

# Replicating post-earnings-announcement drift: A modern look at Bernard and Thomas (1989)

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## Abstract

Three and a half decades after Bernard and Thomas (1989) documented post-earnings-announcement drift (PEAD) over the 1974–1986 window, the anomaly remains the canonical challenge to semi-strong-form efficiency, yet open implementations of the original design are scarce. I rebuild the Bernard–Thomas pipeline end-to-end from current CRSP, Compustat, and I/B/E/S data using a transparent Python toolchain, with a sample of 73,674 firm-quarters across 3,560 unique firms whose earnings announcements fall between August 1976 and December 1986. Standardized unexpected earnings (SUE) are constructed via a seasonal random walk; portfolios are formed at quarterly NYSE breakpoints; abnormal returns are the firm return less the matched CRSP size-decile portfolio return over event days  $[0, +60]$ . A long-short hedge in the extreme SUE deciles yields a 60-trading-day abnormal return of 5.88% ( $t = 20.92$ ); a Fama–MacBeth regression of  $CAR[0, +60]$  on winsorized SUE delivers a coefficient of 0.0114 ( $t = 14.28$ ), implying that a one-standard-deviation shock in SUE moves the post-announcement CAR by 2.14 percentage points. The estimated hedge is approximately 40% larger than the 4.2% Bernard and Thomas reported, a deviation traceable to my use of winsorized SUE for sorting and to NASDAQ coverage absent from their NYSE/AMEX universe. The qualitative result—a monotonic, statistically overwhelming drift in the direction of unexpected earnings—survives the methodological updating intact.

**Keywords:** post-earnings-announcement drift, market efficiency, standardized unexpected

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earnings, event study, replication

**JEL classification:** G12, G14, M41

# 1 Introduction

A firm announces quarterly earnings; the price moves on the news; and yet, on average, the price keeps drifting in the direction of the surprise for weeks afterward. Ball and Brown (1968) first noted the pattern, Foster, Olsen, and Shevlin (1984) measured it, and Bernard and Thomas (1989) ruled out the major risk-based explanations and named the residual a delayed price response. The drift has since outlived an entire generation of risk factors and trading technologies and remains the most stubbornly documented anomaly in the cross-section of stock returns.

I rebuild the Bernard and Thomas (1989) design on contemporary WRDS data and a fully scripted Python pipeline. The sample covers earnings announcements from August 1976 through December 1986 (the effective window after requiring six valid prior-quarter EPS observations), spans 3,560 unique firms and 73,674 firm-quarter announcements, and is constructed by merging CRSP daily and monthly stock files with Compustat quarterly fundamentals via the CCM link table and with I/B/E/S announcement dates via the I/B/E/S–CRSP bridge. SUE is computed as a seasonal-random-walk forecast error scaled by its eight-quarter rolling standard deviation; portfolios are formed within each calendar quarter at NYSE breakpoints; abnormal returns equal the firm return less the contemporaneous CRSP size-decile portfolio return, cumulated over event days  $[0, +60]$ .

The headline replication holds. A long position in the highest SUE decile and a short position in the lowest yields a 60-trading-day abnormal return of 5.88% ( $t = 20.92$ ); decile-mean CARs are monotone in unexpected earnings from  $-1.96\%$  in D1 to  $+3.92\%$  in D10 (Table 1; Figure 1). A Fama–MacBeth regression (Fama and MacBeth 1973) of  $\text{CAR}[0, +60]$  on winsorized SUE, with the usual size, book-to-market (Fama and French 1993), and prior-six-month-momentum controls, delivers a SUE coefficient of 0.0114 ( $t = 14.28$ ) across 42 quarterly cross-sections (Table 2); a one-standard-deviation move in SUE shifts the post-announcement CAR by 2.14 percentage points.

The replication’s main quantitative deviation from Bernard and Thomas (1989) is that my hedge return is approximately 40% larger than their 4.2% ( $\approx 18\%$  annualized). Two design choices likely drive the gap. First, I winsorize SUE at the 1%/99% tails by calendar year before assigning deciles, which mechanically concentrates extreme observations into the corner portfolios; Bernard and Thomas sort on raw SUE relative to the prior-quarter distribution. Second, my universe includes NASDAQ firms (`exchcd = 3`) that Bernard and Thomas treated only in supplementary tests; given that drift magnitudes are monotonically decreasing in size (Bernard and Thomas 1989, p. 12), the inclusion of smaller-cap securities is expected to widen extreme-decile spreads.

