The Death of Insider Trading Alpha:

Most Returns Occur Before Public Disclosure

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Abstract: Insider trading strategies are widely believed to generate abnormal returns, yet practitioner backtests often report performance far exceeding what is documented in the academic literature. Using insider transaction data from U.S. Securities and Exchange Commission (SEC) Form 4 filings for Russell 2000 constituents, we show that this discrepancy is driven by the timing of trade entry. We distinguish between the insider's transaction date, when information remains private, and the filing date, when it becomes publicly available. Strategies that enter on the transaction date generate extremely high Sharpe ratios, but these returns are not economically meaningful. Once entry is delayed until the filing date—the earliest point at which a public investor can legally trade—measured performance collapses, with 70–80 percent of total alpha dissipating between the transaction date and the following trading day, well before any public disclosure. By the time a Form 4 filing is released, the remaining signal is largely confirmatory rather than informative, indicating that backtests relying on transaction dates measure the value of private information rather than a tradable investment strategy.

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The authors conduct independent research. This paper is for academic discussion only and does not constitute investment advice.

1. Introduction

Trading by corporate insiders has long been of interest to both researchers and market participants. The intuition is simple: insiders are closer to firm-specific information than outside investors. Empirical studies based on public disclosures generally confirm this view, but only to a limited extent, documenting modest and often fragile abnormal returns following insider purchases.

At the same time, practitioner backtests frequently report results that look far stronger. In some cases, Sharpe ratios reach levels that are difficult to reconcile with both the academic literature and basic market intuition. The gap between these two sets of results is too large to be explained by differences in portfolio construction or risk adjustment alone.

In this paper, we show that the discrepancy largely comes from a single implementation choice: the timestamp used for trade entry. Using insider transaction data from SEC Form 4 filings, we compare strategy performance when trades are entered on the insider's transaction date versus the public filing date. By delaying entry in daily increments, we directly observe how informational alpha decays as insider activity moves from private to public.

The results are clear. Most of the alpha dissipates before a Form 4 filing becomes public, leaving little economically meaningful edge for legally tradable strategies. Backtests that rely on transaction dates therefore measure the value of private information rather than an implementable investment strategy, reflecting a straightforward but consequential form of look-ahead bias.

2. Background and Related Context

Insider trading signals sit at the intersection of regulation, information diffusion, and backtest implementation. In the United States, corporate insiders are required to report their transactions to the SEC via Form 4 within two business days. This reporting window creates a clear distinction between the transaction date, when the insider acts, and the filing date, when the information becomes public.

That distinction matters. During the reporting delay, insider trades can leave observable footprints in prices, volume, and order flow, even though no formal disclosure has occurred. As a result, prices may begin to adjust before a Form 4 is filed, making the timing of trade entry central to any empirical evaluation.

Prior academic work, which relies on publicly available filing data, generally finds modest abnormal returns following insider purchases. These effects tend to weaken once transaction costs, liquidity, and realistic holding periods are taken into account. Practitioner backtests, however, often report much stronger results. In our view, much

of this gap arises from a simple source: the use of transaction dates rather than filing dates when constructing trading signals.

Entering trades on the transaction date implicitly assumes access to information that is still private at that point in time. This is not a subtle modeling choice. It changes what the backtest is measuring. The analysis that follows shows that once this timing ambiguity is resolved, the apparent outperformance of insider-based strategies largely disappears.

3. Data

Our analysis relies on a deliberately simple and transparent dataset. This section describes the stock universe, the insider transaction data, and how trading signals are constructed.

3.1 Universe and Sample

The investment universe consists of Russell 2000 constituents, with index membership handled on a point-in-time basis to avoid survivorship bias. All return calculations use total return series adjusted for dividends and splits.

The study is motivated by results commonly observed in Bloomberg's Factor Test (FTST) tool, which typically reports performance over rolling one-year windows. Our primary analysis covers January through November 2025. This period is sufficient to reproduce the qualitative patterns seen in practitioner backtests while allowing a controlled examination of how insider-related alpha decays over time. The objective is not to optimize performance over a particular sample, but to study timing effects in a clean setting.

