3)

	Large stocks	Small stocks
After (2003Q3)	0.03 *	0.07 **
	(1.73)	(2.16)
Scandal × After	-0.09 **	0.02
	(-2.04)	(0.33)
Observations	342	342
Fund fixed effects	yes	yes

B: Four quarter Diff-in-Diff (2003Q2-2004Q3)

	Large stocks	Small stocks
After (2004Q2)	0.12 *	0.29 ***
	(1.76)	(3.82)
Scandal × After	-0.28 ***	-0.19 **
	(-3.31)	(-2.10)
Observations	326	326
Fund fixed effects	yes	yes

Scandal funds reduced large-cap holdings in first quarter of scandal

Small-cap holdings reduced later

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Mutual fund flows and return predictability

- Similar to Lou (2012), construct stock-level measure of mutual fund flow pressure:

$$FlowPressure_{i,t} = \frac{\sum_{f=1}^{F} S_{f,i,t-1} \times Flow_{f,t}}{S_{i,t-1}}$$

- Small-cap and large-cap portfolios of ***inflow*** stocks and ***outflow*** stocks

A: Contemporaneous flows	Small stocks			Large stocks		
	High	Low	High-Low	High	Low	High-Low
Monthly Return	1.1 %	0.1 %	0.9 %	1.1 %	-0.1 %	1.2 %
α *4-Factor*	0.3 % ***	-0.3 % ***	0.7 % ***	0.6 % ***	-0.5 % ***	1.1 % ***
	(3.28)	(-3.14)	(5.92)	(4.34)	(-4.13)	(4.92)
B: Lagged flows	Small stocks			Large stocks		
	High	Low	High-Low	High	Low	High-Low
Monthly Return	0.7 %	0.3 %	0.4 %	0.2 %	0.5 %	-0.3 %
α *4-Factor*	0.3 % **	-0.2 % **	0.4 % ***	-0.1 %	0.1 %	-0.2 %
	(2.35)	(-2.01)	(2.85)	(-1.23)	(0.83)	(-1.26)

Lagged flows predict returns on small stocks

Mutual fund flows and volume

- Small-cap and large-cap portfolios of ***high absolute flow*** stocks and ***low absolute flow*** stocks

A: Contemporaneous flows	Small stocks			Large stocks		
	High	Low	H-L	High	Low	H-L
Abnormal turnover	1.3 % ***	-1.4 % *	2.7 % ***	0.5 % **	-1.3 % ***	1.8 % **
	(2.77)	(-1.67)	(5.24)	(2.48)	(-6.20)	(2.56)

B: Lagged flows	Small stocks			Large stocks		
	High	Low	H-L	High	Low	H-L
Abnormal turnover	0.9 % *	-0.7 %	1.6 % **	0.2 %	0.1 %	0.04 %
	(1.89)	(-0.80)	(2.06)	(0.35)	(0.11)	(0.07)

Lagged flows predict volume of small stocks

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Connected stocks and return predictability

- For each stock, construct risk-adjusted returns on a portfolio of ***connected*** stocks weighted by ***commonality in ownership*** (*FCAP* – Anton and Polk, 2014)

$$FCAP_{ij,t} = \frac{\sum_{f=1}^{F}(S_{f,i,t}\,P_{i,t} + S_{f,j,t}P_{j,t})}{S_{i,t}P_{i,t} + S_{j,t}P_{j,t}} \qquad R_{FCAP,i,t} = \frac{\sum_j FCAP_{ij,t} \times R^*_{j,t}}{\sum_j FCAP_{ij,t}}$$

- Time-series regression of stock returns on lagged and contemporaneous FCAP returns, while controlling for market.

$$R_{i,t} = \alpha_i + \vartheta_{i0}R_{FCAP,i,t} + \vartheta_{i1}R_{FCAP,i,t-1} + \beta_{i0}R_{VW,t} + \beta_{i1}R_{VW,t-1} + \varepsilon_{i,t}$$