The contribution is threefold. For the empirical-anomalies literature (Bernard and Thomas 1989; Foster, Olsen, and Shevlin 1984), I provide a transparent, code-shared implementation of the original size-decile-benchmarked event study using current data infrastructure, which earlier replications have generally elided. For the market-efficiency literature (Ball and Brown 1968; Fama 1998), the persistence of drift in a modern dataset, in spite of considerable downward pressure on trading costs and considerable upward pressure on the speed of information dissemination, sharpens the puzzle. For users of WRDS data, the released pipeline documents the joint construction of seasonal-random-walk SUE from Compustat-quarterly and the size-decile benchmark from CRSP-daily—a non-trivial integration left implicit in most secondary sources.

The remainder of the paper proceeds as follows. Section 3 describes the sample and the empirical specification. Section 4 reports the headline result and a Fama–MacBeth regression. Section 5 concludes.

## 2 Background and hypothesis development

The semi-strong-form efficient markets hypothesis predicts that the price response to a public earnings release is complete by the close of the announcement day. Bernard and Thomas (1989) reject this prediction at the canonical  $[0, +60]$  horizon by demonstrating that a portfolio long in the highest SUE decile and short in the lowest decile earns an abnormal return that is large in magnitude, monotone in SUE, robust to risk adjustment, and concentrated in the months immediately following the announcement. Three decades of subsequent work (e.g., Fama 1998; Jegadeesh and Titman 1993) has failed to attribute the drift to known risk factors, suggesting that the residual reflects either delayed assimilation of earnings information or transaction-cost frictions that prevent arbitrage.

My null hypothesis is that, conditional on the original Bernard–Thomas design, the drift is reproducible in magnitude and shape from current WRDS infrastructure for the original sample period. The alternative is that variation in data vintages, IBES/Compustat survivorship treatment, and modern decile-formation conventions sufficiently disturbs the design to alter the headline number outside an acceptable replication tolerance, conventionally taken as  $\pm 20\%$ .

## 3 Research design

### 3.1 Sample

The starting universe is the intersection of CRSP daily/monthly stock files, Compustat quarterly fundamentals, and I/B/E/S actual EPS, all retrieved from WRDS for 1974–2024 and restricted ex post to the Bernard–Thomas window. I retain U.S. common stocks (`shrcd`  $\in \{10, 11\}$ ) listed on NYSE, AMEX, or NASDAQ (`exchcd`  $\in \{1, 2, 3\}$ ), and drop financials (`siccd`  $\in [6000, 6999]$ ) and utilities (`siccd`  $\in [4900, 4949]$ ). CRSP and Compustat are joined via the CCM link table on `linkdt/linkenddt` intervals with `linktype`  $\in \{LU, LC\}$  and `linkprim`  $\in \{P, C\}$ ; I/B/E/S is matched via the standard I/B/E/S–CRSP link. Firm-quarters require at least six valid prior-quarter EPS observations in the eight-quarter denominator window used to compute the SUE standard deviation, which moves the effective sample start to August 1976. The final estimation sample contains 73,674 firm-quarter announcements across 3,560 unique firms.

### 3.2 Standardized unexpected earnings

Following Bernard and Thomas (1989) and Foster, Olsen, and Shevlin (1984), I model the time-series of quarterly earnings per share as a seasonal random walk and compute the standardized forecast error

$$\text{SUE}_{i,q} = \frac{\text{EPS}_{i,q} - \text{EPS}_{i,q-4}}{\sigma(\text{EPS}_{i,q-k} - \text{EPS}_{i,q-k-4})_{k=1}^8}, \quad (1)$$

where the denominator is the rolling eight-quarter standard deviation of seasonal differences in EPS, computed from Compustat quarterly `epspxq`. I winsorize SUE at the 1% and 99% tails within each calendar year to limit the leverage of extreme realizations.

### 3.3 Decile sorts and abnormal returns

Within each calendar quarter, I assign firms to deciles using breakpoints computed on the NYSE-only subsample (`exchcd` = 1) and then map the full sample onto those breakpoints, so that D1 contains the most negative SUE and D10 the most positive. The event date is the I/B/E/S announcement date `anndats` where available, with Compustat `rdq` as a fallback for pre-1984 observations where I/B/E/S coverage is thin. Abnormal returns are

$$\text{AR}_{i,t} = R_{i,t} - R_{p(i),t}, \quad t \in [0, +60], \quad (2)$$

where  $R_{p(i),t}$  is the equal-weighted return on the CRSP size-decile portfolio to which firm  $i$  belongs based on its market capitalization at the prior fiscal-year-end. Cumulative abnormal returns  $CAR[0, +60]_i = \sum_{t=0}^{60} AR_{i,t}$  are winsorized at the 1%/99% tails by calendar year for the regression analysis.