3.2 Insider Trading Data

Insider transaction data are sourced from U.S. SEC Form 4 filings. For each transaction, we explicitly distinguish between two dates:

- the **transaction date**, when the insider executes the trade and the information remains private;
- the **filing date**, when the Form 4 is submitted and the transaction becomes publicly observable.

Portfolios formed using transaction dates serve as a non-tradable benchmark that captures the full value of private information. Portfolios based on filing dates represent the earliest point at which a public investor can legally act on the signal.

3.3 Signal Construction

Each day, stocks are ranked by net insider buying and assigned to decile portfolios. The strategy takes a long position in the top decile and a short position in the bottom decile, forming an equal-weighted long–short portfolio.

To isolate the informational component of returns and remain comparable with reference backtests, transaction costs and market impact are set to zero. These signals form the basis for the entry-timing experiments described in the next section.

4. Methodology

Our methodology is designed to isolate a single question: how measured performance changes as trade entry is delayed relative to the insider's transaction. We do not alter the signal, portfolio construction, or holding period. Only the entry timestamp moves.

Although Form 4 filings are required within two business days of the transaction, they are frequently submitted after market close. As a result, the information typically becomes actionable for public investors no earlier than the following trading day. In this sense, entry timings up to D2 should be viewed as effectively private, while D3 and later entries more accurately reflect strategies based on publicly available information.

4.1 Entry and Exit Timing

We define entry delays relative to the insider's transaction date as follows:

- **D0**: Entry at the market close on the transaction date.
- **D1**: Entry at the close one trading day after the transaction.
- **D2**: Entry at the close two trading days after the transaction, corresponding to the earliest legally public date
- **D3**: Entry at the close three trading days after the transaction
- **D4**: Entry at the close four trading days after the transaction.

Unless stated otherwise, strategies enter at the close and exit at the close of the following trading day, resulting in a one-day holding period with daily rebalancing.

4.2 Multi-Day Holding Period (Diagnostic Exercise)

To get a sense of the maximum value embedded in private insider information during the reporting window, we run a simple diagnostic exercise using a fixed multi-day holding period. Positions are entered at the close on the transaction date (D0), held through the next two trading days, and exited at the close on the third day after entry.

For comparability with one-day strategies, the total return over the three-day holding period is evenly distributed across the holding window and added to daily equity. This

simplification avoids modeling interim realized and unrealized profit and loss, while preserving the scale of cumulative returns.

This exercise is not economically implementable by public investors, as it relies on transaction-date information. Its role is purely diagnostic: to provide an upper bound on the value of private insider information.

4.3 Performance Measurement

Strategy performance is evaluated using two metrics:

- **Equity Multiple,** defined as ending wealth divided by starting wealth. This measure is not annualized.
- **Sharpe Ratio,** computed as the mean daily excess return divided by the standard deviation of daily excess returns and annualized using the square root of trading days.

5. Results

This section reports the results of the timing experiments described above. The pattern is simple and consistent: as trade entry moves away from the insider's transaction date toward public disclosure, performance decays rapidly.

