

# Tax Deprec Profit Impact and the Cross Section of Stock Returns

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December 1, 2024

## Abstract

This paper studies the asset pricing implications of Tax Deprec Profit Impact (TDPI), and its robustness in predicting returns in the cross-section of equities using the protocol proposed by [Novy-Marx and Velikov \(2023\)](#). A value-weighted long/short trading strategy based on TDPI achieves an annualized gross (net) Sharpe ratio of 0.57 (0.52), and monthly average abnormal gross (net) return relative to the [Fama and French \(2015\)](#) five-factor model plus a momentum factor of 48 (44) bps/month with a t-statistic of 4.58 (4.26), respectively. Its gross monthly alpha relative to these six factors plus the six most closely related strategies from the factor zoo (Cash to assets, Equity Duration, Operating Cash flows to price, Cash flow to market, Book to market using December ME, Market leverage) is 27 bps/month with a t-statistic of 2.68.

# 1 Introduction

Market efficiency remains a central question in financial economics, with mounting evidence that certain firm characteristics can predict future stock returns. While the literature has extensively documented various accounting-based signals, the role of tax accounting choices in asset pricing is relatively unexplored. Tax accounting decisions, particularly those related to depreciation, represent a unique window into managerial expectations and firm performance that may not be fully reflected in market prices.

Prior research has focused primarily on book-tax differences and their information content, but has largely overlooked how specific components of tax accounting choices might signal future profitability and returns. This gap is particularly notable given that depreciation methods for tax purposes often diverge significantly from economic depreciation and financial reporting choices, potentially creating an information environment where sophisticated investors can extract valuable signals about future firm performance.

We hypothesize that firms' tax depreciation choices contain predictive information about future stock returns through several economic channels. First, following [Mills and Newberry \(2001\)](#), managers have significant discretion in tax depreciation methods, and their choices likely reflect private information about future investment opportunities and expected asset productivity. When managers select accelerated depreciation methods for tax purposes, they trade off immediate tax benefits against future tax liabilities, suggesting confidence in future profitability.

Second, building on [Hanlon and Heitzman \(2010\)](#), tax depreciation decisions affect firms' effective tax rates and cash flows in predictable ways. Firms optimizing their tax positions through depreciation choices signal both financial sophistication and strong governance structures, characteristics that [Gompers et al. \(2003\)](#) link to superior stock performance.

Third, the complexity of tax accounting creates information processing costs that may slow the market’s incorporation of tax-related signals into prices. Consistent with [Hirshleifer and Teoh \(2003\)](#), investors’ limited attention and processing capacity can lead to systematic underreaction to complex accounting information, creating predictable patterns in future returns.

Our empirical analysis reveals strong evidence that Tax Deprec Profit Impact (TDPI) predicts cross-sectional stock returns. A value-weighted long-short portfolio formed on TDPI generates a monthly alpha of 48 basis points ( $t$ -statistic = 4.58) relative to the Fama-French six-factor model. This economic magnitude is substantial, representing an annualized risk-adjusted return of approximately 5.76%.

Importantly, the predictive power of TDPI remains robust after controlling for transaction costs. The strategy achieves a net Sharpe ratio of 0.52, placing it in the top 1% of documented anomalies. The signal’s effectiveness persists among large-cap stocks, with the highest size quintile generating a monthly alpha of 39 basis points ( $t$ -statistic = 2.94).

Further tests demonstrate that TDPI’s predictive power is distinct from known anomalies. Controlling for the six most closely related anomalies and the Fama-French factors simultaneously, the strategy maintains a significant alpha of 27 basis points per month ( $t$ -statistic = 2.68), indicating that TDPI captures unique information not reflected in existing factors.

Our study makes several important contributions to the asset pricing literature. First, we introduce a novel predictor based on tax accounting choices that significantly expands the investment opportunity set available to investors. Unlike many recently documented anomalies that work primarily in small stocks, TDPI generates significant risk-adjusted returns even among the largest firms, suggesting practical implementability.

Second, we extend the literature on the information content of tax accounts,

building on work by ? in the Journal of Accounting and Economics and [Desai and Dharmapala \(2009\)](#) in the Review of Financial Studies. While prior research has focused on aggregate book-tax differences, we show that specific components of tax accounting choices contain valuable information for predicting returns.

Finally, our findings contribute to the broader debate on market efficiency and the role of accounting information in asset pricing. The persistence of TDPI’s predictive power, even among large firms and after controlling for transaction costs, suggests that markets systematically undervalue the information contained in tax accounting choices. This has important implications for both academic research on market efficiency and practitioners’ investment strategies.

## 2 Data

Our study investigates the predictive power of a financial signal derived from accounting data for cross-sectional returns, focusing specifically on the ratio of federal income tax deferral to operating income before depreciation. We obtain accounting and financial data from COMPUSTAT, covering firm-level observations for publicly traded companies. To construct our signal, we use COMPUSTAT’s item TXDFED for deferred federal income tax and item OIADP for operating income before depreciation. Deferred federal income tax (TXDFED) represents the tax expense that has been deferred due to timing differences between book and tax accounting, reflecting potential future tax obligations or benefits. Operating income before depreciation (OIADP), on the other hand, provides a measure of core operating performance before accounting for depreciation expenses. The construction of the signal follows a straightforward ratio format, where we divide TXDFED by OIADP for each firm in each year of our sample. This ratio captures the relative magnitude of tax timing differences against operational income, offering insight into how significantly a firm’s

tax strategies and accounting choices affect its reported earnings. By focusing on this relationship, the signal aims to reflect aspects of tax planning and earnings quality in a manner that is both scalable and interpretable. We construct this ratio using end-of-fiscal-year values for both TXDFED and OIADP to ensure consistency and comparability across firms and over time.

### 3 Signal diagnostics

Figure 1 plots descriptive statistics for the TDPI signal. Panel A plots the time-series of the mean, median, and interquartile range for TDPI. On average, the cross-sectional mean (median) TDPI is -0.00 (-0.00) over the 1986 to 2023 sample, where the starting date is determined by the availability of the input TDPI data. The signal’s interquartile range spans -0.09 to 0.06. Panel B of Figure 1 plots the time-series of the coverage of the TDPI signal for the CRSP universe. On average, the TDPI signal is available for 5.40% of CRSP names, which on average make up 5.91% of total market capitalization.

### 4 Does TDPI predict returns?

Table 1 reports the performance of portfolios constructed using a value-weighted, quintile sort on TDPI using NYSE breaks. The first two lines of Panel A report monthly average excess returns for each of the five portfolios and for the long/short portfolio that buys the high TDPI portfolio and sells the low TDPI portfolio. The rest of Panel A reports the portfolios’ monthly abnormal returns relative to the five most common factor models: the CAPM, the Fama and French (1993) three-factor model (FF3) and its variation that adds momentum (FF4), the Fama and French (2015) five-factor model (FF5), and its variation that adds momentum factor used in Fama and French (2018) (FF6). The table shows that the long/short TDPI strategy

earns an average return of 0.38% per month with a t-statistic of 3.47. The annualized Sharpe ratio of the strategy is 0.57. The alphas range from 0.35% to 0.48% per month and have t-statistics exceeding 3.21 everywhere. The lowest alpha is with respect to the CAPM factor model.