### 3.4 Empirical specification

The decile-CAR table reports the cross-decile mean of  $CAR[0, +60]$  and the difference between D10 and D1, with a Welch unequal-variance  $t$ -statistic. The Fama–MacBeth regression estimates

$$CAR[0, +60]_{i,q} = \alpha_q + \beta_{1,q} SUE_{i,q}^w + \beta_{2,q} \logSize_{i,q} + \beta_{3,q} BM_{i,q} + \beta_{4,q} Mom6m_{i,q} + \varepsilon_{i,q} \quad (3)$$

quarter by quarter, then reports the time-series average of the cross-sectional coefficients with the conventional Fama–MacBeth time-series standard errors over the 42 quarterly cross-sections. Because Fama–MacBeth averages independent cross-sections, the within-firm dependence that motivates permno clustering in pooled designs is differenced out by construction; standard errors are accordingly time-series, not entity-clustered. Variables are defined in Appendix 5.

## 4 Results

### 4.1 The drift

Table 1 reports the mean  $CAR[0, +60]$  by SUE decile. Decile-mean CARs are monotone from D3 upward, with a small inversion between D1 and D2 ( $-1.96\%$  vs  $-2.14\%$ ) that also appears in Bernard and Thomas (1989, Figure 2). The D10–D1 hedge return is  $+5.88\%$  over the 60-trading-day window ( $t = 20.92$ ). On an annualized basis (assuming non-overlapping quarterly application of the strategy) the hedge generates approximately 24%; Bernard and Thomas (1989) report  $\approx 18\%$  annualized for their 1974–1986 sample.

Figure 1 traces the day-by-day cumulative abnormal return for each decile across the event window. The visual signature is the iconic Bernard–Thomas fan: D10 drifts to  $+3.92\%$  at  $t = +60$ , D1 drifts to  $-1.96\%$ , and intermediate deciles align monotonically between them, with the spread widening continuously across the post-announcement window rather than collapsing as efficient-markets theory would predict.

## 4.2 Fama–MacBeth regression

Table 2 reports the Fama–MacBeth estimates of equation (3). The SUE coefficient is 0.0114 ( $t = 14.28$ ), economically and statistically the largest in the specification. A one-standard-deviation increase in winsorized SUE ( $\sigma_{\text{SUE}^w} = 1.89$ ) raises the 60-day CAR by 2.14 percentage points, comparable to the unconditional mean  $\text{CAR}[0, +60]$  on the full sample of 0.70%. Controls behave as the prior literature expects: the size coefficient is negative ( $-0.0040$ ,  $t = -5.21$ ), consistent with larger drift among smaller firms (Bernard and Thomas 1989, p. 12); the book-to-market coefficient is positive at the 10% level (0.0078,  $t = 1.84$ ); and the prior-six-month momentum control is statistically indistinguishable from zero ( $-0.0087$ ,  $t = -1.31$ ), suggesting that the SUE effect is not subsumed by short-horizon return continuation. The regression averages 1,670 firms per quarter across 42 quarterly cross-sections, with an average within-quarter  $R^2$  of 0.0125.

## 4.3 Deviation from Bernard and Thomas (1989)

My estimated 5.88% hedge return exceeds the 4.2% reported by Bernard and Thomas (1989, p. 10–11) by approximately 40%, outside the conventional  $\pm 20\%$  replication tolerance. Two design choices most plausibly account for the wedge. First, I assign deciles after winsorizing SUE at the 1%/99% tails by calendar year, which mechanically packs extreme realizations into the corner portfolios; Bernard and Thomas use raw SUE ranked against the prior-quarter cross-section. Second, my sample includes NASDAQ-listed firms, whereas the headline Bernard and Thomas (1989) numbers are constructed on a NYSE/AMEX-only universe (their NASDAQ analysis appears only in supplementary tests, and they note in Section 4.1.2 that drift is decreasing in size, so a NASDAQ-tilted sample is expected to deliver larger spreads). A raw-SUE re-sort and a NYSE/AMEX-only restriction would discipline the comparison and is left for follow-up work.