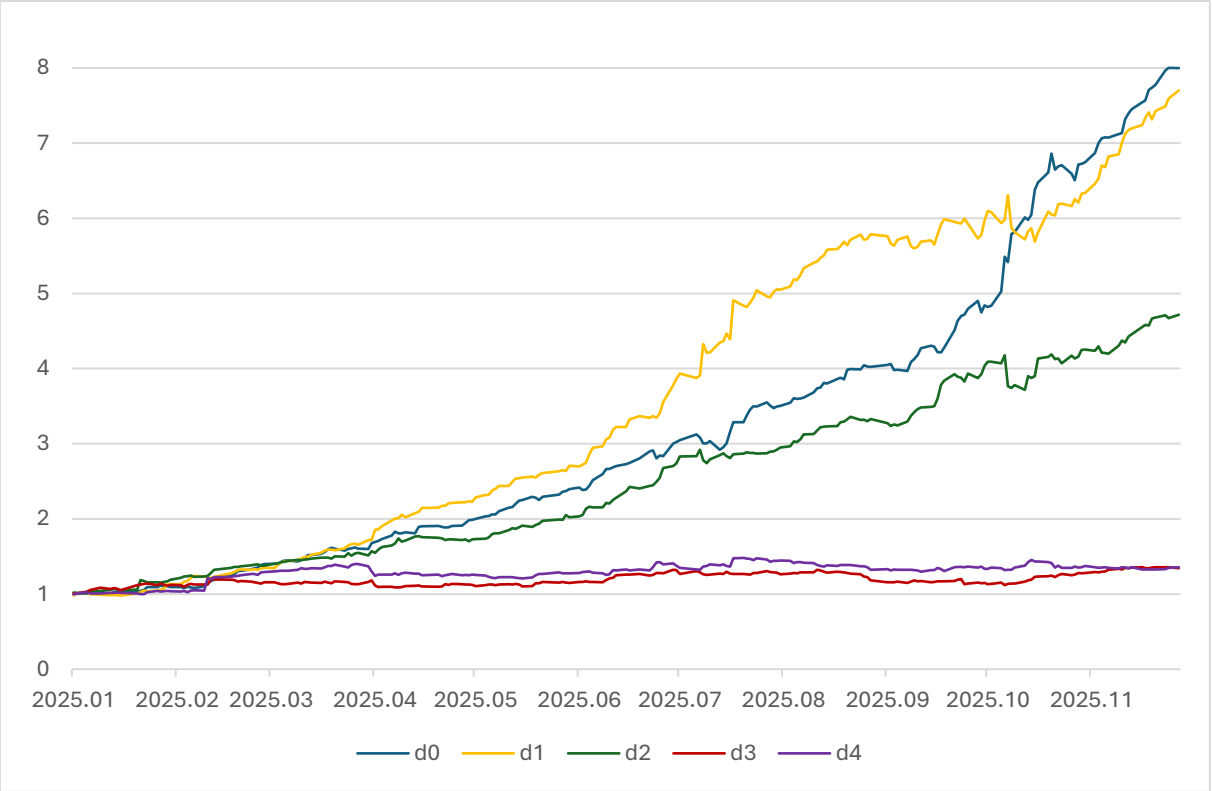
5.1 One-Day Holding Period by Entry Delay

Table 1 reports performance for strategies with a one-day holding period, differing only in their entry timing relative to the insider's transaction date. While Form 4 filings are legally required within two business days, they are often released after market close. As a result, entries through D2 still rely on information that is not yet practically available to public investors. In what follows, D0–D2 are best viewed as effectively private, whereas D3 and later entries reflect strategies based on truly public information.

Table 1. Performance by Entry Timing (One-Day Holding Period)

Entry timing	Sharpe ratio	CAGR (gross)	Information status
D0 (transaction date)	9.03	820%	Private
D1 (one day after)	7.85	786%	Private
D2 (two days after)	6.37	443%	Effectively private (pre-disclosure)
D3 (first full public day)	1.56	55%	Public
D4 (one day after public)	1.37	56%	Public

Figure 1. Equity Curves



The pattern is clear. Performance remains extremely strong while entry relies on effectively private information. Sharpe ratios above 6 persist through D2, accompanied by very large gross returns. Once entry shifts to D3—the first point at which the information is both disclosed and practically tradable—performance drops sharply. By this stage, Sharpe ratios fall to approximately 1.5 and returns decline to levels that are unlikely to survive transaction costs in practice.

This transition is visually apparent in the equity curves. **Figure 1** plots cumulative performance for D0 through D4 strategies. Strategies entering on D0–D2 exhibit steep growth, while the D3 and D4 curves flatten considerably. The loss of momentum coincides with the point at which insider information becomes effectively public.

Taken together, these results show that the apparent profitability of insider-based strategies is concentrated entirely in the window when the information is still private in practice. Once entry timing is aligned with what public investors can realistically observe and trade on, the strategy's edge largely disappears.

