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**JACOBS LEVY EQUITY
MANAGEMENT CENTER**
for Quantitative Financial Research

What Drives Momentum and Reversal? Evidence from Day and Night Signals

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Momentum and reversal

- Past returns predict future returns in the cross-section
 - Short-term reversal (Jegadeesh, 1990; Lehmann, 1990), momentum (Jegadeesh and Titman, 1993), long-term reversal (De Bondt and Thaler, 1985)
- Interpretation is often challenging
 - Compensation for risk? Underreaction? Overreaction?
- This paper examines the role of private and public information for theories of momentum and reversal
 - Investors fail to learn from prices: prices underreact to private information?
 - One group of informed investors: prices overreact to private information and underreact to public news?
 - No distinction: investors overreact to past returns?

How to identify price moves induced by public news and private information?

- Must be able to identify the relevance of public news accurately
- This is challenging and will result in a limited sample due to the availability of news sources
- Public news should drive overnight returns to a larger extent than intraday returns
 - No/limited trading after hours
 - Trading of U.S. stocks listed on the Tokyo exchange is negligible and does not generate additional volatility (Barclay, Litzenberger, and Warner, 1990)
 - Intraday returns primarily reflect the impact of investors' trading (French and Roll, 1985)
 - News account for about 50% of idiosyncratic overnight volatility but for only about 12% of intraday idiosyncratic volatility (Boudoukh, Feldman, Kogan, and Richardson, 2019)

Form strategies based on past day and night returns

- Day/night return over the previous week/month

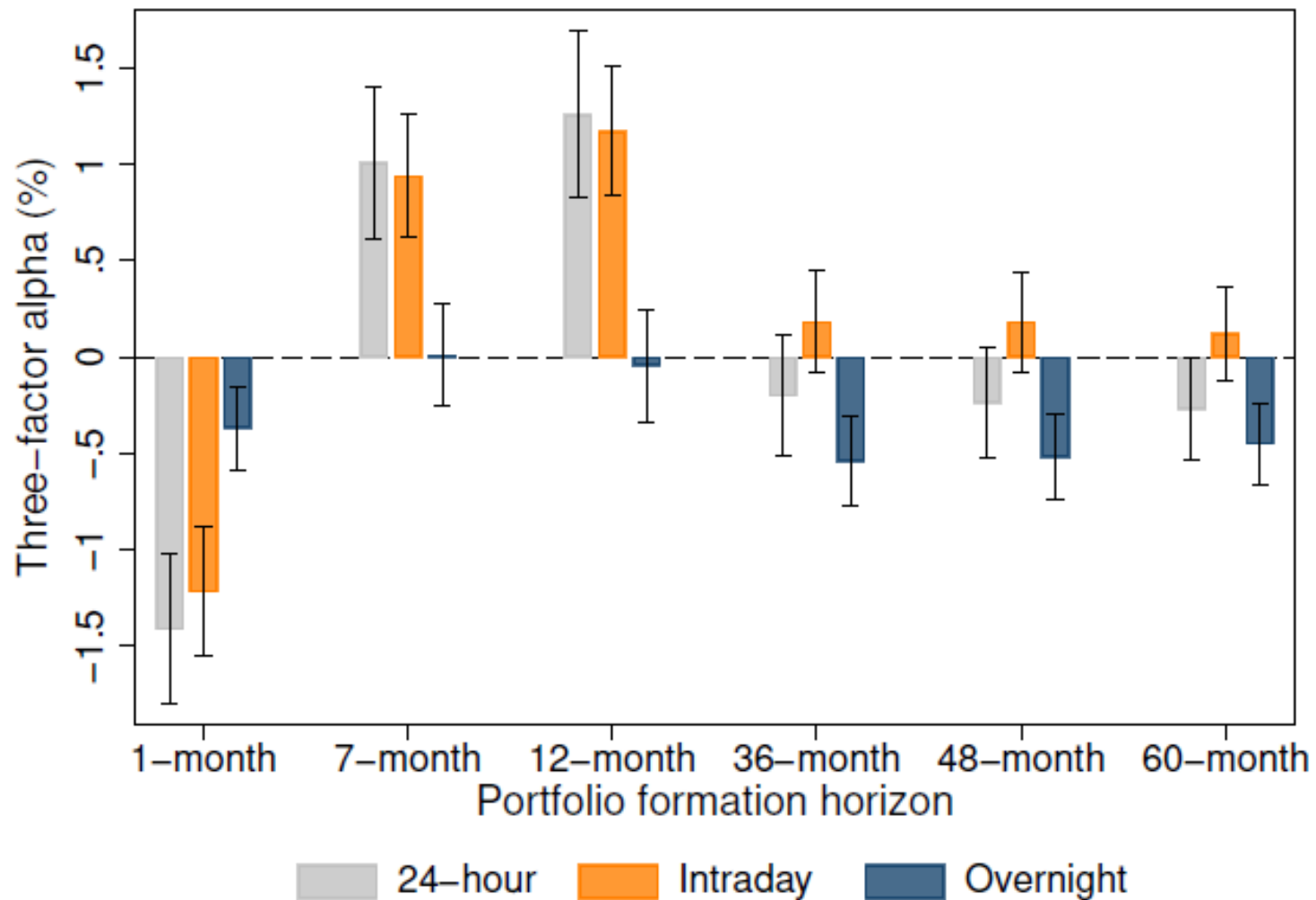
$$1 + r_m = \prod_d (1 + r_{ov,d}) \prod_d (1 + r_{in,d})$$

