

Revisiting Market Efficiency: Evidence from Post-Earnings Announcement Drift in U.S. Equities

Theory, Data Construction, and Empirical Evidence, 2018–2024

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Final Capstone Presentation

Core question: Do earnings-surprise portfolios still drift after earnings announcements?

Motivation: Why PEAD Matters

Post-Earnings Announcement Drift (PEAD) is the tendency for stock prices to continue moving in the direction of an earnings surprise after the announcement.

Positive surprise

Actual EPS $>$ Expected EPS

Prices may continue rising after the announcement.

Negative surprise

Actual EPS $<$ Expected EPS

Prices may continue falling after the announcement.

Why it matters: PEAD challenges the idea that public information is fully incorporated into prices immediately.

Research question:

What drives the drift in stock prices following earnings announcements?

Main answer of the project

PEAD remains visible in event time in the 2018–2024 sample, but most price formation is front-loaded around the announcement window. The remaining drift is statistically detectable, yet harder to monetize after trading frictions and risk controls. So we have fast but incomplete adjustment to earnings news.

Literature and Contribution

Bernard & Thomas (1989, 1990)

- Document PEAD as a robust anomaly in U.S. equities.
- Show that post-announcement returns are predictable from earnings surprises.

Hong & Stein (1999)

- Explain drift through gradual information diffusion across different types of traders.

Shiller (2017, 2020)

- Emphasizes how narratives spread and influence economic decisions and asset prices.

Contribution

I combine a theoretical mechanism of time-varying sentiment amplification with a modern empirical test of whether earnings surprises still predict post-announcement abnormal returns.

Theoretical Mechanism: Dynamic Sentiment Amplification

Core idea: the price impact of sentiment is not constant.

- Some investors are low-attention and can be influenced by narratives.
- Narrative-driven trading can temporarily become more important after news.
- Sophisticated investors eventually correct mispricing, reducing the influence of narratives.

Mechanism

PEAD can arise when sentiment is temporarily amplified by the evolving composition of traders in the market.

Jump → Drift → Flattening

Model Setup in One Slide

Trader types

- **Retail** (R): low attention, can be persuaded.
- **Narrative** (N): demand is influenced by sentiment.
- **High-precision** (H): sophisticated and institutional.

$$r_t + n_t + h_t = 1.$$

Rational demand

$$X_{i,t}^{rat} = \frac{m_{i,t} - P_t}{\gamma v_{i,t}}.$$

Narrative sentiment demand

$$X_t^{sent} = \beta n_t \xi_t.$$

Interpretation

Sentiment affects prices more strongly when the narrative share n_t is high.

Price Implication and Empirical Prediction

Market clearing gives the price decomposition:

$$P_t = P_t^{fund} + \phi_t \xi_t.$$

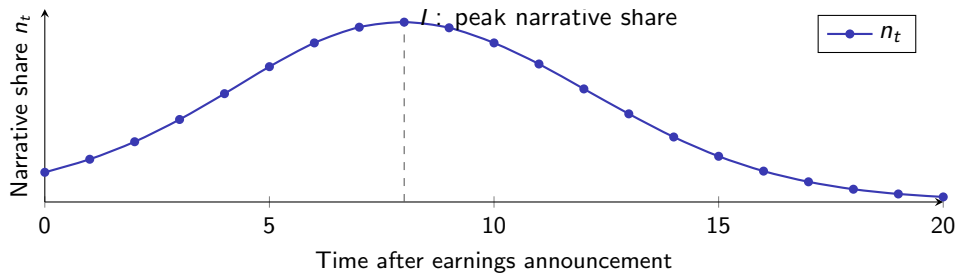
The sentiment multiplier is:

$$\phi_t = \frac{\gamma \beta n_t}{\Omega_t}, \quad \Omega_t = \frac{r_t}{v_{R,t}} + \frac{n_t}{v_{N,t}} + \frac{h_t}{v_{H,t}}.$$

Prediction

When n_t rises after earnings news, sentiment is amplified and prices continue drifting. When n_t falls, the drift weakens and eventually disappears.

Hump-Shaped Narrative Dynamics



Early after the announcement, narrative contagion can dominate correction. Later, sophisticated correction dominates and the narrative share declines.