6. Interpretation and Discussion

The results reveal a clear pattern in how insider-related information is incorporated into prices. A substantial share of the measured alpha decays well before formal disclosure, remaining strong only while trade entry relies on information that is effectively private. Once the information becomes practically accessible to public investors, performance deteriorates sharply.

One plausible explanation is that insider trades leave observable market footprints prior to disclosure. Even in the absence of public filings, transaction-related effects on prices, trading volumes, and liquidity may be detected and incorporated by other market participants. This mechanism does not require illegal information leakage; rather, it reflects inference based on legally observable trading activity rather than explicit disclosure.

These findings underscore an important distinction between legally public and effectively public information. Although Form 4 filings define the legal disclosure date, the evidence suggests that much of the underlying information is already reflected in prices by that time. As a result, filings often serve a confirmatory role rather than introducing new, economically meaningful signals.

The magnitude of this effect also depends on the cross-sectional environment. The analysis focuses on Russell 2000 stocks, where lower liquidity and greater information asymmetry increase the likelihood that insider trades leave detectable pre-disclosure footprints. In contrast, comparable tests on large-cap universes such as the S&P 500 and Nasdaq 100 exhibit substantially weaker effects, with no comparable private-to-public performance cliff.

Overall, the results support a view of information diffusion as a continuous process unfolding through trading activity rather than as a discrete event tied to regulatory announcements. The apparent profitability of insider trading strategies is therefore concentrated in the period when information remains private in practice, not after it becomes publicly disclosed.

7. Practical Implications

The findings have direct implications for how insider-based strategies are tested, interpreted, and regulated. The key takeaway is simple: most of the apparent profitability of insider trading strategies disappears once realistic implementation timing is enforced.

For Factor Researchers

The results highlight the importance of correct timestamp alignment. Backtests that rely on transaction dates implicitly assume access to private information and suffer from look-ahead bias. Extremely high Sharpe ratios—particularly values above 5—should be treated as a warning sign rather than evidence of a robust signal. For strategies based on regulatory filings, entry must be aligned with filing dates or later to reflect what a public investor can actually implement.

For Traders

From a practical standpoint, legally tradable insider strategies offer limited economic value. Once entry is restricted to effectively public information, performance drops to levels that are unlikely to survive transaction costs, especially in small-cap stocks. In the Russell 2000 universe, where bid–ask spreads are wide and liquidity is limited, the turnover required by daily rebalanced strategies would further erode any remaining edge. Capacity constraints also limit scalability.

For Regulators

The evidence suggests that the current two-business-day reporting window lags the speed of market adjustment. Prices appear to react to insider activity before formal disclosure, implying that post-event filings may arrive too late to prevent information-based trading advantages. Effective enforcement may therefore require greater emphasis on real-time monitoring of trading behavior rather than reliance on delayed disclosures alone.

For Market Efficiency

More broadly, the results support a view of markets in which information diffusion occurs through trading activity rather than discrete disclosure events. The distinction between legal disclosure and effective public information is economically meaningful. By the time insider trades are formally reported, much of their informational content has already been absorbed by prices.

8. Limitations

Several limitations should be noted when interpreting the results.

First, the analysis abstracts from transaction costs, including bid–ask spreads, commissions, and market impact. Incorporating these frictions would further reduce the profitability of strategies based on effectively public information and would likely eliminate any remaining economic edge.

Second, the insider signal is constructed at an aggregate level. The analysis does not differentiate by insider role (e.g., executives versus directors) or transaction size, which may carry different informational content.

Third, the results are documented within a small-cap universe. The study focuses on Russell 2000 stocks, where liquidity is lower and information asymmetries are more pronounced. The magnitude and timing of alpha decay may differ in larger, more liquid stocks.

Fourth, the analysis does not condition on the intra-day timing of Form 4 filings. Filings released after market close may affect subsequent returns differently from disclosures made during trading hours.

Finally, the diagnostic multi-day holding period presented in the appendix relies on idealized assumptions and serves only as an illustrative upper bound on the value of private information, not as a feasible trading strategy.