- Report average regression coefficients, grouped by ***small*** (Decile 1-5) and ***large*** (Decile 10) stocks

Connected stocks and return predictability

	Daily			Weekly			Monthly		
	Small	Large	S-L	Small	Large	S-L	Small	Large	S-L
$R_{FCAP,i,t}$	1.011	0.748	0.262	1.130	0.644	0.486	1.238	0.755	0.482
	(30.52)	(18.51)	(5.66)	(33.61)	(17.34)	(7.82)	(15.88)	(15.8)	(6.46)
$R_{FCAP,i,t-1}$	0.152	-0.049	0.201	0.217	-0.093	0.310	0.250	-0.072	0.322
	(9.17)	(-2.55)	(8.72)	(6.02)	(-4.42)	(6.41)	(6.08)	(-1.84)	(4.63)
$R_{VW,t}$	0.645	0.896	-0.251	0.807	1.050	-0.243	0.995	1.185	-0.191
	(25.22)	(44.36)	(-15.25)	(26.85)	(47.03)	(-9.17)	(25.29)	(38.1)	(-2.71)
$R_{VW,t-1}$	0.039	-0.011	0.050	0.086	-0.003	0.082	0.101	-0.017	0.118
	(3.71)	(-0.75)	(2.86)	(5.23)	(-2.16)	(5.3)	(1.90)	(-0.32)	(1.09)
R^2	0.094	0.199		0.180	0.375		0.482	0.505	

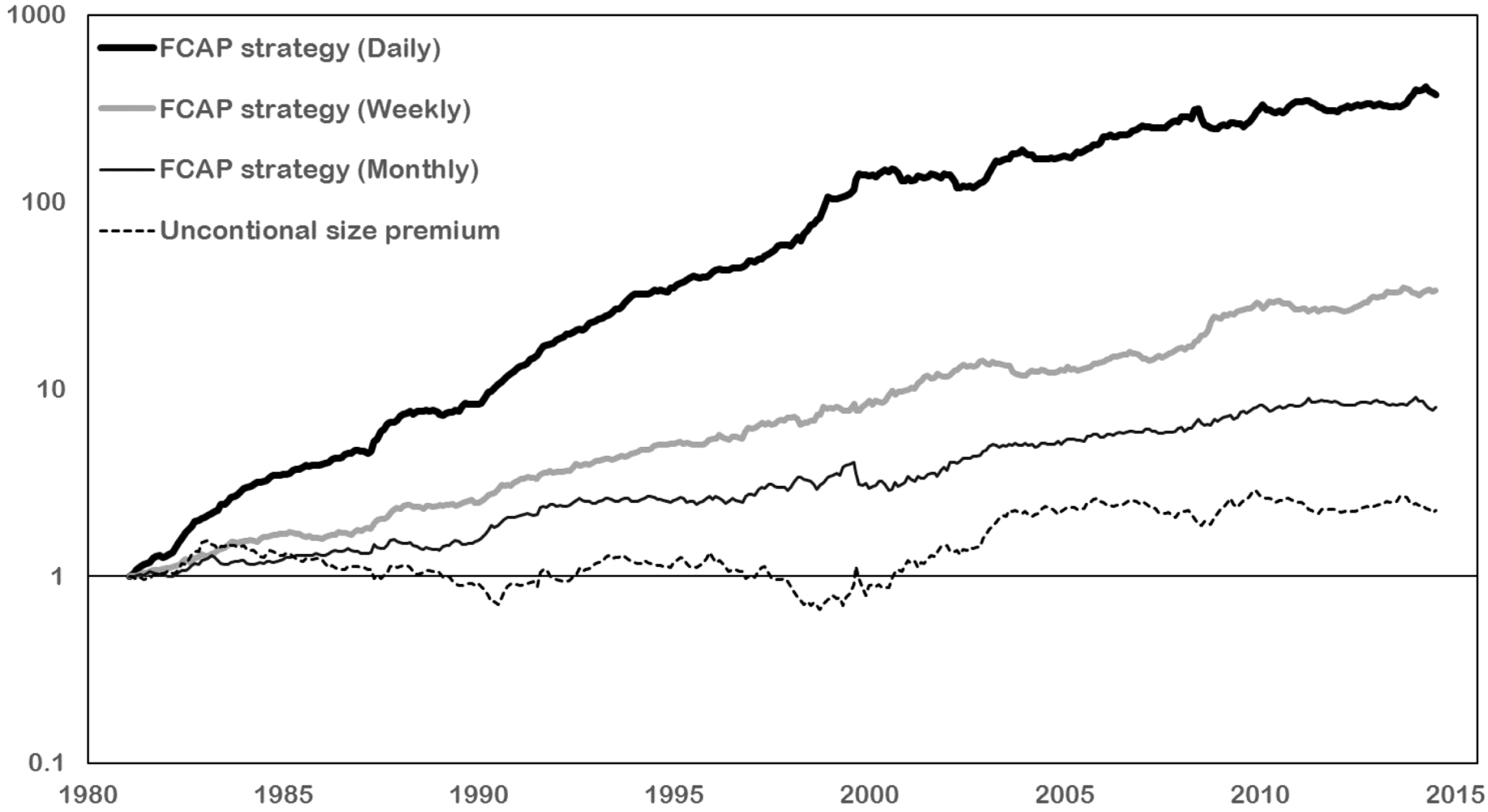
- Small (large) stocks respond positively (negatively) to the lagged return on connected stocks
- Robust to controlling for industry returns, idiosyncratic reversals
- FCAP weighted turnover predicts small stocks turnover