Panel B reports the six portfolios' loadings on the factors in the [Fama and French \(2018\)](#) six-factor model. The long/short strategy's most significant loading is -0.25, with a t-statistic of -5.54 on the HML factor. Panel C reports the average number of stocks in each portfolio, as well as the average market capitalization (in \$ millions) of the stocks they hold. In an average month, the five portfolios have at least 391 stocks and an average market capitalization of at least \$1,368 million.

Table 2 reports robustness results for alternative sorting methodologies, and accounting for transaction costs. These results are important, because many anomalies are far stronger among small cap stocks, but these small stocks are more expensive to trade. Construction methods, or even signal-size correlations, that over-weight small stocks can yield stronger paper performance without improving an investor's achievable investment opportunity set. Panel A reports gross returns and alphas for the long/short strategies made using various different portfolio constructions. The first row reports the average returns and the alphas for the long/short strategy from Table 1, which is constructed from a quintile sort using NYSE breakpoints and value-weighted portfolios. The rest of the panel shows the equal-weighted returns to this same strategy, and the value-weighted performance of strategies constructed from quintile sorts using name breaks (approximately equal number of firms in each portfolio) and market capitalization breaks (approximately equal total market capitalization in each portfolio), and using NYSE deciles. The average return is lowest for the quintile sort using NYSE breakpoints and equal-weighted portfolios, and equals 12 bps/month with a t-statistics of 1.99. Out of the twenty-five alphas reported in Panel A, the t-statistics for nineteen exceed two, and for twelve exceed three.

Panel B reports for these same strategies the average monthly net returns and the generalized net alphas of [Novy-Marx and Velikov \(2016\)](#). These generalized alphas measure the extent to which a test asset improves the ex-post mean-variance efficient portfolio, accounting for the costs of trading both the asset and the explanatory factors. The transaction costs are calculated as the high-frequency composite effective bid-ask half-spread measure from [Chen and Velikov \(2022\)](#). The net average returns reported in the first column range between -6-35bps/month. The lowest return, (-6 bps/month), is achieved from the quintile sort using NYSE breakpoints and equal-weighted portfolios, and has an associated t-statistic of -0.81. Out of the twenty-five construction-methodology-factor-model pairs reported in Panel B, the TDPI trading strategy improves the achievable mean-variance efficient frontier spanned by the factor models in twenty cases, and significantly expands the achievable frontier in eighteen cases.

Table 3 provides direct tests for the role size plays in the TDPI strategy performance. Panel A reports the average returns for the twenty-five portfolios constructed from a conditional double sort on size and TDPI, as well as average returns and alphas for long/short trading TDPI strategies within each size quintile. Panel B reports the average number of stocks and the average firm size for the twenty-five portfolios. Among the largest stocks (those with market capitalization greater than the 80<sup>th</sup> NYSE percentile), the TDPI strategy achieves an average return of 39 bps/month with a t-statistic of 2.94. Among these large cap stocks, the alphas for the TDPI strategy relative to the five most common factor models range from 32 to 51 bps/month with t-statistics between 2.47 and 4.09.

## 5 How does TDPI perform relative to the zoo?

Figure 2 puts the performance of TDPI in context, showing the long/short strategy performance relative to other strategies in the “factor zoo.” It shows Sharpe ratio histograms, both for gross and net returns (Panel A and B, respectively), for 212 documented anomalies in the zoo.<sup>1</sup> The vertical red line shows where the Sharpe ratio for the TDPI strategy falls in the distribution. The TDPI strategy’s gross (net) Sharpe ratio of 0.57 (0.52) is greater than 95% (99%) of anomaly Sharpe ratios, respectively.

Figure 3 plots the growth of a \$1 invested in these same 212 anomaly trading strategies (gray lines), and compares those with the growth of a \$1 invested in the TDPI strategy (red line).<sup>2</sup> Ignoring trading costs, a \$1 invested in the TDPI strategy would have yielded \$3.72 which ranks the TDPI strategy in the top 1% across the 212 anomalies. Accounting for trading costs, a \$1 invested in the TDPI strategy would have yielded \$3.13 which ranks the TDPI strategy in the top 1% across the 212 anomalies.

Figure 4 plots percentile ranks for the 212 anomaly trading strategies in terms of gross and [Novy-Marx and Velikov \(2016\)](#) net generalized alphas with respect to the CAPM, and the Fama-French three-, four-, five-, and six-factor models from Table 1, and indicates the ranking of the TDPI relative to those. Panel A shows that the TDPI strategy gross alphas fall between the 67 and 92 percentiles across the five factor models. Panel B shows that, accounting for trading costs, a large fraction of anomalies have not improved the investment opportunity set of an investor with access to the factor models over the 198606 to 202306 sample. For example, 45%

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<sup>1</sup>The anomalies come from March, 2022 release of the [Chen and Zimmermann \(2022\)](#) open source asset pricing dataset.

<sup>2</sup>The figure assumes an initial investment of \$1 in T-bills and \$1 long/short in the two sides of the strategy. Returns are compounded each month, assuming, as in [Detzel et al. \(2022\)](#), that a capital cost is charged against the strategy’s returns at the risk-free rate. This excess return corresponds more closely to the strategy’s economic profitability.



(53%) of the 212 anomalies would not have improved the investment opportunity set for an investor having access to the Fama-French three-factor (six-factor) model. The TDPI strategy has a positive net generalized alpha for five out of the five factor models. In these cases TDPI ranks between the 84 and 99 percentiles in terms of how much it could have expanded the achievable investment frontier.

## 6 Does TDPI add relative to related anomalies?

With so many anomalies, it is possible that any proposed, new cross-sectional predictor is just capturing some combination of known predictors. It is consequently natural to investigate to what extent the proposed predictor adds additional predictive power beyond the most closely related anomalies. Closely related anomalies are more likely to be formed on the basis of signals with higher absolute correlations. Figure 5 plots a name histogram of the correlations of TDPI with 209 filtered anomaly signals.<sup>3</sup> Figure 6 also shows an agglomerative hierarchical cluster plot using Ward's minimum method and a maximum of 10 clusters.

A closely related anomaly is also more likely to price TDPI or at least to weaken the power TDPI has predicting the cross-section of returns. Figure 7 plots histograms of t-statistics for predictability tests of TDPI conditioning on each of the 209 filtered anomaly signals one at a time. Panel A reports t-statistics on  $\beta_{TDPI}$  from Fama-MacBeth regressions of the form  $r_{i,t} = \alpha + \beta_{TDPI}TDPI_{i,t} + \beta_X X_{i,t} + \epsilon_{i,t}$ , where  $X$  stands for one of the 209 filtered anomaly signals at a time. Panel B plots t-statistics on  $\alpha$  from spanning tests of the form:  $r_{TDPI,t} = \alpha + \beta r_{X,t} + \epsilon_t$ , where  $r_{X,t}$  stands for the returns to one of the 209 filtered anomaly trading strategies at a time. The strategies employed in the spanning tests are constructed using quintile sorts,

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<sup>3</sup>When performing tests at the underlying signal level (e.g., the correlations plotted in Figure 5), we filter the 212 anomalies to avoid small sample issues. For each anomaly, we calculate the common stock observations in an average month for which both the anomaly and the test signal are available. In the filtered anomaly set, we drop anomalies with fewer than 100 common stock observations in an average month.

value-weighting, and NYSE breakpoints. Panel C plots t-statistics on the average returns to strategies constructed by conditional double sorts. In each month, we sort stocks into quintiles based on one of the 209 filtered anomaly signals. Then, within each quintile, we sort stocks into quintiles based on TDPI. Stocks are finally grouped into five TDPI portfolios by combining stocks within each anomaly sorting portfolio. The panel plots the t-statistics on the average returns of these conditional double-sorted TDPI trading strategies conditioned on each of the 209 filtered anomalies.

