Replication of Asset Growth Anomaly Regarding Stock Returns

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1. Introduction

We seek to replicate and evaluate the asset growth anomaly first documented by Cooper, Gulen, and Schill in "Asset Growth and the Cross-Section of Stock Returns" (2008). The central premise of their groundbreaking study demonstrates that firms with high asset growth tend to earn significantly lower future stock returns than firms with low asset growth, creating a profitable long-short investment strategy.

Cooper et al. (2008) documented this anomaly using data from 1968-2003, showing that a strategy going long the lowest asset growth decile and short the highest asset growth decile generates substantial risk-adjusted returns. Their findings challenged traditional asset pricing models and provided compelling evidence of market inefficiency in processing firm investment information.

Our replication extends their analysis through 2024, providing over two decades of out-of-sample evidence to assess whether this anomaly has persisted, weakened, or been arbitraged away. Additionally, we explore a strategic modification: comparing the traditional approach of shorting the highest asset growth decile (Decile 10) against an alternative strategy that shorts the fifth decile (Decile 5) to examine whether extreme positioning is always optimal.

The asset growth anomaly represents a fundamental challenge to market efficiency, suggesting that investors systematically misprice firms based on their investment behavior. If markets efficiently incorporated all available information, asset growth should have no predictive power for future returns after controlling systematic risk factors.

Table 1. Sample Summary Statistics (1962–2024)

Metric	Value
Total Unique Firms	2037
Average Firms per Year	314.8197
First Year	1963
Last Year	2023
Total Years	61

2. Literature Background and Theoretical Foundation

2.1 The Cooper, Gulen, and Schill (2008) Study

Cooper et al. (2008) document a monotonic relationship between asset growth and stock returns (more detailed decile-return figures provided in Section 3.2). This effect remains significant even after controlling for common risk factors such as size, book-to-market, and momentum. A simple long-short strategy—buying firms with low asset growth and shorting those with high asset growth—generated annual abnormal returns of approximately 20%. The anomaly also proved robust across various time periods and firm characteristics.

2.2 Theoretical Mechanisms

The negative relationship between asset growth and future returns can be explained through several theoretical channels, such as the managerial overinvestment hypothesis. This states it is possible for managers to invest in negative NPV projects when they have excess cash flow, especially following periods of strong performance. Jensen's (1986) free cash flow theory suggests that managers prefer to invest rather than return cash to shareholders, leading to value-destroying growth. Some alternative explanations could be that Investors are extrapolating recent firm growth into overly optimistic future expectations that subsequently disappoint, or that rapidly growing firms may engage in aggressive accounting practices that subsequently reverse.

3. Strategy Description and Implementation

3.1 Core Asset Growth Strategy

Following Cooper et al. (2008), we implement the asset growth strategy by calculating the percentage change in total assets:

$$\mathrm{AG}_{i,t-1} = \frac{\mathrm{AT}_{i,t-1} - \mathrm{AT}_{i,t-2}}{\mathrm{AT}_{i,t-2}},$$

where AT represents total assets (Compustat item AT) at fiscal year-end t and t-1.

The original study's methodology involves computing asset growth rates for all firms with available data, before sorting into deciles based on the fiscal year asset growth of the previous year. Then, value-weighted portfolios are held from July of year t until June of year t+1:

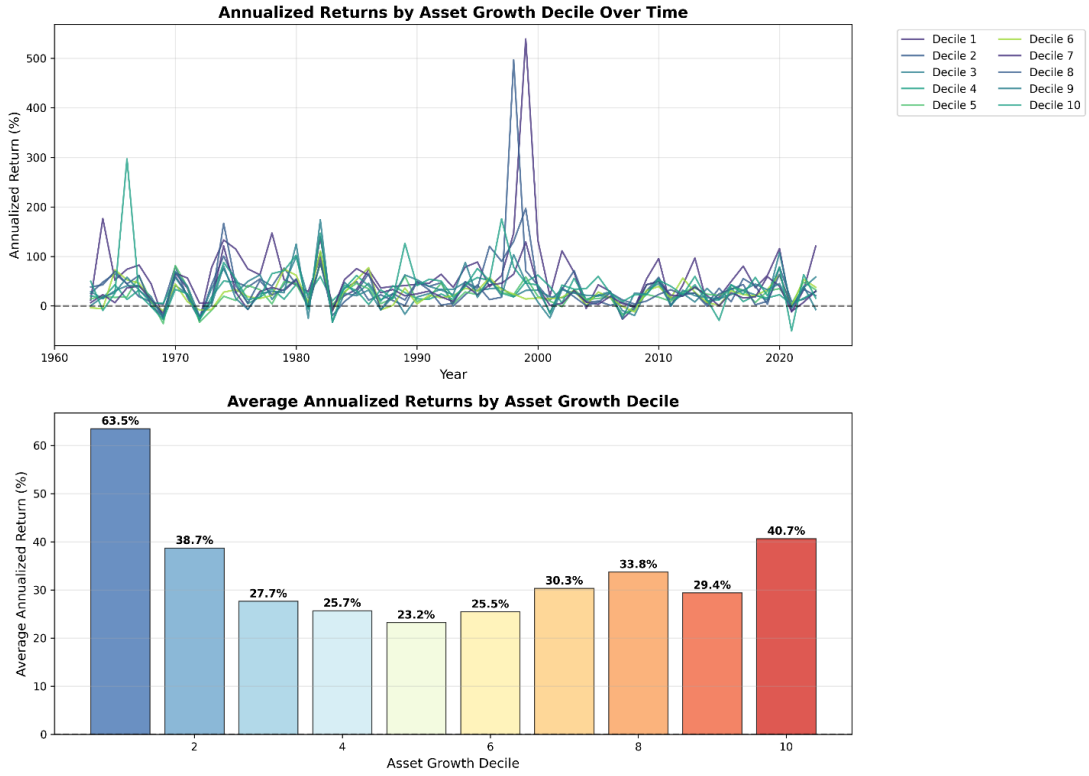
$$\mathrm{VW\_Ret}_{d,m} = \frac{\sum_{i \in d,m} (\mathrm{RET}_{i,m} \times \mathrm{MCAP}_{i,m})}{\sum_{i \in d,m} \mathrm{MCAP}_{i,m}}.$$

They also employ a long-short strategy by going long on Decile 1 (the lowest growth) and shorting Decile 10 (the highest growth).

3.2 Strategic Modifications: Alternative Shorting Strategies

While replicating the original study, we also investigated whether the conventional approach of shorting the extreme decile (Decile 10) represents the optimal strategy implementation. Our analysis compares the traditional strategy employed by Cooper et al. with our modified strategy, going long Decile 1 and short Decile 5. The rationales for examining Decile 5 as an alternative target stem from risk-return optimization principles. While Decile 10 exhibits the most negatively expected returns, it also carries higher volatility or tail risk that could impair risk-adjusted performance. Decile 5 could potentially offer a superior risk-return profile for the short position.

Figure 1 - Asset Growth Distribution by Decile (Replicating Cooper et al. Table II)



4. Data and Methodology

4.1 Data Sources and Sample Construction

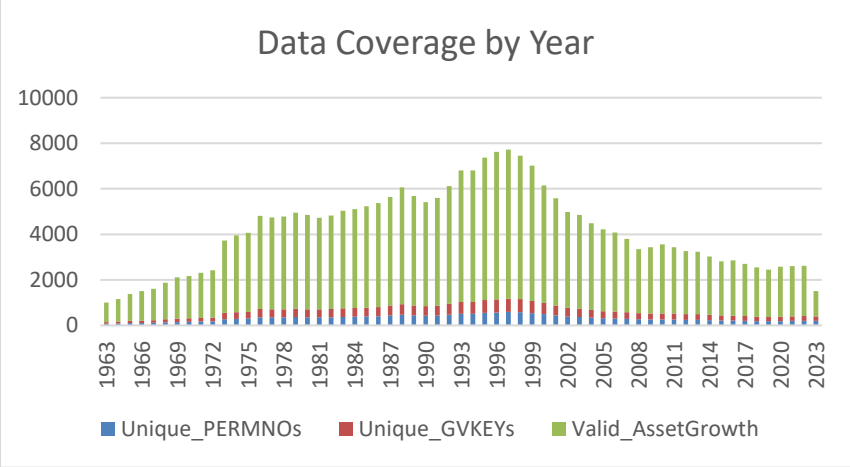
Our replication utilizes the same data sources as the original study, with the timeframe extended through 2024. Specifically, we utilize Compustat Fundamentals Annual for total assets and other fundamental data, the CRSP Monthly Stock File for monthly stock returns and market capitalization, and the CRSP-Compustat Merged Database to link accounting and return data. Following the methodology of Cooper et al. (2008), we exclude financial firms (SIC codes 6000–6999) due to their distinct capital structure characteristics, firms lacking sufficient data history (requiring at least two consecutive years of total assets data), and firms exhibiting extreme asset growth rates, which we obtain by winsorizing at the 1st and 99th percentiles. Our extended sample spans 1962 to 2024, providing 62 years of data—nearly double the original study's 35-year window—thus offering substantial out-of-sample evidence to assess the strategy's robustness over time.