FCAP trading strategy

$$FCAP\ strategy = \begin{cases} \textbf{\textit{Long}}: small\ stocks\ with\ R_{FCAP,i,t-1} > 0 \\ \quad and\ large\ stocks\ with\ R_{FCAP,i,t-1} < 0 \\ \textbf{\textit{Short}}: small\ stocks\ with\ R_{FCAP,i,t-1} < 0 \\ \quad and\ large\ stocks\ with\ R_{FCAP,i,t-1} > 0. \end{cases}$$

	Daily	Weekly	Monthly
Monthly Return	2.0 %	0.9 %	0.6 %
Sharpe Ratio	0.53	0.32	0.20
α	2.2 % ***	1.1 % ***	0.8 % ***
	(6.19)	(5.13)	(4.66)
Mkt	-0.11	-0.06	-0.14 ***
	(-1.43)	(-1.37)	(-3.07)
SMB	0.11	0.06	0.13
	(1.42)	(0.90)	(1.34)
HML	0.05	0.04	0.01
	(0.53)	(0.60)	(0.15)
UMD	-0.01	-0.13 ***	-0.08 *
	(-0.16)	(-3.53)	(-1.68)

FCAP trading strategy



FCAP trading strategy

- Returns most predictable when market volume is high, and market/funding liquidity is low.

	FCAP strategy	FCAP strategy	FCAP strategy	FCAP strategy	FCAP strategy	FCAP strategy
Intercept	-0.001	0.050 ***	0.002	0.011 ***	0.016 ***	0.006
	(-0.64)	(3.16)	(1.46)	(6.19)	(5.25)	(1.52)
Turnover $_{t-1}$	0.026 *					0.024 **
	(1.73)					(2.08)
VIX $_{t-1}$		0.016 ***				0.012 ***
		(2.63)				(2.69)
TED spread $_{t-1}$			0.013 **			0.012 *
			(2.40)			(1.93)
PS-liquidity $_{t-1}$				-0.046 *		-0.037
				(-1.76)		(-1.29)
$R_{t-1:t-3}$ (3 months)					-0.024 *	-0.012
					(-1.93)	(-0.47)
Adjusted R^2	0.019	0.070	0.026	0.011	0.012	0.066
Period	1981-2014	1990-2014	1986-2014	1981-2014	1981-2014	1990-2014