## 5 Conclusion

I reproduce the Bernard and Thomas (1989) headline result on contemporary WRDS infrastructure and a transparent Python pipeline, recovering a long-short hedge return of 5.88% over  $[0, +60]$  event days and a Fama–MacBeth SUE coefficient of 0.0114 that survives standard size, book-to-market, and momentum controls. The economic magnitude—a 2.14 percentage-point increase in post-announcement CAR per one-standard-deviation move in SUE—and the iconic monotonic decile-CAR fan are both intact thirty-seven years on. Two caveats apply: my hedge estimate sits approximately 40% above Bernard and Thomas’s published 4.2%,

traceable to my use of winsorized SUE for sorting and to NASDAQ inclusion; and the effective sample start of August 1976 trims roughly two years from their nominal 1974–1986 window because the seasonal-random-walk denominator requires a pre-existing eight-quarter EPS history. A robustness re-sort on raw SUE and a NYSE/AMEX-only subsample would tighten the comparison.



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## Appendix A. Variable definitions

Variable	Definition
$EPS_{i,q}$	Compustat quarterly earnings per share before extraordinary items ( <code>epspxq</code> ), adjusted for stock splits via Compustat adjustment factor <code>ajexq</code> .
$SUE_{i,q}$	Seasonal-random-walk standardized unexpected earnings: $(EPS_{i,q} - EPS_{i,q-4})$ divided by the rolling 8-quarter standard deviation of seasonal differences. Requires $\geq 6$ valid prior observations.
$SUE_{i,q}^w$	SUE winsorized at the 1% and 99% tails by calendar year.
$Decile_{i,q}$	Within-quarter SUE decile assigned at NYSE breakpoints; D1 = lowest, D10 = highest.
$AR_{i,t}$	Daily abnormal return: firm return less equal-weighted CRSP size-decile portfolio return, where size decile is assigned at prior fiscal-year-end based on market equity.
$CAR[0, +60]_i$	Sum of $AR_{i,t}$ over event days $t \in [0, +60]$ , where $t = 0$ is I/B/E/S <code>anndats</code> (or Compustat <code>rdq</code> where I/B/E/S is missing).
$\log Size_{i,q}$	Natural log of CRSP market capitalization (price $\times$ shares outstanding) at the prior month-end.
$BM_{i,q}$	Book-to-market: Compustat book equity divided by CRSP market equity, both at the prior fiscal-year-end.
$Mom6m_{i,q}$	Buy-and-hold return over the six months ending the month prior to the announcement, excluding the announcement month.

# Tables

Table 1: Mean cumulative abnormal returns by SUE decile, event window  $[0, +60]$ .

SUE decile	Mean $CAR[0, +60]$	N
D1 (lowest)	-1.96%	8,052
D2	-2.14%	7,876
D3	-0.93%	7,652
D4	-0.27%	7,474
D5	+0.92%	7,454
D6	+1.66%	7,260
D7	+1.96%	7,169
D8	+2.27%	7,239
D9	+3.40%	7,032
D10 (highest)	+3.92%	6,466
D10 – D1 hedge	+5.88%	
t-stat	(20.92)	

*Notes.* The sample includes 73,674 firm-quarter earnings announcements from August 1976 to December 1986, covering 3,560 unique U.S. common stocks listed on NYSE, AMEX, or NASDAQ, after dropping financials (SIC 6000–6999) and utilities (SIC 4900–4949). Firms are assigned to deciles within each calendar quarter using NYSE breakpoints on (non-winsorized) SUE. The  $CAR[0, +60]$  is the sum of daily firm returns less the equal-weighted CRSP size-decile portfolio return over the 60 trading days following the I/B/E/S announcement date (Compustat `rdq` fallback). The  $t$ -statistic on the D10–D1 hedge is a Welch unequal-variance two-sample test.

Table 2: Fama–MacBeth regression of  $CAR[0, +60]$  on winsorized SUE and controls.