9. Conclusion

The strong backtested performance often attributed to insider trading strategies is largely an artifact of using transaction-date information that is not available to public investors. When trade entry is aligned with realistic implementation timing—after insider activity becomes effectively public—performance falls sharply to levels consistent with semi-strong market efficiency.

Across timing experiments, we show that most of the measured alpha dissipates before formal disclosure. By the time Form 4 filings become actionable, their informational content has largely been incorporated into prices. Transaction-date backtests therefore measure the value of private information rather than the economic value of a tradable strategy.

The central implication is straightforward. Timestamp alignment is not a technical detail but a defining element of what a backtest measures. Failing to respect this distinction leads to overstated performance and misleading conclusions. Once timing is handled correctly, insider-based strategies derived from public filings offer little meaningful economic value.

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Appendix A. Definitions and Timing Conventions

Transaction date vs. filing date.

The transaction date is the day an insider executes a trade. This information remains private until disclosed. The filing date is the day the insider submits Form 4 to the SEC, making the transaction legally public.

Legally public vs. effectively public information.

Legally public information refers to information that has been formally released through a regulatory filing. Effectively public information refers to signals that, while not yet legally disclosed, have already been inferred by the market through observable trading activity.

Entry timing notation (D0–D4).

D0 denotes entry at the market close on the transaction date. D1 denotes entry one trading day after the transaction. D2 denotes entry two trading days after the transaction. D3 and D4 denote entries on subsequent trading days. In practice, entries through D2 rely on information that is not yet effectively available to public investors, while D3 and later entries reflect truly public information.

Equity multiple.

The equity multiple is defined as ending wealth divided by starting wealth over the backtest period. It is a measure of cumulative growth and is not annualized.

Appendix B. Diagnostic Upper Bound Illustration

As a purely illustrative exercise, we examine the performance of a fixed three-day holding period strategy entered on the transaction date. Positions are entered at the close on D0, held through the following two trading days, and exited at the close on the third trading day after entry.

For comparability with one-day strategies, the cumulative return over the three-day holding period is evenly distributed across the holding window and added to daily equity. This simplification avoids modeling interim realized and unrealized profit and loss while preserving the overall magnitude of returns.

This exercise relies entirely on transaction-date information and is not economically implementable by public investors. It should therefore be interpreted solely as an upper bound on the value of private insider information, rather than as a feasible trading strategy.