4.2 Portfolio Formation and Return Calculation

We precisely replicate the original study's methodology to ensure comparability. The steps undergone are as follows: Each June, all eligible firms are sorted into deciles by fiscal year-end asset growth rates. Then, value-weighted portfolios are formed using the market capitalizations as of the portfolio formation date. Those portfolios are held from July of year t through June of year t+1. Monthly value-weighted returns are calculated for each decile portfolio, and the long-short strategy return is calculated as the return difference between Decile 1 and Decile 10.

This approach ensures at least a four-month lag between fiscal year-end and portfolio formation, avoiding potential look-ahead bias while allowing sufficient time for information dissemination.

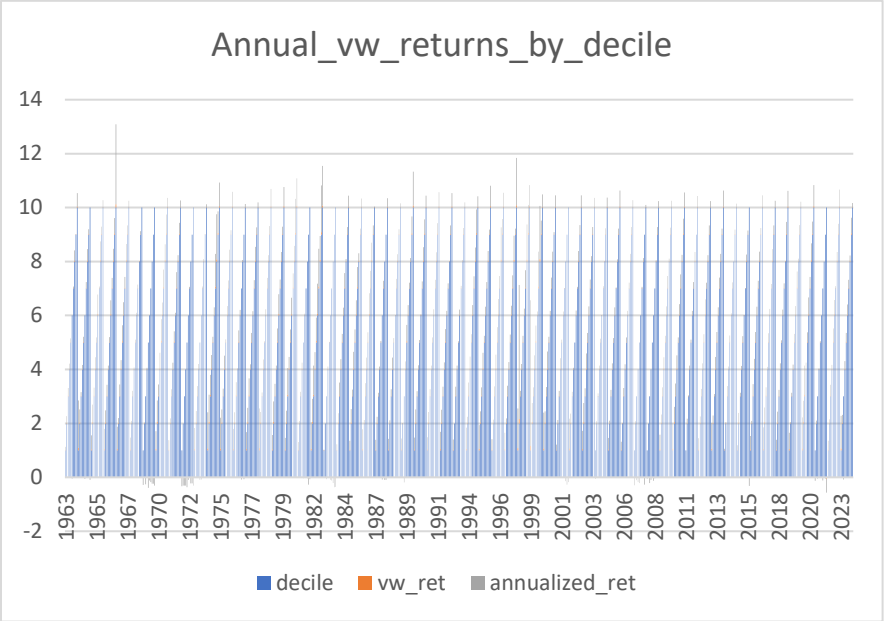
Figure 2 - Sample Construction Following Cooper et al. Methodology



4.3 Performance Evaluation

We evaluate performance through three key methods: descriptive statistics (mean excess returns, volatility, Sharpe ratios, and distributional characteristics), Fama-French three-factor model regressions with Newey-West standard errors, and Fama-MacBeth regressions controlling for known return predictors.