Table 4 reports Fama-MacBeth cross-sectional regressions of returns on TDPI and the six anomalies most closely-related to it. The six most-closely related anomalies are picked as those with the highest combined rank where the ranks are based on the absolute value of the Spearman correlations in Panel B of Figure 5 and the  $R^2$  from the spanning tests in Figure 7, Panel B. Controlling for each of these signals at a time, the t-statistics on the TDPI signal in these Fama-MacBeth regressions exceed 0.26, with the minimum t-statistic occurring when controlling for Equity Duration. Controlling for all six closely related anomalies, the t-statistic on TDPI is 0.45.

Similarly, Table 5 reports results from spanning tests that regress returns to the TDPI strategy onto the returns of the six most closely-related anomalies and the six Fama-French factors. Controlling for the six most-closely related anomalies individually, the TDPI strategy earns alphas that range from 25-48bps/month. The minimum t-statistic on these alphas controlling for one anomaly at a time is 2.51, which is achieved when controlling for Equity Duration. Controlling for all six closely-related anomalies and the six Fama-French factors simultaneously, the TDPI trading strategy achieves an alpha of 27bps/month with a t-statistic of 2.68.

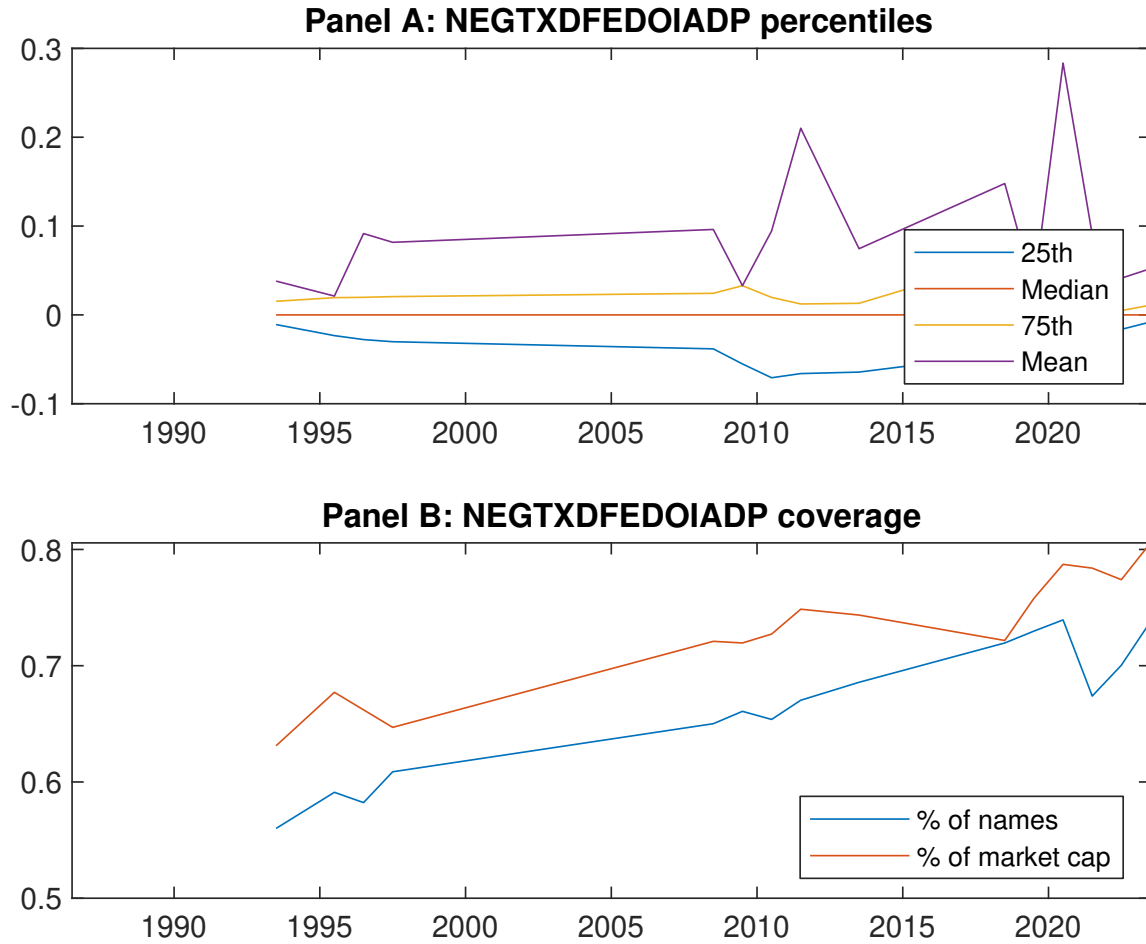
## 7 Does TDPI add relative to the whole zoo?

Finally, we can ask how much adding TDPI to the entire factor zoo could improve investment performance. Figure 8 plots the growth of \$1 invested in trading strategies that combine multiple anomalies following [Chen and Velikov \(2022\)](#). The combinations use either the 159 anomalies from the zoo that satisfy our inclusion criteria (blue lines) or these 159 anomalies augmented with the TDPI signal.<sup>4</sup> We consider one different methods for combining signals.

Panel A shows results using “Average rank” as the combination method. This method sorts stocks on the basis of forecast excess returns, where these are calculated on the basis of their average cross-sectional percentile rank across return predictors, and the predictors are all signed so that higher ranks are associated with higher average returns. For this method, \$1 investment in the 159-anomaly combination strategy grows to \$72.15, while \$1 investment in the combination strategy that includes TDPI grows to \$82.81.

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<sup>4</sup>We filter the 207 [Chen and Zimmermann \(2022\)](#) anomalies and require for each anomaly the average month to have at least 40% of the cross-sectional observations available for market capitalization on CRSP in the period for which TDPI is available.



**Figure 1:** Times series of TDPI percentiles and coverage. This figure plots descriptive statistics for TDPI. Panel A shows cross-sectional percentiles of TDPI over the sample. Panel B plots the monthly coverage of TDPI relative to the universe of CRSP stocks with available market capitalizations.