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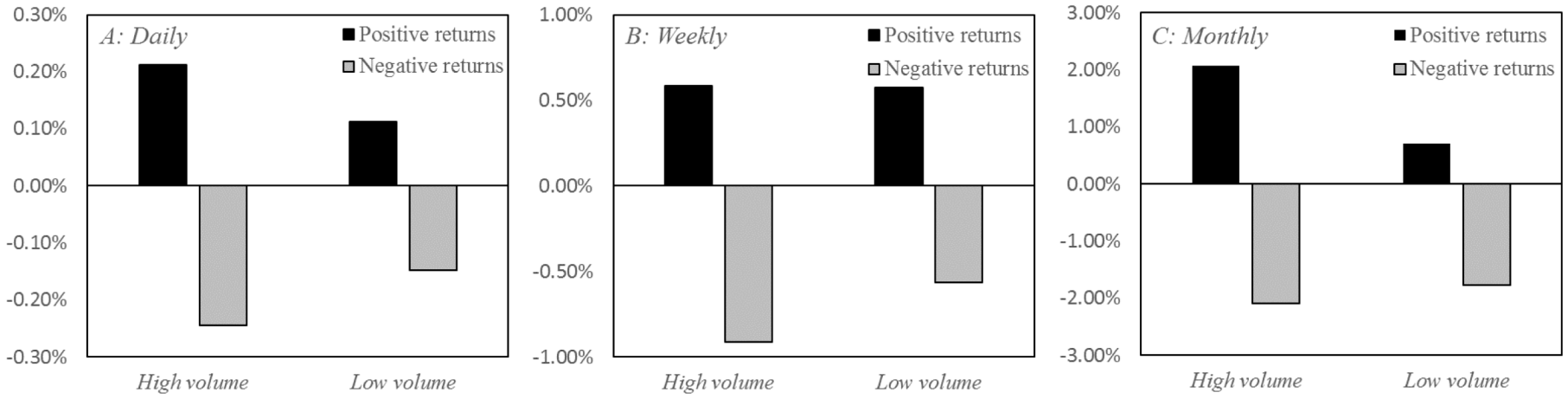
Size premium predictability

- Size premium predictable by lagged market
- Small-cap continuation. Large-cap reversal
- Predictability stronger following periods of relatively high market turnover (>52 week moving average)

Weekly	$Size_t$	$Size_t$	$Small_t$	$Small_t$	$Large_t$	$Large_t$
Intercept	0.0002	0.0008	0.003 ***	0.004 ***	0.003 ***	0.003 ***
	(0.37)	(1.17)	(3.95)	(4.01)	(4.76)	(3.31)
$R_{VW,t-1}$	0.313 ***	0.247 ***	0.208 ***	0.177 ***	-0.105 ***	-0.070
	(8.75)	(8.47)	(5.92)	(4.69)	(-3.23)	(-1.23)
$HighTurnover_{t-1}$		-0.0010		-0.0012		-0.0002
		(-1.16)		(-0.94)		(-0.16)
$R_{VW,t-1} \times HighTurnover_{t-1}$		0.092 ***		0.047 *		-0.046 *
		(2.67)		(1.80)		(-1.82)
Adjusted R^2	0.144	0.154	0.037	0.038	0.009	0.008

Size premium predictability

- Size premium conditional on lagged market return state and lagged market turnover state



Conclusion

- Slow trading: On high-volume days, institutional investors focus on large stocks and delay trading of small stocks

- Return predictability: differential predictability of large and small returns by mutual fund flows and connected stocks. Large stock reversal and small stock continuation.
  - Implications for the size premium

- Slow adjustment (delay) of small stock returns due to institutional frictions rather than slow diffusion of information