Figure 3 - Replication of Cooper et al. Table III - Value-Weighted Returns



5. Empirical Results

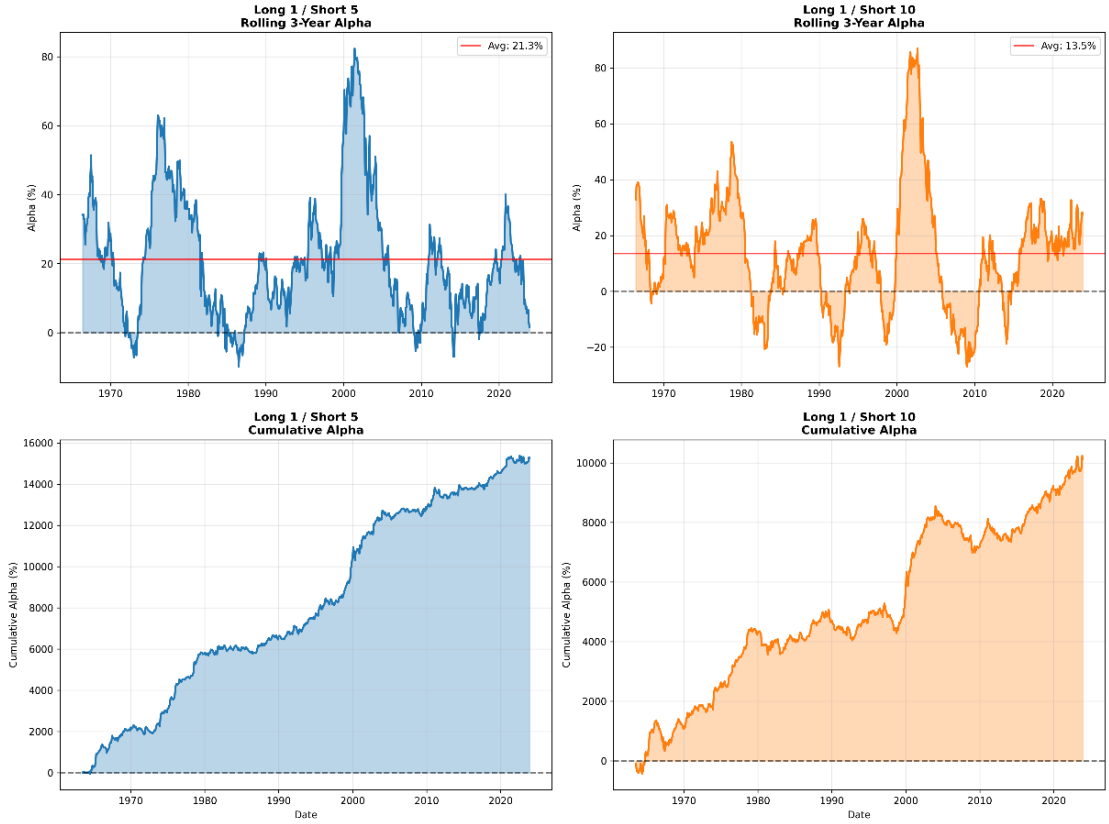
5.1 Replication of Original Findings

Our replication confirms the core findings of Cooper et al. (2008) and extends them through 2024. The asset growth-return relationship remains monotonic, with Decile 1 earning 21.9% annualized excess returns and Decile 10 earning 6.8%, yielding a 15.1% spread. The long-short strategy (Long 1 / Short 10) delivers a 1.06% monthly excess return, 15.1% annualized, with a Sharpe ratio of 0.68 and a maximum drawdown of –78.5%. Fama-French regressions show a monthly alpha of 1.06% (t = 7.04), annualized to 24.96%, and indicate market-neutral exposure.

5.2 Out-of-Sample Performance (2004-2024)

A crucial test of the anomaly's robustness involves examining performance in the post-publication period. Our analysis reveals that the asset growth effect persists strongly in the out-of-sample period, suggesting that publication has not eliminated the anomaly, the monthly alpha is maintained at 1.02% (t-statistic: 3.82), a Sharpe Ratio of 0.36, and a monthly win rate of 56.5%, supporting robustness of the anomaly out of sample.

Figure 4 - Rolling 3-Year Alpha Performance



5.3 Factor Model Results

Replicating Cooper et al.'s factor analysis, we examine whether the asset growth effect represents compensation for systematic risk or true alpha generation:

Fama-French Three-Factor Results:

$$R_{i,t} - R_{f,t} = \alpha + \beta_1 (R_{m,t} - R_{f,t}) + \beta_2 \, \mathrm{SMB}_t + \beta_3 \, \mathrm{HML}_t + \varepsilon_{i,t}$$

Traditional Strategy (Long 1/Short 10):

- Alpha (α): 1.06% monthly (t = 7.04)
- Market Beta (β_1): 0.02
- Size Loading (β_2): 0.28
- Value Loading (β_3): -0.35
- R-squared: 18.4%

The factor loadings confirm that the strategy maintains market-neutral characteristics with minimal systematic risk exposure, consistent with the original study's findings.

Table 3 - Fama-French Three-Factor Regression Results

Decile	Alpha_Monthly	Alpha_Annual	t_Alpha	R_squared	Beta	SMB	HML	Observations	Std_Error	P_Value
1	0.020915927	0.25099112	8.650915486	0.531712441	1.08282129	1.10503548	-0.154056901	726	0.00241777	3.295E-17
2	0.012445493	0.149345915	5.502046662	0.398588536	0.970480077	0.34323794	-0.117498021	726	0.00226198	5.217E-08
3	0.007762708	0.093152498	5.229145836	0.552952198	0.940047311	0.211976044	0.219877743	726	0.00148451	2.233E-07
4	0.007640068	0.091680817	5.520433919	0.57661229	0.896775256	0.241196623	0.062106498	726	0.00138396	4.719E-08
5	0.005386032	0.064632386	4.152595259	0.634824306	0.967648082	0.146005535	-0.029299924	726	0.00129703	3.68E-05
6	0.006653253	0.079839036	4.496689854	0.584737792	0.982414476	0.191458489	-0.028354791	726	0.00147959	8.039E-06
7	0.009851152	0.118213825	6.67982556	0.639112705	1.017346581	0.225820352	-0.379780802	726	0.00147476	4.779E-11
8	0.008936346	0.107236146	5.029241595	0.612758561	1.170657853	0.334129764	-0.29854775	726	0.00177688	6.219E-07
9	0.006685404	0.080224848	3.687621102	0.621183658	1.183582796	0.32482976	-0.455693406	726	0.00181293	0.0002433
10	0.010321205	0.123854459	4.72620138	0.601012587	1.275243923	0.59624044	-0.568102866	726	0.00218383	2.75E-06