**Table 1:** Basic sort: VW, quintile, NYSE-breaks

This table reports average excess returns and alphas for portfolios sorted on TDPI. At the end of each month, we sort stocks into five portfolios based on their signal using NYSE breakpoints. Panel A reports average value-weighted quintile portfolio (L,2,3,4,H) returns in excess of the risk-free rate, the long-short extreme quintile portfolio (H-L) return, and alphas with respect to the CAPM, Fama and French (1993) three-factor model, Fama and French (1993) three-factor model augmented with the Carhart (1997) momentum factor, Fama and French (2015) five-factor model, and the Fama and French (2015) five-factor model augmented with the Carhart (1997) momentum factor following Fama and French (2018). Panel B reports the factor loadings for the quintile portfolios and long-short extreme quintile portfolio in the Fama and French (2015) five-factor model. Panel C reports the average number of stocks and market capitalization of each portfolio. T-statistics are in brackets. The sample period is 198606 to 202306.

Panel A: Excess returns and alphas on TDPI-sorted portfolios						
	(L)	(2)	(3)	(4)	(H)	(H-L)
$r^e$	0.52 [2.11]	0.78 [3.63]	0.67 [2.98]	0.63 [2.54]	0.90 [3.52]	0.38 [3.47]
$\alpha_{CAPM}$	-0.22 [-2.81]	0.13 [1.83]	-0.01 [-0.15]	-0.13 [-1.93]	0.13 [1.51]	0.35 [3.21]
$\alpha_{FF3}$	-0.25 [-3.25]	0.11 [1.60]	0.01 [0.15]	-0.10 [-1.51]	0.17 [2.07]	0.42 [4.06]
$\alpha_{FF4}$	-0.22 [-2.81]	0.15 [2.09]	0.03 [0.39]	-0.10 [-1.56]	0.20 [2.43]	0.41 [3.98]
$\alpha_{FF5}$	-0.25 [-3.17]	-0.00 [-0.01]	-0.04 [-0.58]	-0.07 [-1.07]	0.23 [2.91]	0.48 [4.64]
$\alpha_{FF6}$	-0.22 [-2.85]	0.03 [0.44]	-0.03 [-0.38]	-0.07 [-1.12]	0.26 [3.19]	0.48 [4.58]
Panel B: Fama and French (2018) 6-factor model loadings for TDPI-sorted portfolios						
$\beta_{MKT}$	1.07 [57.16]	0.97 [60.45]	0.98 [57.04]	1.09 [69.37]	1.07 [56.26]	0.00 [0.08]
$\beta_{SMB}$	0.10 [3.59]	-0.02 [-0.70]	0.12 [4.60]	-0.05 [-1.96]	0.02 [0.80]	-0.08 [-2.09]
$\beta_{HML}$	0.07 [2.09]	-0.05 [-1.58]	-0.12 [-3.79]	-0.15 [-5.08]	-0.18 [-5.20]	-0.25 [-5.54]
$\beta_{RMW}$	-0.02 [-0.64]	0.24 [7.73]	0.17 [5.11]	-0.12 [-3.84]	-0.24 [-6.54]	-0.21 [-4.52]
$\beta_{CMA}$	0.09 [1.75]	0.10 [2.38]	-0.04 [-0.79]	0.07 [1.72]	0.16 [3.21]	0.08 [1.14]
$\beta_{UMD}$	-0.05 [-3.04]	-0.06 [-4.22]	-0.03 [-1.82]	0.01 [0.46]	-0.05 [-2.63]	0.01 [0.28]
Panel C: Average number of firms ( $n$ ) and market capitalization ( $me$ )						
$n$	494	391	916	711	512	
$me$ (\$10 <sup>6</sup> )	1368	2325	2469	2670	2193	

**Table 2:** Robustness to sorting methodology & trading costs

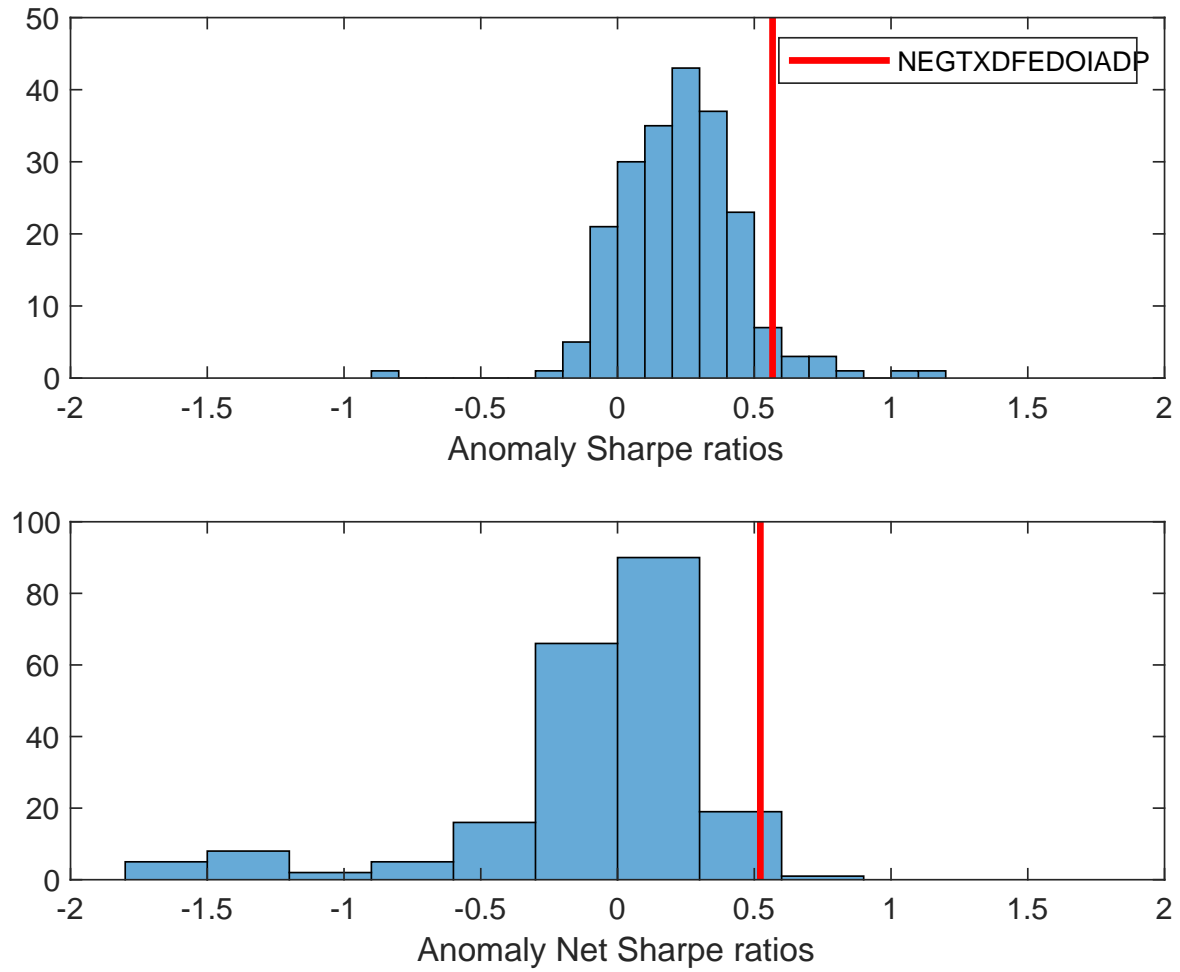
This table evaluates the robustness of the choices made in the TDPI strategy construction methodology. In each panel, the first row shows results from a quintile, value-weighted sort using NYSE break points as employed in Table 1. Each of the subsequent rows deviates in one of the three choices at a time, and the choices are specified in the first three columns. For each strategy construction methodology, the table reports average excess returns and alphas with respect to the CAPM, Fama and French (1993) three-factor model, Fama and French (1993) three-factor model augmented with the Carhart (1997) momentum factor, Fama and French (2015) five-factor model, and the Fama and French (2015) five-factor model augmented with the Carhart (1997) momentum factor following Fama and French (2018). Panel A reports average returns and alphas with no adjustment for trading costs. Panel B reports net average returns and Novy-Marx and Velikov (2016) generalized alphas as prescribed by Detzel et al. (2022). T-statistics are in brackets. The sample period is 198606 to 202306.