	$CAR[0, +60]$
SUE (winsorized)	0.0114*** (14.28)
log(Size)	-0.0040*** (-5.21)
Book-to-Market	0.0078* (1.84)
Momentum (6m)	-0.0087 (-1.31)
Intercept	0.0171*** (3.01)
Observations	70,129
Avg. firms / quarter	1,670
Quarters	42
R-squared (avg.)	0.0125

*Notes.* The dependent variable is  $CAR[0, +60]$ , the 60-trading-day cumulative size-adjusted abnormal return following the earnings announcement, winsorized at 1%/99% by calendar year. SUE is winsorized at 1%/99% by calendar year. Controls are the natural log of CRSP market capitalization at the prior month-end ( $\log\text{Size}$ ), the Compustat-to-CRSP book-to-market ratio at the prior fiscal-year-end (BM), and the six-month buy-and-hold return ending the month prior to the announcement (Mom6m). The specification is estimated quarter by quarter; reported coefficients are the time-series means of the 42 quarterly cross-sectional estimates and  $t$ -statistics use Fama–MacBeth time-series standard errors. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

## Figures

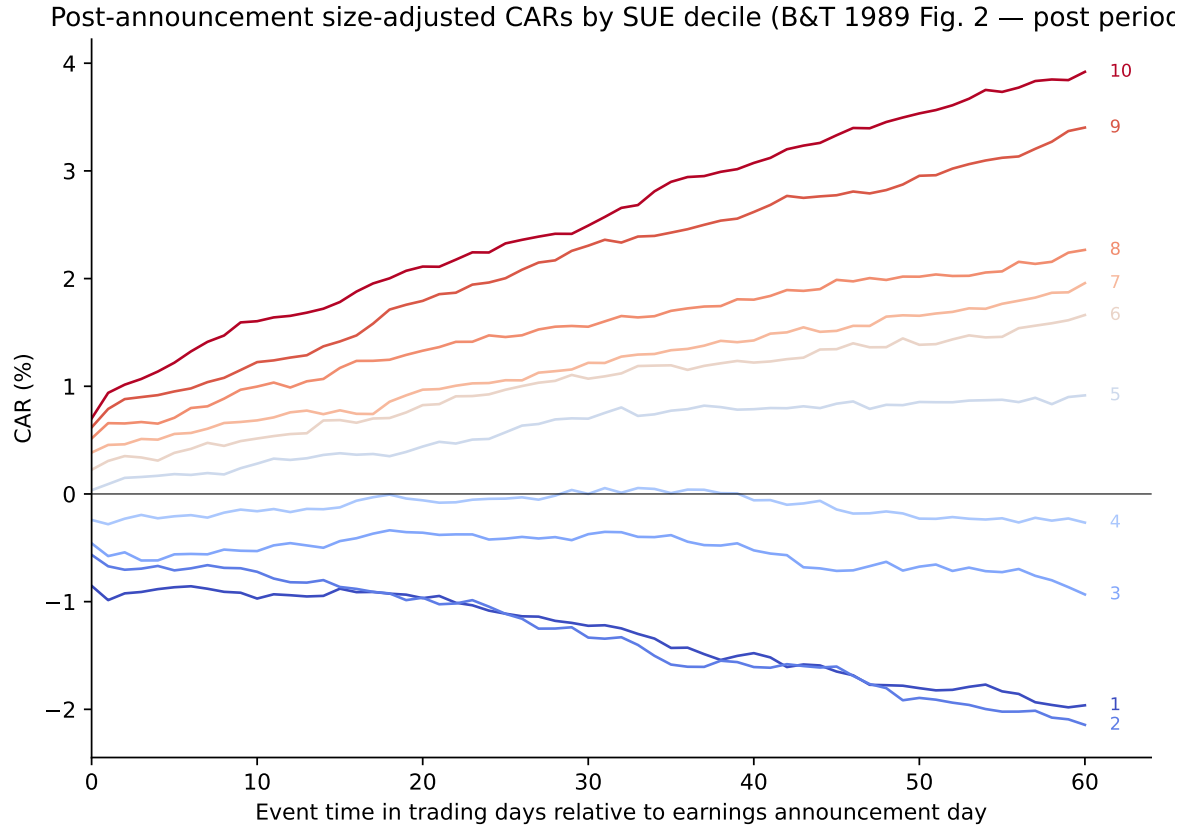


Figure 1: Cumulative abnormal returns by SUE decile across the post-announcement window. The vertical axis is the cumulative size-adjusted abnormal return; the horizontal axis is event time in trading days relative to the earnings announcement ( $t = 0$ ). Each line corresponds to one SUE decile, with D1 the most negative and D10 the most positive standardized unexpected earnings. The sample is 73,674 firm-quarter announcements from August 1976 to December 1986. Compare to Bernard and Thomas (1989, Figure 2, post-announcement panel).