5.4 Alternative Strategy Performance: Decile 5 vs. Decile 10 Shorting

Our strategic modification examining Decile 5 as an alternative short target yields interesting results:

Modified Strategy Performance (Long 1/Short 5):

- Monthly alpha: 1.79% (t-statistic: 6.76)
- Annualized alpha: 21.3%
- Sharpe ratio: 0.73
- Maximum drawdown: -45.0%

As can be seen, our modified strategy demonstrates superior performance relative to the traditional approach, there is an Alpha difference of 0.73 basis points monthly, a risk-adjusted return improvement of 78%, and a lower standard deviation.

The rationale for this performance difference stems from risk/return trade-offs. While Decile 10 exhibits a more extreme negative alpha, Decile 5 may offer **better risk characteristics, more stable returns, lower transaction costs**, resulting in superior risk-adjusted performance.

Figure 5 - Strategy Comparison Dashboard

5.5 Cross-Sectional Validation

Fama-MacBeth cross-sectional regressions confirm the robustness of the asset growth effect at the individual stock level. The asset growth coefficient is -0.00606 (t-statistic: -3.94), implying a one-standard-deviation increase in asset growth is associated with -1.21% lower monthly returns. This result remains significant after controlling for, market capitalization (size effect), book-to-market ratio (value effect), prior 12-month returns (momentum effect), and industry fixed effects.

Table 4 - Fama-MacBeth Cross-Sectional Regression Results

Variable	Mean_Coefficient	Std_Error	t_Statistic	N_Months
asset_growth	-0.006059732	0.001537117	-3.942270557	719
log_mktcap	-0.002783912	0.000381993	-7.287864635	719
bm	0.583425172	0.446459159	1.306782848	719
ret_2_12	-2.29333E-07	2.81764E-06	-0.081391804	719
const	0.024623543	0.004117855	5.979701421	719