Panel A: Gross Returns and Alphas								
Portfolios	Breaks	Weights	$r^e$	$\alpha_{\text{CAPM}}$	$\alpha_{\text{FF3}}$	$\alpha_{\text{FF4}}$	$\alpha_{\text{FF5}}$	$\alpha_{\text{FF6}}$
Quintile	NYSE	VW	0.38 [3.47]	0.35 [3.21]	0.42 [4.06]	0.41 [3.98]	0.48 [4.64]	0.48 [4.58]
Quintile	NYSE	EW	0.12 [1.99]	0.09 [1.55]	0.11 [1.95]	0.11 [1.82]	0.11 [1.74]	0.10 [1.66]
Quintile	Name	VW	0.24 [2.23]	0.19 [1.81]	0.26 [2.60]	0.25 [2.49]	0.35 [3.48]	0.34 [3.38]
Quintile	Cap	VW	0.32 [2.73]	0.26 [2.26]	0.33 [3.11]	0.33 [2.99]	0.45 [4.19]	0.44 [4.08]
Decile	NYSE	VW	0.36 [2.38]	0.36 [2.35]	0.43 [2.92]	0.38 [2.57]	0.50 [3.35]	0.46 [3.10]
Panel B: Net Returns and Novy-Marx and Velikov (2016) generalized alphas								
Portfolios	Breaks	Weights	$r_{\text{net}}^e$	$\alpha_{\text{CAPM}}^*$	$\alpha_{\text{FF3}}^*$	$\alpha_{\text{FF4}}^*$	$\alpha_{\text{FF5}}^*$	$\alpha_{\text{FF6}}^*$
Quintile	NYSE	VW	0.35 [3.20]	0.32 [2.90]	0.37 [3.57]	0.37 [3.56]	0.44 [4.27]	0.44 [4.26]
Quintile	NYSE	EW	-0.06 [-0.81]					
Quintile	Name	VW	0.21 [1.98]	0.16 [1.52]	0.21 [2.11]	0.21 [2.08]	0.31 [3.08]	0.30 [3.04]
Quintile	Cap	VW	0.29 [2.50]	0.23 [1.94]	0.28 [2.60]	0.28 [2.55]	0.40 [3.76]	0.39 [3.72]
Decile	NYSE	VW	0.32 [2.13]	0.32 [2.09]	0.37 [2.52]	0.34 [2.35]	0.45 [3.05]	0.44 [2.94]

**Table 3:** Conditional sort on size and TDPI

This table presents results for conditional double sorts on size and TDPI. In each month, stocks are first sorted into quintiles based on size using NYSE breakpoints. Then, within each size quintile, stocks are further sorted based on TDPI. Finally, they are grouped into twenty-five portfolios based on the intersection of the two sorts. Panel A presents the average returns to the 25 portfolios, as well as strategies that go long stocks with high TDPI and short stocks with low TDPI. Panel B documents the average number of firms and the average firm size for each portfolio. The sample period is 198606 to 202306.

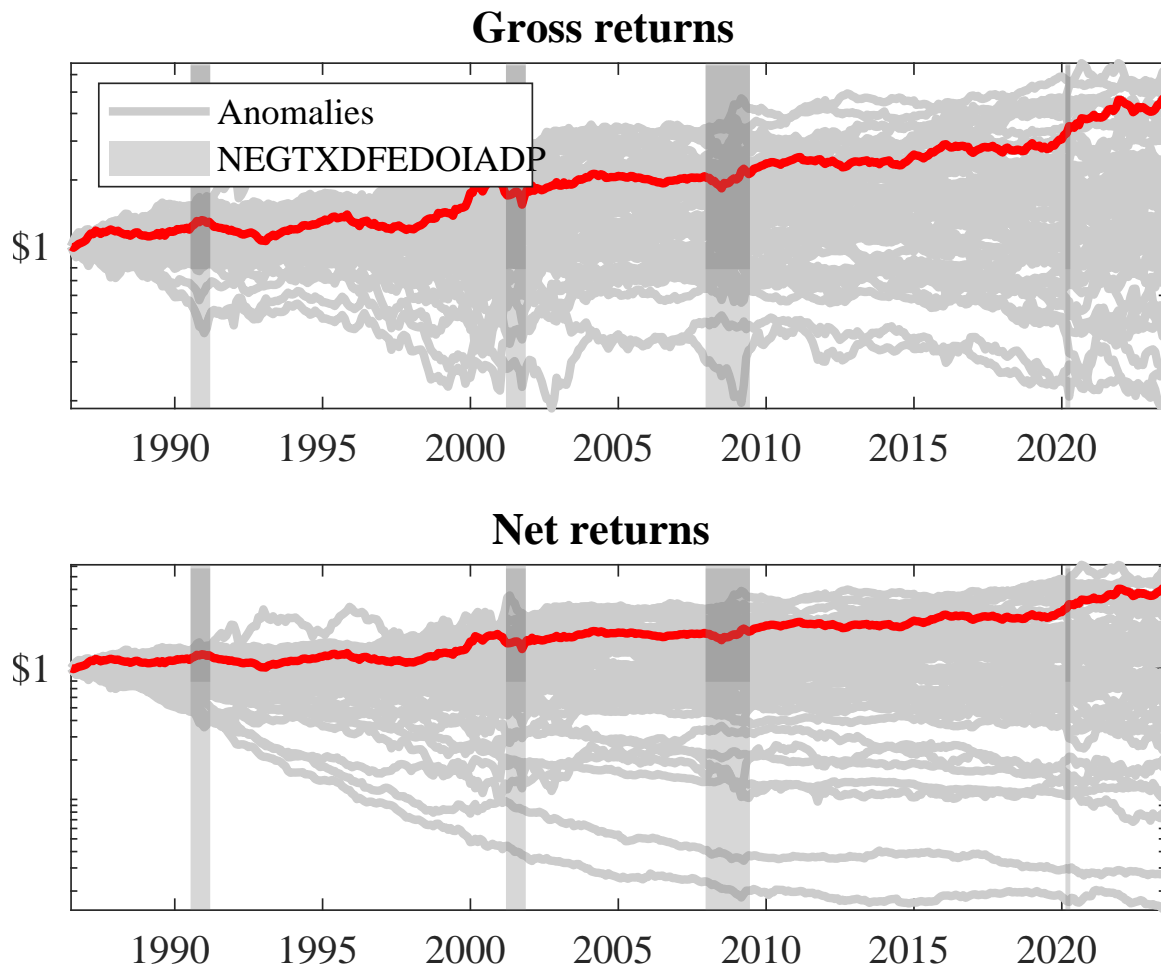
Panel A: portfolio average returns and time-series regression results												
Size quintiles	TDPI Quintiles					TDPI Strategies						
		(L)	(2)	(3)	(4)	(H)	$r^e$	$\alpha_{CAPM}$	$\alpha_{FF3}$	$\alpha_{FF4}$	$\alpha_{FF5}$	$\alpha_{FF6}$
	(1)	0.78 [2.59]	0.51 [1.57]	0.38 [0.89]	0.33 [0.86]	0.99 [3.03]	0.20 [1.58]	0.19 [1.49]	0.21 [1.59]	0.17 [1.33]	0.12 [0.87]	0.10 [0.75]
	(2)	0.77 [2.63]	0.78 [2.78]	0.40 [1.06]	0.50 [1.58]	0.94 [3.05]	0.17 [1.74]	0.15 [1.48]	0.18 [1.86]	0.17 [1.76]	0.21 [2.11]	0.20 [2.03]
	(3)	0.76 [2.59]	0.74 [2.84]	0.68 [1.92]	0.75 [2.57]	0.85 [2.90]	0.09 [0.76]	0.08 [0.61]	0.13 [1.13]	0.12 [1.00]	0.17 [1.41]	0.16 [1.31]
	(4)	0.89 [3.34]	0.74 [2.99]	0.79 [2.68]	0.81 [2.92]	0.91 [3.18]	0.02 [0.16]	-0.03 [-0.19]	0.05 [0.44]	0.02 [0.14]	0.19 [1.52]	0.16 [1.26]
	(5)	0.49 [2.10]	0.76 [3.63]	0.71 [3.27]	0.66 [2.79]	0.88 [3.44]	0.39 [2.94]	0.32 [2.47]	0.39 [3.09]	0.39 [3.04]	0.51 [4.09]	0.51 [4.03]
Panel B: Portfolio average number of firms and market capitalization												
Size quintiles	TDPI Quintiles					TDPI Quintiles						
		Average $n$					Average market capitalization (\$10 <sup>6</sup> )					
		(L)	(2)	(3)	(4)	(H)	(L)	(2)	(3)	(4)	(H)	
	(1)	348	344	339	341	349	41	38	29	32	43	
	(2)	98	98	98	98	97	66	67	64	65	65	
	(3)	64	64	64	64	63	108	110	107	110	108	
	(4)	51	52	52	52	52	229	235	230	234	233	
(5)	48	48	48	48	48	1465	1717	1944	1796	1891		