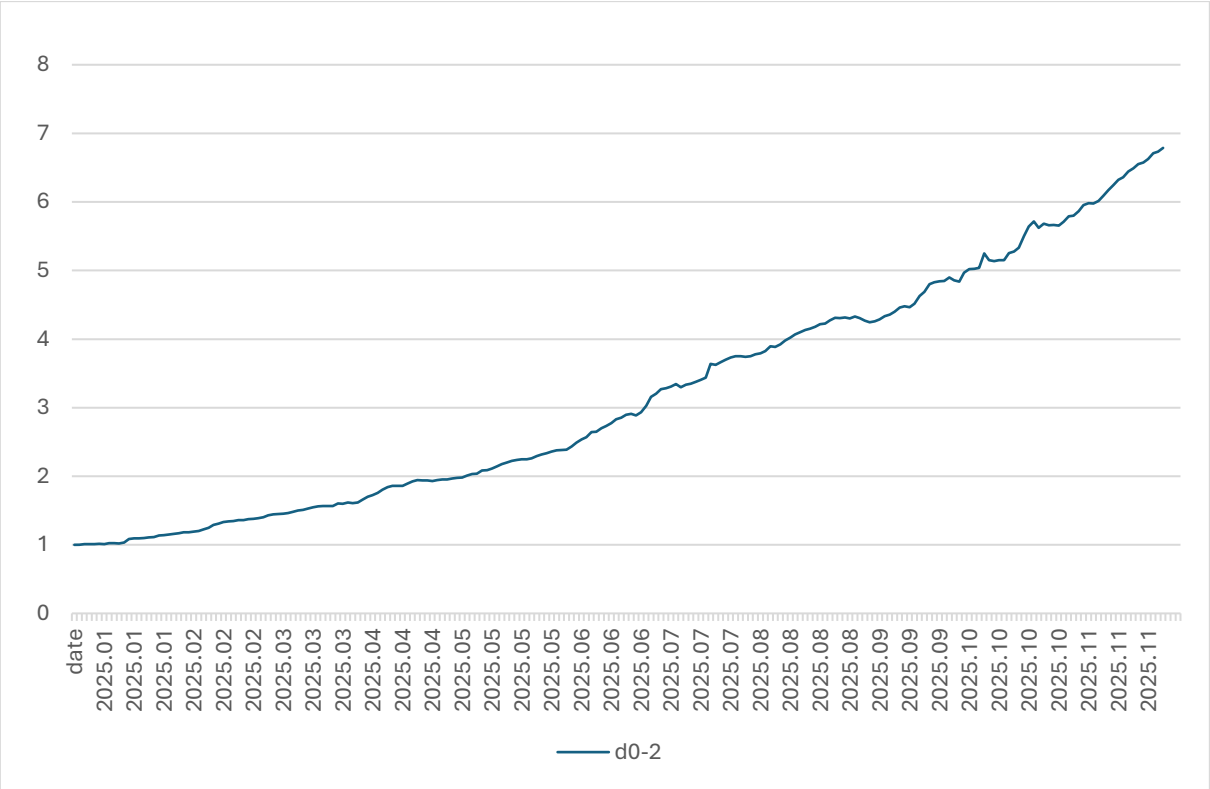


Figure B1. Equity curve for a three-day holding period strategy entered on the transaction date.

The strategy is shown for illustrative purposes only and relies on private information.

Appendix C. Bloomberg FTST and Python Implementation Details

The analysis combines Bloomberg's Factor Test (FTST) framework with custom Python-based backtests to evaluate the impact of entry timing on insider trading strategies.

Baseline factor construction (FTST).

Bloomberg FTST is used to construct the baseline insider trading factor and to validate the transaction-date (D0) performance under standard factor-testing conventions. FTST evaluates cross-sectional factor returns by sorting stocks into decile portfolios based on insider trading activity derived from SEC Form 4 data.

At each rebalance date, stocks are ranked by net insider trading activity. Stocks with the strongest net insider buying are assigned to the top decile, while stocks with the strongest net insider selling are assigned to the bottom decile. FTST constructs a market-neutral long–short factor by taking equal-weighted long positions in the top decile and equal-weighted short positions in the bottom decile, with daily rebalancing.

Custom timing extensions (Python implementation).

Bloomberg FTST does not natively support flexible post-transaction entry delays beyond its standard signal timing conventions. To study how performance evolves as

entry timing moves away from the transaction date, we therefore implement additional timing variations using custom Python backtests.

Using the same universe, insider rankings, and portfolio construction logic as in FTST, we simulate delayed entry strategies corresponding to D1 through D4. These strategies differ only in the assumed entry date relative to the insider transaction, while signal construction, weighting, and rebalancing rules remain unchanged.

This hybrid approach ensures that the baseline factor behavior matches Bloomberg FTST outputs, while allowing precise control over entry timing required to study the decay of insider-related alpha.

Universe and consistency.

The primary analysis is conducted on Russell 2000 constituents using point-in-time index membership. Identical procedures are applied to the S&P 500 and Nasdaq 100 universes for comparison. Across FTST and Python implementations, universe definitions, ranking logic, portfolio construction, and weighting schemes are held constant.

Transaction costs and execution.

Both FTST and Python backtests abstract from transaction costs, bid–ask spreads, and market impact. This choice is deliberate and intended to isolate the informational component of returns rather than to model realistic execution.

Performance measurement.

Daily market-neutral returns are computed for each strategy. Sharpe ratios, cumulative equity curves, and annualized return metrics are calculated consistently across FTST and Python outputs. All reported performance statistics are based on these harmonized return series.