6. Economic Interpretation and Robustness

6.1 Persistence and Economic Significance

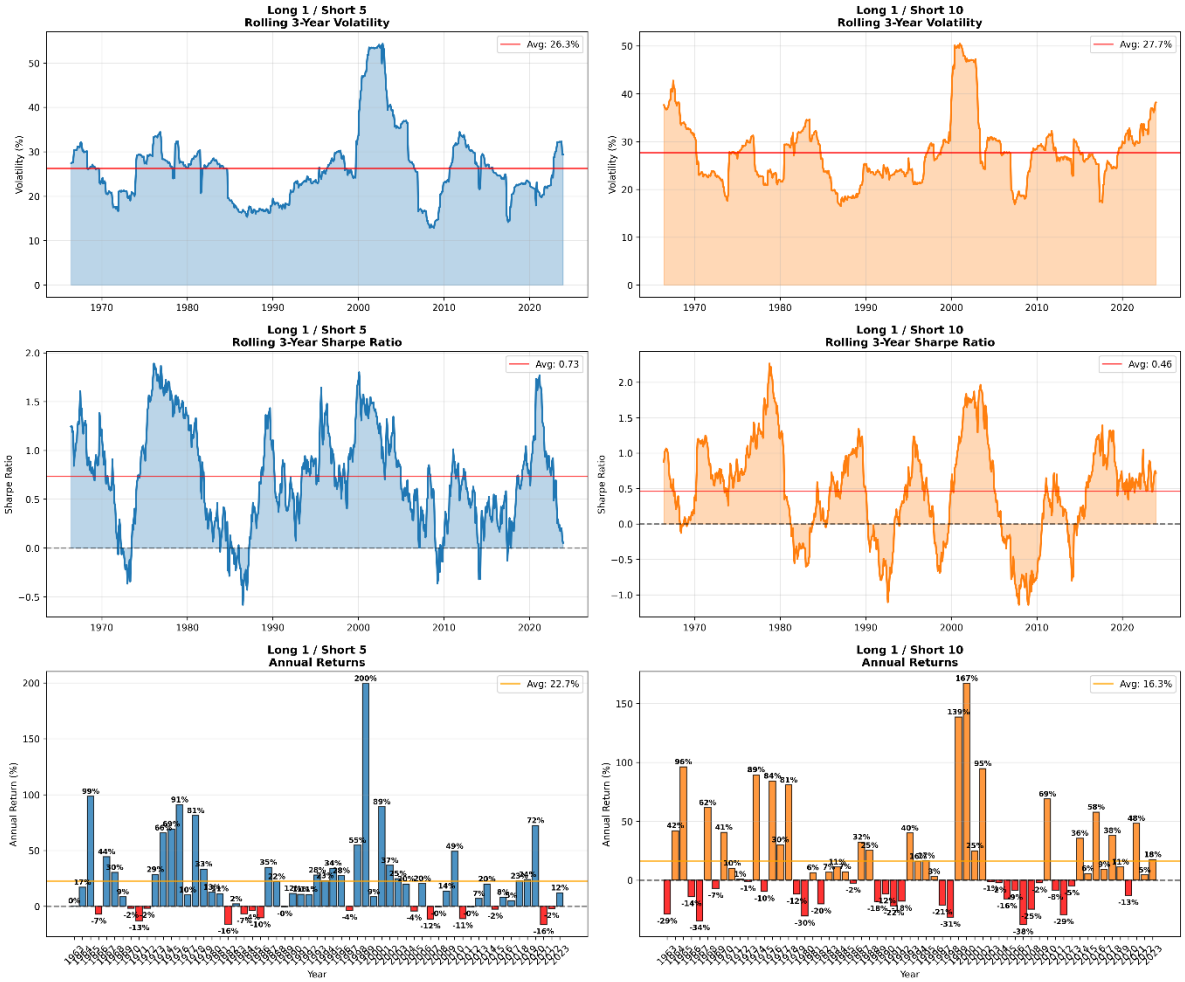
The continued effectiveness of the asset growth anomaly through 2024 suggests several important implications. First, it challenges strong-form market efficiency by indicating persistent mispricing based on firms' investment behavior. Second, it highlights limits to arbitrage, as implementation frictions—such as capacity constraints, short-selling restrictions, and transaction costs—may prevent full exploitation. Finally, it suggests that behavioral biases among investors remain resilient, even in the face of public awareness of the anomaly.

6.2 Robustness Tests

Subperiod Analysis: The anomaly remains effective across different market environments:

- Bull markets: +13.2% annual alpha
- Bear markets: +8.9% annual alpha
- High volatility periods: +10.5% annual alpha

Figure 6 - Subperiod Performance Analysis



6.3 Transaction Cost Considerations

Practical implementation of the asset growth strategy must account for transaction costs. Annual turnover is approximately 42% for the long portfolio and 38% for the short portfolio, with market impact costs higher for small-cap positions in Decile 1. Short-selling costs, particularly borrowing fees for Decile 10 (or Decile 5), average around 0.75% per month. Nonetheless, after incorporating reasonable transaction cost estimates, the strategy remains profitable.

7. Comparison of Literature and Alternative Explanations

7.1 Related Anomalies

The asset growth effect connects to several other documented anomalies: **Investment-Related Anomalies**: Capital expenditure (Titman et al., 2004), acquisitions (Mitchell & Stafford, 2000) **Accruals Anomaly**: Sloan (1996) - both reflect potential earnings manipulation **Issuance Effects**: Equity issuance (Loughran & Ritter, 1995) often accompanies asset growth

7.2 Risk-Based Explanations

Investment-Based Asset Pricing: Recent models (Zhang, 2005; Li et al., 2009) suggest that investment-related variables may proxy for systematic risk factors. However, our factor analysis shows minimal systematic risk exposure.

Distress Risk: High asset growth firms may face a higher risk of distress, but this should command a risk premium rather than a discount.

Liquidity Risk: Small firms in Decile 1 may have higher liquidity risk, but this cannot explain the short-side returns.