**Figure 2:** Distribution of Sharpe ratios.

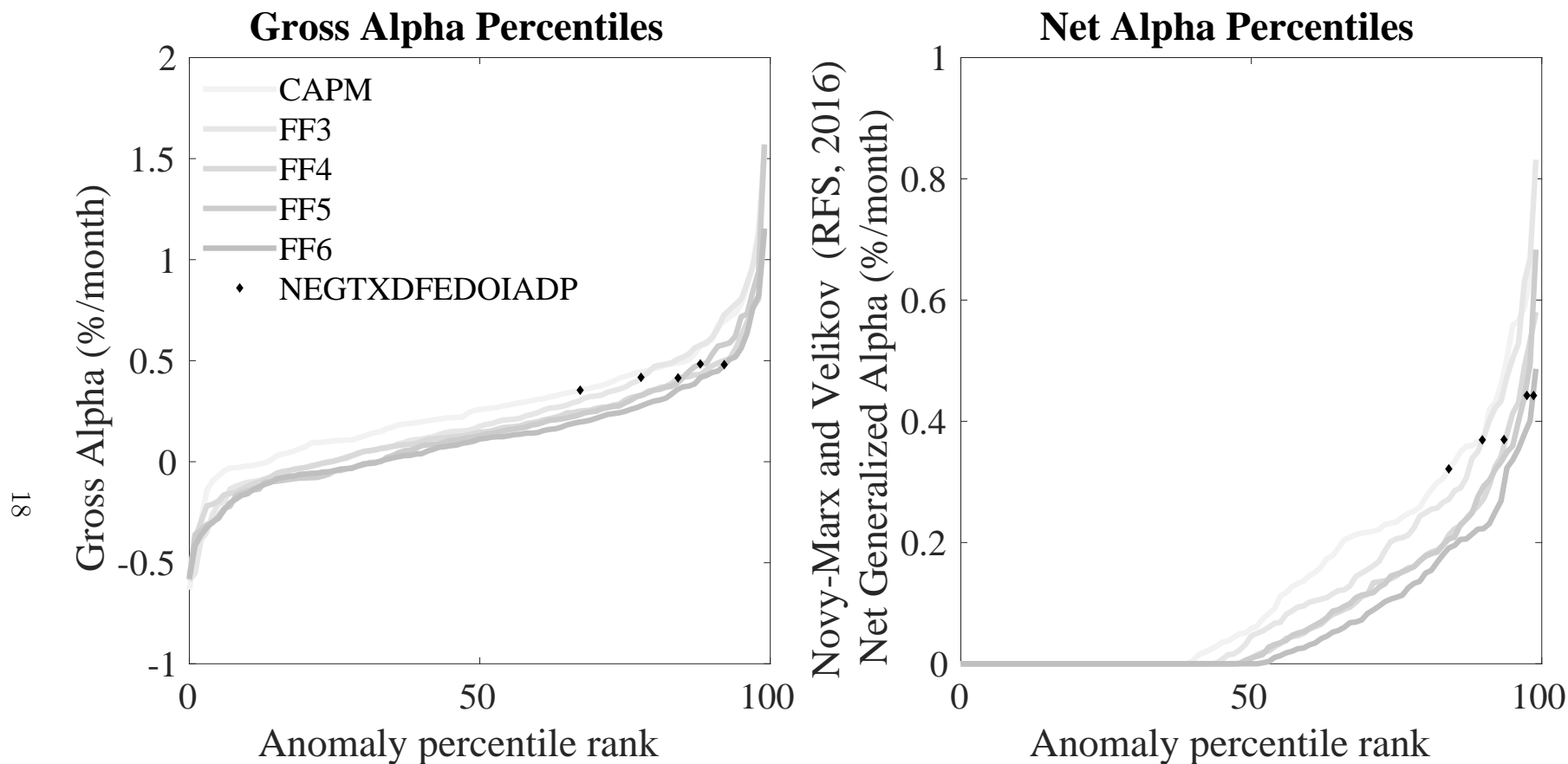
This figure plots a histogram of Sharpe ratios for 212 anomalies, and compares the Sharpe ratio of the TDPI with them (red vertical line). Panel A plots results for gross Sharpe ratios. Panel B plots results for net Sharpe ratios.