From Theory to Empirical Design

The full theory predicts a dynamic mechanism involving sentiment and trader composition.

What I test directly in this Project?

I test the central reduced-form implication of PEAD: earnings surprises should continue to predict abnormal returns after the announcement window.

Empirical design

- Measure earnings surprise using analyst forecast errors.
- Sort firms into surprise deciles.
- Track abnormal returns after earnings announcements.
- Test whether surprise rank predicts post-announcement BHAR.

Data and Sample Construction

- Sample period: **2018-10-02 to 2024-12-31**
- Event window: **-10 to +62 trading days**
- Total daily observations: **4,392,191**
- Earnings events: **60,167**
- Unique firms: **4,369**
- Main post-announcement drift window: **BHAR[2,60]**

Why start the drift window at day +2?

The immediate announcement reaction is excluded so that the test focuses on post-announcement drift rather than the announcement-day jump.

Key Measures

Analyst-based price-scaled earnings surprise

$$SUE_{i,j} = \frac{\text{Actual EPS}_{i,j} - \text{Consensus Analyst Forecast EPS}_{i,j}}{\text{Stock Price}_{i,j}}.$$

Daily abnormal return

$$AR_{i,t} = R_{i,t} - R_{m,t}.$$

Compounded market-adjusted abnormal return

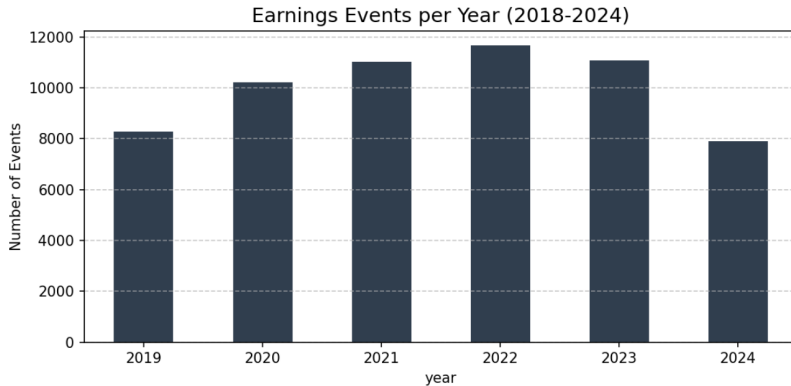
$$BHAR[a, b] = \prod_{t=a}^b (1 + AR_{i,t}) - 1.$$

Portfolio construction

Firms are sorted into SUE deciles. Decile 10 is the best-surprise portfolio; Decile 1 is the worst-surprise portfolio.

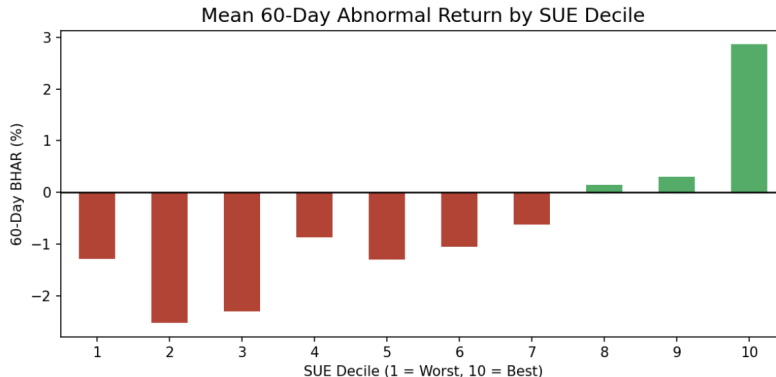
Note: In this project, BHAR is implemented as compounded daily market-adjusted abnormal returns.

Sample Coverage Across Years



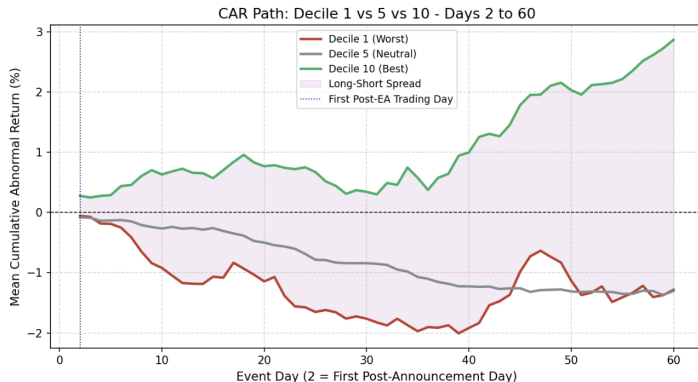
The sample covers COVID/stimulus years and the 2022–2024 rate-hike regime, giving a modern test of PEAD.