- Day/night return over the prior 6/12 months, excluding the last month
- Day/night return over the prior 3/5 years, excluding the last year
- Equal-weighted (value-weighted) portfolio returns over the next month with NYSE breakpoints (decile)
- We do not examine when returns are realized (Lou, Polk, and Skouras, 2019; Bogouslavsky, 2021)

Data sources to compute U.S. stocks day and night returns

- Open prices from CRSP for 1926-1962 (NYSE-listed stocks only) and post 1991
- Open prices reported by Global Financial Data (GFD) for 1963-1991
 - Match about 88% of all daily CRSP observations post 1963 (Barardehi et al., 2021)
 - Matched sample has highly similar characteristics to CRSP population
- ISSM/TAQ data for 1985-2015 for robustness checks
 - Quote midpoints taken 15 minutes after the open
- Left-hand side variable: CRSP monthly return

Monthly alpha of past-return strategies, 1963-2019



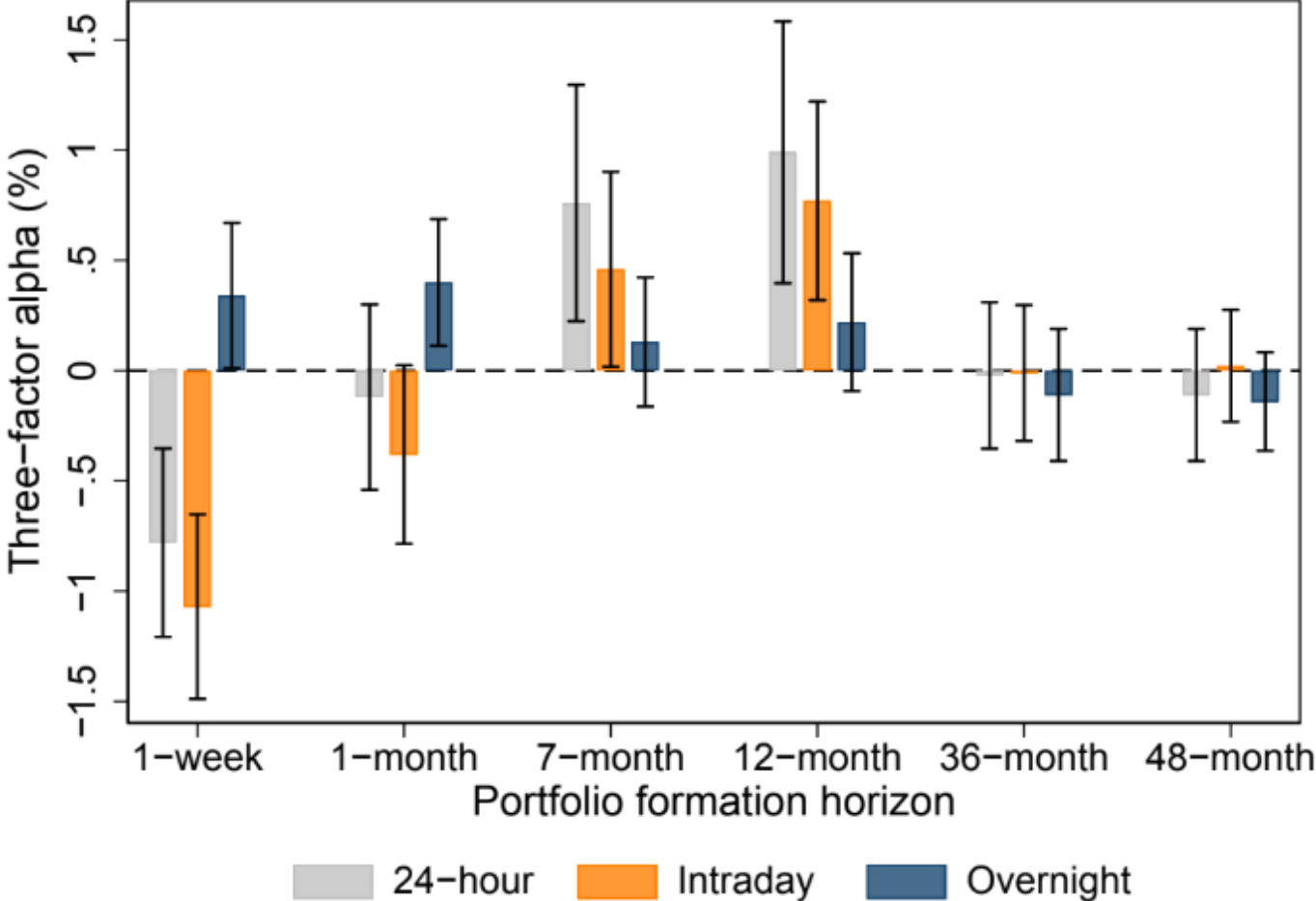
NYSE breakpoints, long-short decile portfolios

Robustness (1)

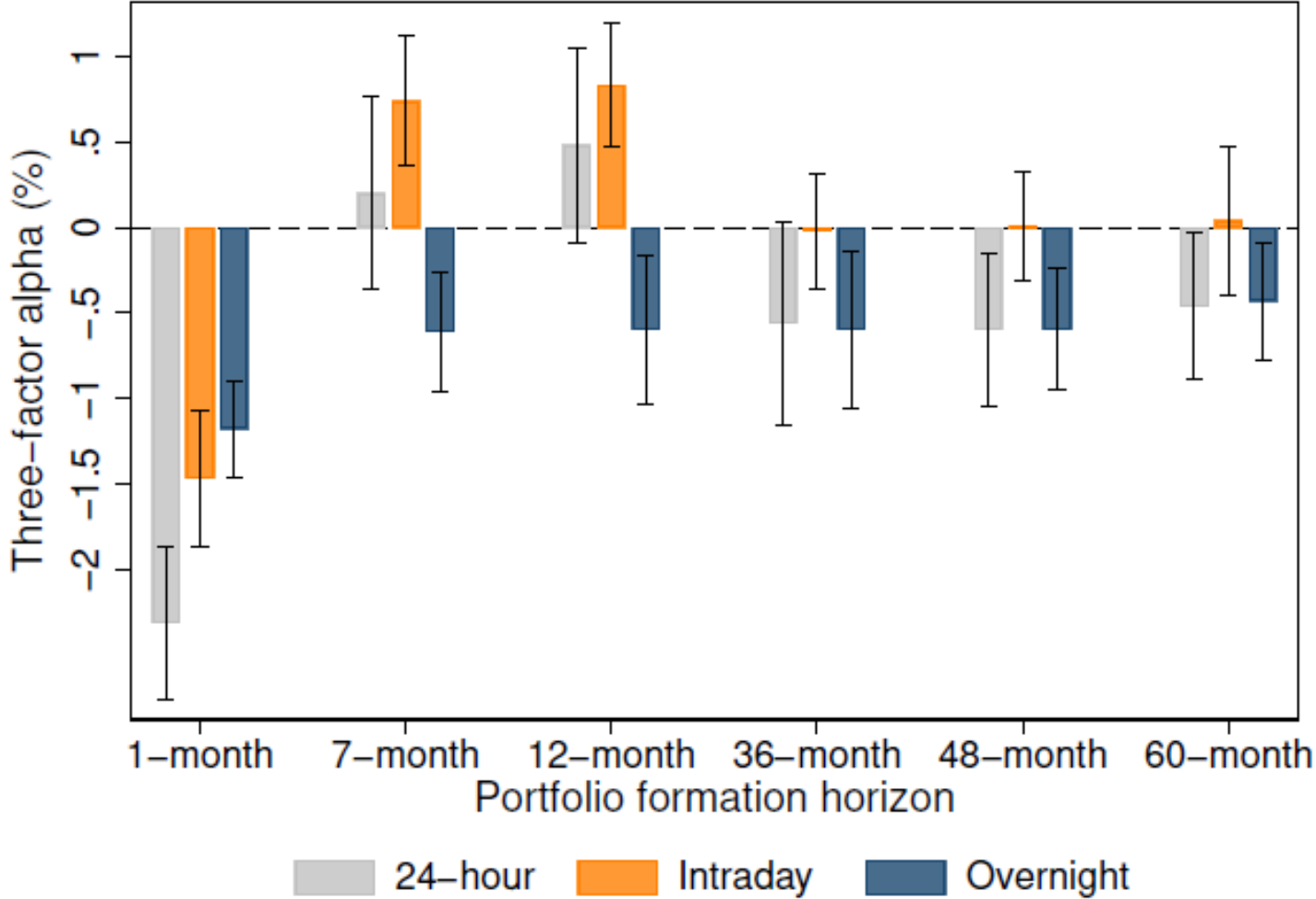
- Excluding stocks in the bottom 20% of market capitalization and to dropping the 3-day windows around earning announcements
- Value-weighting:

Signal type	Portfolios of months –12 to –2 return										
	1	2	3	4	5	6	7	8	9	10	10-1
24-hour	–1.02 [–5.83]	–0.38 [–2.98]	–0.2 [–1.92]	–0.075 [–0.84]	–0.023 [–0.35]	–0.0028 [–0.04]	0.016 [0.25]	0.2 [3.05]	0.16 [2.13]	0.5 [4.34]	1.52 [6.15]
Intraday	–0.81 [–5.25]	–0.31 [–3.09]	–0.099 [–1.3]	–0.029 [–0.47]	0.0014 [0.02]	0.031 [0.61]	0.12 [2.07]	0.19 [3.22]	0.24 [3.22]	0.26 [3.03]	1.06 [5.32]
Overnight	–0.18 [–1.89]	–0.17 [–1.96]	–0.12 [–1.63]	0.027 [0.44]	0.054 [0.97]	–0.0073 [–0.12]	0.11 [1.79]	0.0023 [0.04]	0.07 [1.01]	0.089 [0.76]	0.27 [1.57]

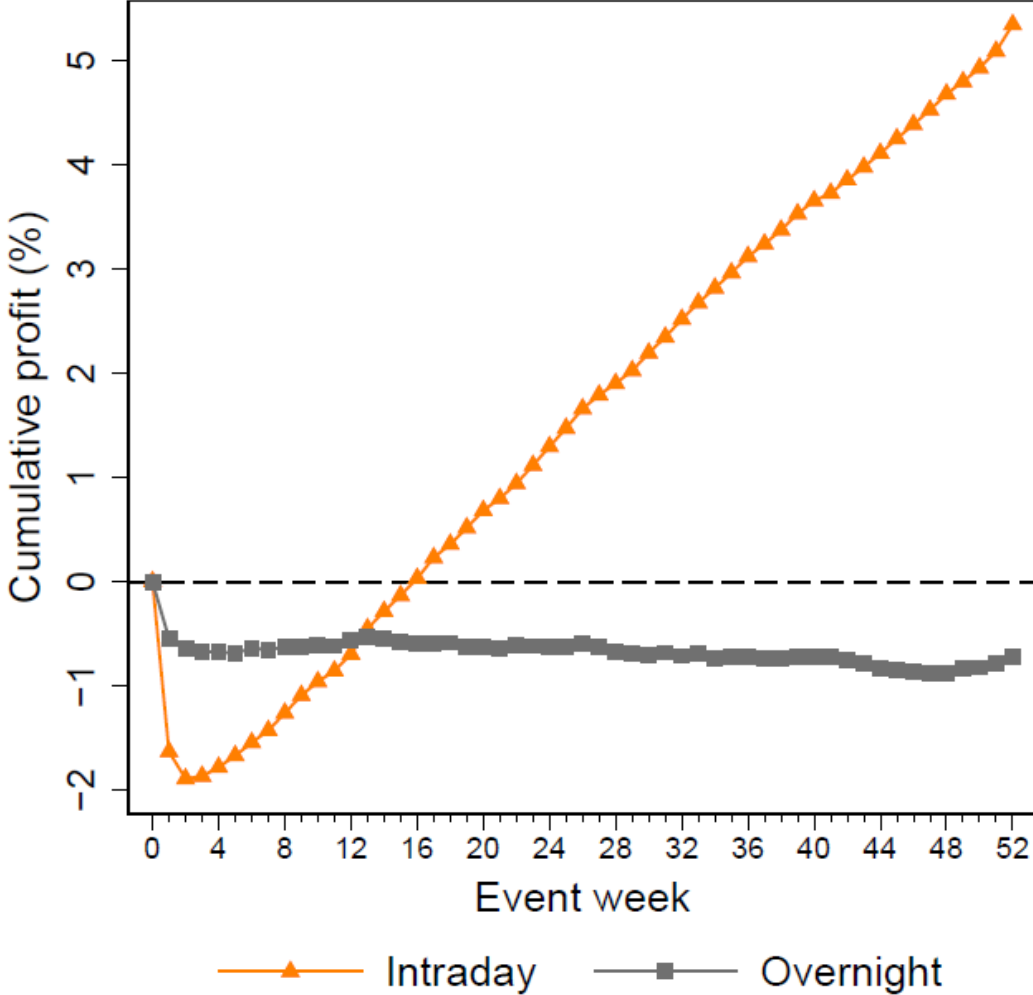
Robustness (2): 1985-2015 with 9:45am midquote



Robustness (3): 1929-1962 (CRSP)



Prior-week return (1963-2019)



Discussion

- Short-term reversal consistent with theories of imperfect liquidity
 - Campbell, Grossman, and Wang (1993); Nagel (2012); Hendershott and Menkveld (2014)
 - Weaker value-weighted returns also support liquidity effects
- News-based theories of momentum are hard to reconcile with the overnight signal's lack of profitability
- Momentum could be also driven by investors' continued overreaction to past price movements (reflected in intraday returns)
 - Absence of long-term reversal suggests underreaction
 - Momentum profits are realized overnight (at least post 1993)
- Underreaction to information conveyed by the trades of other investors?
 - Profits realized when public information is revealed

Additional evidence: volume-based return signal

- Momentum decreases with volume if investors learn from prices to some extent or due to the release of public information
- Split each stock-month into below-median and above-median volume days
- Compute past-return signals using either days with below-median volume or days with above-median volume

	$m - 1$		$(m - 12, m - 2)$		$(m - 60, m - 12)$	
	low	high	low	high	low	high
24h	-0.36 [-3.3]	-1.14 [-7.37]	0.93 [6.66]	0.41 [2.35]	0.087 [0.79]	-0.36 [-3.34]
IN	-0.35 [-3.1]	-1.15 [-7.89]	0.96 [7.09]	0.59 [3.79]	0.26 [2.21]	-0.19 [-1.83]
OV	-0.2 [-2.47]	-0.3 [-2.91]	-0.083 [-0.68]	-0.052 [-0.38]	-0.35 [-3.72]	-0.43 [-4.12]

Sequential sorts: overnight then intraday (momentum alpha)