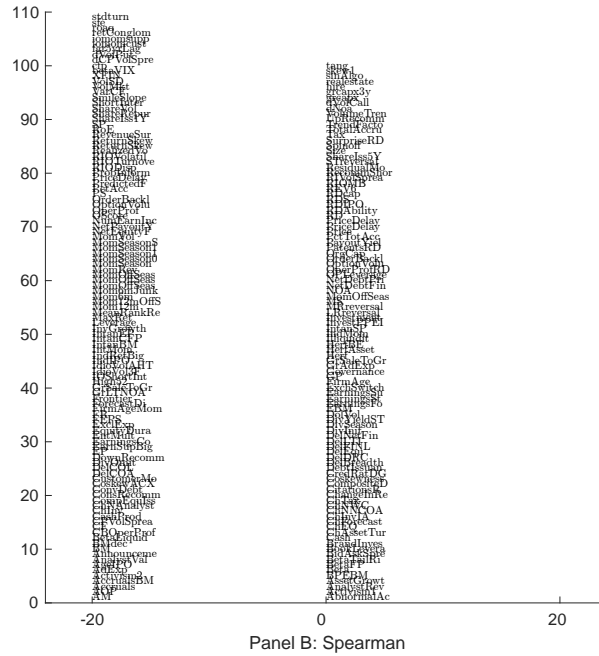
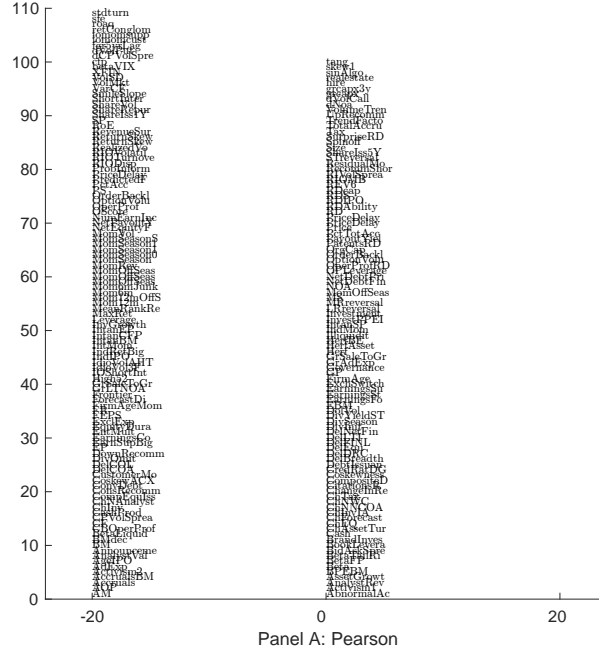
**Figure 3:** Dollar invested.

This figure plots the growth of a \$1 invested in 212 anomaly trading strategies (gray lines), and compares those with the TDPI trading strategy (red line). The strategies are constructed using value-weighted quintile sorts using NYSE breakpoints. Panel A plots results for gross strategy returns. Panel B plots results for net strategy returns.



**Figure 4:** Gross and generalized net alpha percentiles of anomalies relative to factor models

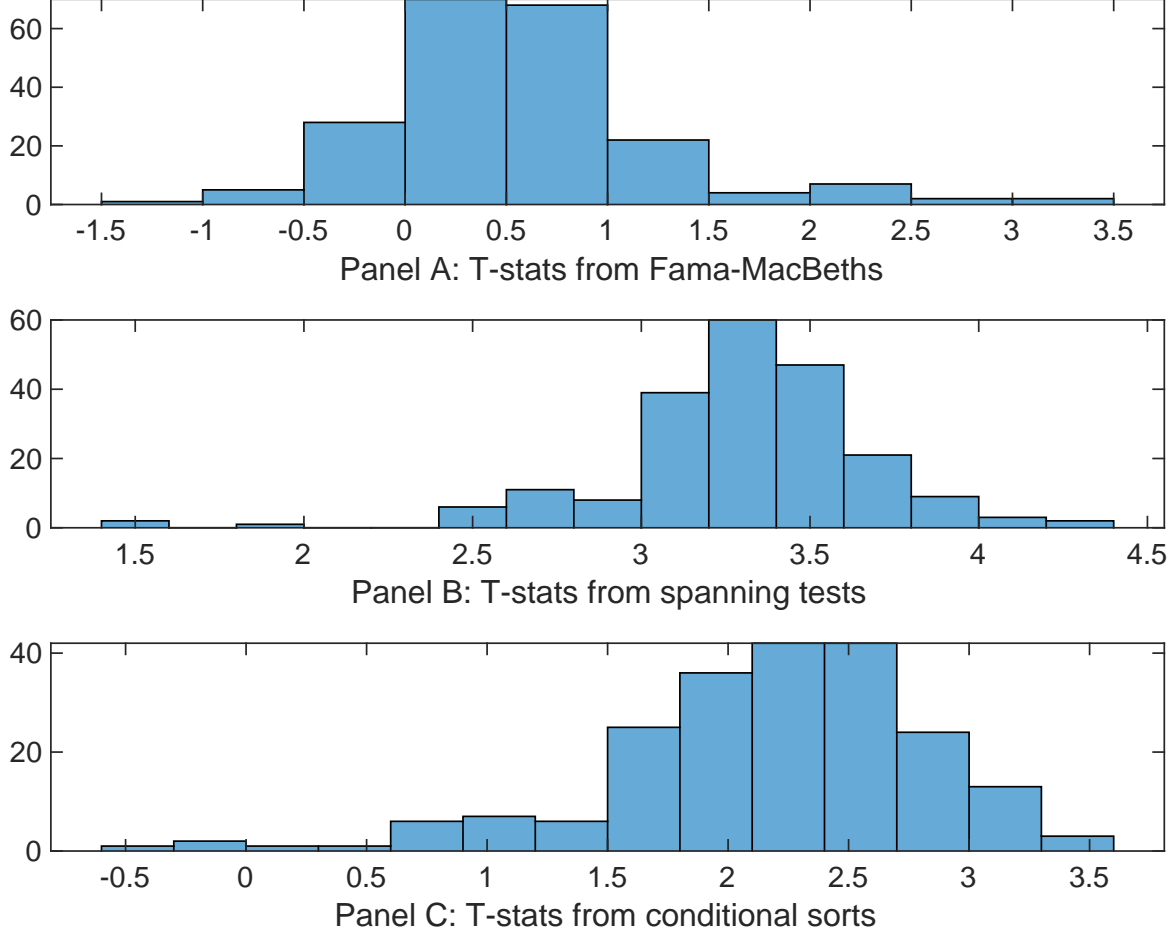
This figure plots the percentile ranks for 212 anomaly trading strategies in terms of alphas (solid lines), and compares those with the TDPI trading strategy alphas (diamonds). The strategies are constructed using value-weighted quintile sorts using NYSE breakpoints. The alphas include those with respect to the CAPM, [Fama and French \(1993\)](#) three-factor model, [Fama and French \(1993\)](#) three-factor model augmented with the [Carhart \(1997\)](#) momentum factor, [Fama and French \(2015\)](#) five-factor model, and the [Fama and French \(2015\)](#) five-factor model augmented with the [Carhart \(1997\)](#) momentum factor following [Fama and French \(2018\)](#). The left panel plots alphas with no adjustment for trading costs. The right panel plots [Novy-Marx and Velikov \(2016\)](#) net generalized alphas.