Main Descriptive Evidence: Drift by SUE Decile



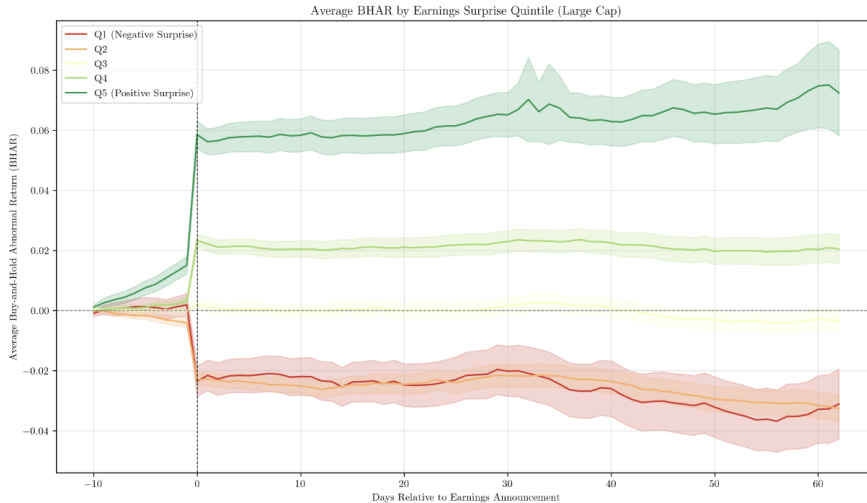
The best-surprise portfolio has the strongest positive post-announcement abnormal return, while bad-surprise portfolios generally underperform.

Mechanism in Event Time: Drift Builds Gradually



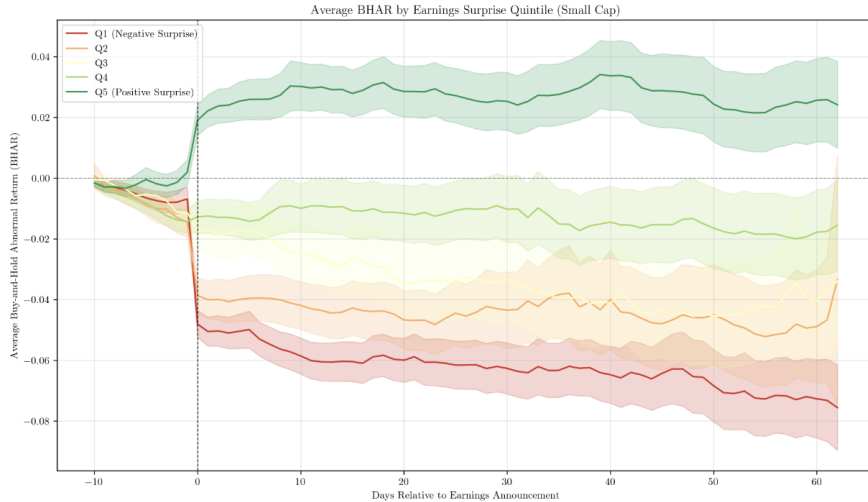
The spread does not appear only on one announcement day. It widens gradually over the post-announcement window, which is the central event-time signature of PEAD.

Event-Time Evidence by Size: Large-Cap Firms



Large-cap positive-surprise firms remain above negative-surprise firms throughout the post-announcement window.

Event-Time Evidence by Size: Small-Cap Firms



Small-cap negative-surprise firms show stronger underperformance, suggesting PEAD varies across firm-size groups.

Regression Evidence: Where Does Price Formation Happen?