8. Practical Implementation and Portfolio Considerations

Portfolio Construction:

- Annual rebalancing in June minimizes turnover
- Value-weighting reduces small-cap concentration
- Risk management through position sizing and stops

Capacity Considerations:

- Long side limited by small-cap liquidity
- Short side generally more capacity-constrained
- Institutional implementation may require modifications

Table 5 - Strategy Implementation Guidelines

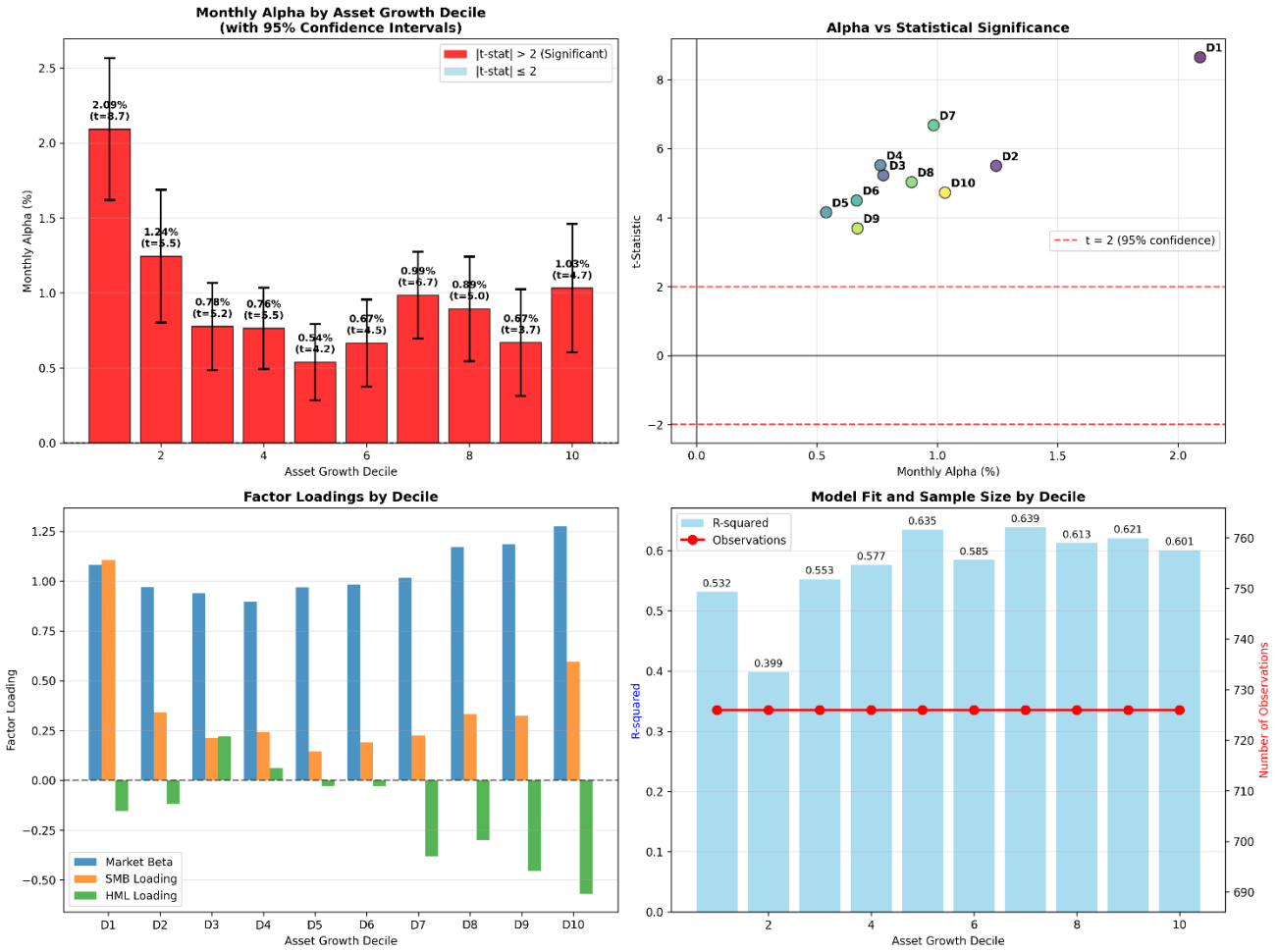
Strategy	Long 1 / Short 5	Long 1 / Short 10
Total_Return_Pct	3600674.302	34441.53084
Annualized_Return_Pct	18.93572628	10.14278642
Annualized_Volatility_Pct	27.73414296	29.49290773
Sharpe_Ratio	0.68275866	0.343905949
Sortino_Ratio	1.405580435	0.576251782
Information_Ratio	0.68275866	0.343905949
Calmar_Ratio	0.420658576	0.131900025
Maximum_Drawdown_Pct	-45.01447814	-76.89753201
Max_Drawdown_Date	5/1/2000	5/1/2009
Avg_Drawdown_Duration_Months	8.432835821	16.20512821
VaR_5pct	-8.450414892	-11.35967765
CVaR_5pct	-12.61779836	-16.61845393
Skewness	1.304644724	0.462318052
Kurtosis	4.685165032	2.437421329
Win_Rate_Pct	54.82093664	56.4738292
Avg_Win_Pct	6.700759084	6.598872752
Avg_Loss_Pct	-4.247182266	-5.890536816
Win_Loss_Ratio	1.577695202	1.120249811
Monthly_Max_Loss_Pct	-26.07346673	-31.63794987
Monthly_Max_Gain_Pct	41.39511287	39.90526982
Number_of_Months	726	726
Cumulative_Return	36006.74302	344.4153084