		Portfolios of past intraday returns (past year)					
		Low	2	3	4	High	H - L
Portfolios of past overnight returns	Low	-0.46 [-2.67]	-0.14 [-1.40]	0.020 [0.23]	0.12 [1.55]	0.26 [2.81]	0.72 [4.62]
	2	-0.53 [-4.49]	-0.025 [-0.32]	0.026 [0.39]	0.17 [2.53]	0.37 [5.74]	0.90 [5.82]
	3	-0.45 [-4.08]	0.028 [0.35]	0.14 [2.29]	0.25 [3.62]	0.53 [7.67]	0.98 [6.72]
	4	-0.36 [-3.03]	0.030 [0.43]	0.14 [2.08]	0.24 [3.82]	0.53 [6.36]	0.89 [5.26]
	High	-0.63 [-3.12]	0.056 [0.56]	0.32 [3.75]	0.35 [4.16]	0.56 [4.87]	1.19 [5.30]

Sequential sorts: intraday then overnight (momentum alpha)

		Portfolios of past overnight returns					
		Low	2	3	4	High	H - L
Portfolios of past intraday returns	Low	-0.56 [-3.23]	-0.58 [-4.21]	-0.37 [-3.04]	-0.42 [-3.70]	-0.51 [-2.93]	0.045 [0.27]
	2	-0.10 [-0.93]	-0.028 [-0.35]	-0.0078 [-0.10]	0.027 [0.36]	0.27 [3.48]	0.37 [2.63]
	3	-0.045 [-0.48]	0.037 [0.53]	0.19 [2.84]	0.19 [3.27]	0.29 [4.03]	0.34 [2.55]
	4	0.0022 [0.03]	0.19 [2.81]	0.26 [3.89]	0.31 [4.39]	0.34 [4.44]	0.33 [2.66]
	High	0.18 [1.82]	0.31 [4.86]	0.38 [5.68]	0.59 [6.92]	0.60 [5.14]	0.42 [2.62]

Overnight public news vs intraday public news

- Type of news disclosed overnight differs from type of news disclosed intraday?
- Market participants react differently to overnight public news than to intraday public news?
 - Less attention to overnight information would go against our findings
 - Public news disclosed overnight appear more salient to investors than public news disclosed intraday?
- Less attention to information that arrives continuously in small amounts vs infrequently but in large amounts (Da, Gurn, and Warachka, 2014)
 - E.g., over a five-day period, a return of 0% on the first four days followed by a return of 5% on the last day is more "discrete" than a return of 1% on every day, which is interpreted as more "continuous"
 - Information discreteness does not explain our results

Underreaction to news

- Drift after bad news in the previous month over 1980-2000 (Chan, 2003); in line with our overnight proxy

Portfolios of last month's return, 1985-2015

Signal type	1	2	...	9	10	10-1
Overnight	-0.34 [-3.58]	-0.075 [-0.8]	...	0.16 [1.81]	0.05 [0.53]	0.4 [2.73]

- Underreaction to news over next few days (Jiang, Li, and Wang, 2021)
 - Momentum signals exclude the previous month return
- Our results do not go against underreaction/overreaction to news in general, but they suggest another important channel for momentum profits

Evidence from analyst target prices

- Investors' beliefs should respond differently to the information proxied by past day and night returns
- How do analyst target prices incorporate information in past day and night returns?
 - Jegadeesh, Kim, Krische, and Lee (2004); Brav, Lehavy, and Michaely (2005); Palley, Steffen, and Zhang (2019); Engelberg, McLean, and Pontiff (2020)
- Compute *consensus* analyst predicted 12-month return for each stock-month (IBES): *pret*

Evidence from analyst target prices: 1999-2015 (quote midpoint at 9:45am); log returns; date fixed effects

Dep. Variable	$r_{t+1:t+12}$	$pret_t$	$ferr_{i,t+1:t+12}$
$r_{t-12:t-1}^{ov}$	-0.0608* (-1.8182)	-0.1146*** (-14.910)	0.0538 (1.4756)
$r_{t-12:t-1}^{in}$	0.1109*** (5.8508)	-0.2318*** (-30.052)	0.3427*** (16.051)
R^2	0.0165	0.1884	0.0650
Obs.	477,179	477,179	477,179
p -value Δ in/ov	0.0000	0.0000	0.0000

Takeaways

- We examine the role of trading and non-trading information for reversal and momentum
- Our results support underreaction theories of momentum and suggest underreaction to information conveyed through trading
 - Response to public news differs than that to private information
- More broadly, in line with evidence that traders neglect some of the informational content of prices