Regression specification

$$BHAR[a, b]_{i,j} = \beta \text{ SurpriseRank}_{i,j} + \alpha_i + \delta_{q(j)} + \varepsilon_{i,j}.$$

Outcome	Coef. on SurpriseRank	T-stat	Implied D10–D1	Message
BHAR[0,1]	0.933	22.65	8.40 pp	Strong immediate reaction
BHAR[2,15]	0.135	3.22	1.22 pp	Short-run drift remains
BHAR[2,60]	0.378	3.52	3.40 pp	Medium-run PEAD remains

Interpretation

The dependent variable is BHAR in percentage points. Moving from Decile 1 to Decile 10 is a 9-decile move, so the implied spread is $9 \times \beta$.

Firm fixed effects and earnings-quarter fixed effects are absorbed. Standard errors are clustered by firm and earnings quarter.

Interpreting the Regression Evidence

Main empirical message

Markets react strongly to earnings news immediately, but the reaction is not complete. SurpriseRank still predicts abnormal returns after day +2.

- **Immediate price formation is large:** $BHAR[0,1]$ implies an 8.40 percentage-point D10–D1 difference.
- **Short-term drift remains:** $BHAR[2,15]$ implies a 1.22 percentage-point D10–D1 spread.
- **Medium-term PEAD remains visible:** $BHAR[2,60]$ implies a 3.40 percentage-point D10–D1 spread.

Price formation is front-loaded, but not complete.

markets are not fully efficient, but they are also not completely slow, and PEAD is still alive. The evidence suggests fast but incomplete adjustment to earnings news.

Economic Caution: Is the Drift Tradable?

Mkt Cap	D10 (%)	D1 (%)	L/S Spread (%)	RT TC (%)	Net Spread (%)	D10 N	D1 N
Nano	2.168%	-2.742%	4.910%	4.00%	0.910%	2,280	2,280
Micro	5.386%	-1.415%	6.801%	1.90%	4.901%	1,227	1,227
Small	2.387%	-1.652%	4.039%	1.10%	2.939%	925	925
Mid	1.441%	-1.283%	2.724%	0.40%	2.324%	814	814
Large	1.450%	-1.258%	2.709%	0.16%	2.549%	770	770

** RT TC = estimated round-trip transaction cost, approximated as 2x one-way bid-ask spread. Net Spread = D10-D1 Long-Short Spread minus estimated round-trip transaction cost. This is a friction-adjusted event-time spread test, not definitive proof of implementable trading alpha.*

The event-time evidence shows drift, and some size-bucket long-short spreads survive rough transaction-cost estimates. However, stricter calendar-time and factor-adjusted alpha tests are more conservative, so tradability remains less conclusive.

Key message: PEAD is statistically visible, but it is not necessarily easy alpha.

Robustness: Calendar-Time and Factor-Adjusted Alpha

Why this matters

Event-time regressions show PEAD in abnormal returns, but a stricter test asks whether a calendar-time long-short PEAD portfolio earns statistically significant alpha after risk-factor controls.

Test	Alpha	T-stat	P-value
Daily calendar-time alpha	0.032%	1.10	0.269
Daily CAPM alpha	0.032%	1.09	0.275
Daily Fama-French 3 alpha	0.030%	1.10	0.269
Daily Fama-French 5 alpha	0.026%	0.96	0.336
Monthly compounded alpha	0.662%	1.10	0.271
Monthly FF5 + Momentum alpha	0.349%	0.58	0.559

Interpretation

The alphas are positive, but not statistically significant. PEAD is visible in event time, but the evidence for tradable factor-adjusted alpha is more conservative.

Daily tests use Newey–West standard errors with 60 lags. Monthly tests use Newey–West standard errors with 3 lags.

Conclusion

- Earnings news is incorporated quickly around the announcement window.
- The reaction is not complete: high-surprise firms continue to outperform after day +2.
- The strongest evidence appears when firms are ranked into SUE deciles.
- The effect is concentrated in the tails, especially strong positive earnings surprises.

Main conclusion

PEAD remains visible in event time in the 2018–2024 sample, but it appears weaker, faster, and harder to monetize than the classic version of the anomaly.

PEAD is not fully dead, but it is not easy alpha.

- Event-time regressions support post-earnings announcement drift.
- Calendar-time and factor-adjusted alpha tests are positive, but not statistically significant.
- Transaction costs and liquidity frictions limit economic harvestability.
- There is an incomplete price adjustment.

Thank you.