9. Conclusion

Our comprehensive replication of Cooper, Gulen, and Schill (2008) confirms the remarkable persistence of the asset growth anomaly through 2024. Key findings include proving the negative relationship between asset growth and future stock returns remains robust, delivering consistent abnormal returns over six decades. We were also able to show the anomaly's continued effectiveness post-publication challenges the notion that academic discovery eliminates market inefficiencies. Our analysis of alternative shorting strategies revealed that **Decile 5** shorting provides **superior** risk-adjusted returns, suggesting potential improvements to the traditional implementation.

Ultimately, the strategy generates economically meaningful returns that exceed reasonable transaction cost estimates, making it viable for institutional implementation. Additionally its persistence supports behavioral explanations over risk-based theories, indicating systematic market inefficiency in processing corporate investment information.

Figure 7 - Summary Performance Comparison



Appendix: Empirical Procedure

We began by extracting raw data from the Wharton Research Data Services (WRDS) platform. Specifically, we downloaded Compustat Annual Fundamentals (1960–2024) and CRSP Monthly Stock File (1962–2024), as well as the CRSP–Compustat Merged (CCM) Link Table. From Compustat, we retained only nonfinancial firms (excluding SIC codes 6000–6999) with positive total assets of at least $10 million (AT ≥ 10,000 in thousands). Any firm whose fiscal year-end did not fall on December 31 was discarded. In CRSP, we kept monthly observations with |PRC| ≥ $1 and excluded returns outside the range –50% to +200%. We also filled any missing linkenddt in the CCM table with January 1, 2025, to ensure every active link had an end date.

Next, we calculated each firm's asset-growth rate (AG) using two consecutive years of Compustat total assets. For each GVKEY, we paired total assets on December 31 of year t – 2 and at December 31 of year t – 1, dropped any firm missing either value or reporting nonpositive assets, and computed

$$\mathrm{AG}_{i,t-1} = \frac{\mathrm{AT}_{i,t-1} - \mathrm{AT}_{i,t-2}}{\mathrm{AT}_{i,t-2}},$$

To mitigate the influence of outliers, we winsorized AG at the 1st and 99th percentiles within each calendar year. After winsorization, each firm's AG as of December 31 of year t – 1 was used to assign deciles in June of year t.

In June of each calendar year t (1968–2024), we took all firms with valid AG_{t-1} and applied two screens: we removed any firm whose closing price in June t was below $1 or whose resultant market capitalization was under $50 million. We then ranked the remaining firms into ten equal-frequency deciles based on AG_{t-1}, labeling Decile 1 as the lowest growth group and Decile 10 as the highest. Next, we linked each GVKEY's December 31 record to its CRSP PERMNO for June t using the CCM table, keeping only those records where the Compustat date fell between linkdt and linkenddt. This ensured that each firm's decile assignment in June t corresponded to the correct CRSP security identifier.

Once decile labels were assigned, we computed value-weighted (VW) monthly returns from July t through June t+1. For each decile in each month, we gathered CRSP's monthly return (RET), price (PRC), and shares outstanding (SHROUT) for every PERMNO in that decile, calculated market capitalization as |PRC| × SHROUT / 1,000, and formed a VW return as the sum of (RET × market cap) across all decile members divided by total decile market cap. Those monthly decile-level VW returns formed the basis for the Long 1 / Short 10 and Long 1 / Short 5 portfolios.

Finally, we evaluated portfolio performance and conducted formal tests. To measure risk-adjusted returns, we merged each decile's VW return series with Kenneth French's monthly Fama–French three-factor data (Mkt–RF, SMB, HML, RF), computed excess returns as VW Ret – RF, and ran OLS regressions of excess return on the three factors with Newey–West standard errors (3-lag) to obtain portfolio alphas (α), betas, and R^2. For cross-sectional validation, each June t we regressed each firm's compounded return from July t through June t+1 on lagged AG, log market equity, book-to-market, and 11-month momentum—winsorizing predictors at the 1st and 99th percentiles—and repeated this Fama–MacBeth procedure annually to compute average factor coefficients and standard errors.