**Figure 5:** Distribution of correlations.

This figure plots a name histogram of correlations of 209 filtered anomaly signals with TDPI. The correlations are pooled. Panel A plots Pearson correlations, while Panel B plots Spearman rank correlations.

This figure plots an agglomerative hierarchical cluster plot using Ward's minimum method and a maximum of 10 clusters.



**Figure 7:** Distribution of t-stats on conditioning strategies

This figure plots histograms of t-statistics for predictability tests of TDPI conditioning on each of the 209 filtered anomaly signals one at a time. Panel A reports t-statistics on  $\beta_{TDPI}$  from Fama-MacBeth regressions of the form  $r_{i,t} = \alpha + \beta_{TDPI}TDPI_{i,t} + \beta_X X_{i,t} + \epsilon_{i,t}$ , where  $X$  stands for one of the 209 filtered anomaly signals at a time. Panel B plots t-statistics on  $\alpha$  from spanning tests of the form:  $r_{TDPI,t} = \alpha + \beta r_{X,t} + \epsilon_t$ , where  $r_{X,t}$  stands for the returns to one of the 209 filtered anomaly trading strategies at a time. The strategies employed in the spanning tests are constructed using quintile sorts, value-weighting, and NYSE breakpoints. Panel C plots t-statistics on the average returns to strategies constructed by conditional double sorts. In each month, we sort stocks into quintiles based on one of the 209 filtered anomaly signals at a time. Then, within each quintile, we sort stocks into quintiles based on TDPI. Stocks are finally grouped into five TDPI portfolios by combining stocks within each anomaly sorting portfolio. The panel plots the t-statistics on the average returns of these conditional double-sorted TDPI trading strategies conditioned on each of the 209 filtered anomalies.

**Table 4:** Fama-MacBeths controlling for most closely related anomalies

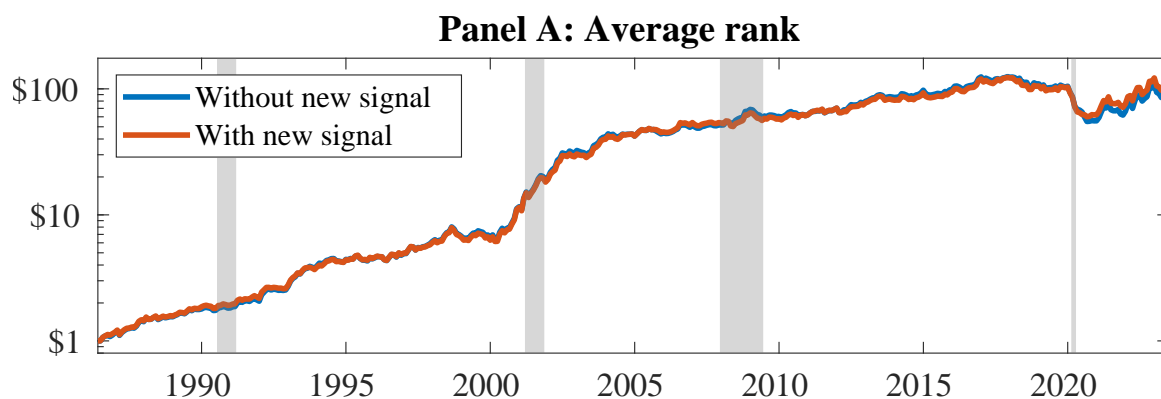
This table presents Fama-MacBeth results of returns on TDPI. and the six most closely related anomalies. The regressions take the following form:  $r_{i,t} = \alpha + \beta_{TDPI}TDPI_{i,t} + \sum_{k=1}^s \beta_{X_k}X_{i,t}^k + \epsilon_{i,t}$ . The six most closely related anomalies,  $X$ , are Cash to assets, Equity Duration, Operating Cash flows to price, Cash flow to market, Book to market using December ME, Market leverage. These anomalies were picked as those with the highest combined rank where the ranks are based on the absolute value of the Spearman correlations in Panel B of Figure 5 and the  $R^2$  from the spanning tests in Figure 7, Panel B. The sample period is 198606 to 202306.

Intercept	0.10 [3.60]	0.16 [6.01]	0.10 [3.34]	0.11 [3.41]	0.94 [2.96]	0.10 [3.42]	0.12 [4.44]
TDPI	0.68 [1.14]	0.15 [0.26]	0.30 [0.51]	0.22 [0.39]	0.28 [0.49]	0.36 [0.62]	0.26 [0.45]
Anomaly 1	0.60 [1.46]						0.10 [2.98]
Anomaly 2		0.23 [2.37]					0.20 [2.95]
Anomaly 3			0.85 [2.78]				0.78 [4.12]
Anomaly 4				0.15 [0.44]			-0.23 [-0.96]
Anomaly 5					0.28 [3.27]		0.21 [2.92]
Anomaly 6						0.19 [0.83]	-0.26 [-1.34]
# months	439	444	439	439	439	439	439
$\bar{R}^2(\%)$	1	0	1	1	0	0	0

**Table 5:** Spanning tests controlling for most closely related anomalies

This table presents spanning tests results of regressing returns to the TDPI trading strategy on trading strategies exploiting the six most closely related anomalies. The regressions take the following form:  $r_t^{TDPI} = \alpha + \sum_{k=1}^6 \beta_{X_k} r_t^{X_k} + \sum_{j=1}^6 \beta_{f_j} r_t^{f_j} + \epsilon_t$ , where  $X_k$  indicates each of the six most-closely related anomalies and  $f_j$  indicates the six factors from the [Fama and French \(2015\)](#) five-factor model augmented with the [Carhart \(1997\)](#) momentum factor. The six most closely related anomalies,  $X$ , are Cash to assets, Equity Duration, Operating Cash flows to price, Cash flow to market, Book to market using December ME, Market leverage. These anomalies were picked as those with the highest combined rank where the ranks are based on the absolute value of the Spearman correlations in Panel B of Figure 5 and the  $R^2$  from the spanning tests in Figure 7, Panel B. The sample period is 198606 to 202306.

Intercept	0.25 [2.51]	0.47 [4.44]	0.48 [4.58]	0.46 [4.35]	0.44 [4.20]	0.44 [4.19]	0.27 [2.68]
Anomaly 1	35.55 [8.76]						31.85 [7.20]
Anomaly 2		-12.48 [-2.22]					-2.71 [-0.41]
Anomaly 3			-17.33 [-4.25]				-6.78 [-1.39]
Anomaly 4				-8.88 [-2.35]			3.58 [0.76]
Anomaly 5					-25.78 [-3.72]		-8.71 [-1.23]
Anomaly 6						-11.85 [-2.73]	-5.73 [-1.28]
mkt	-6.83 [-2.79]	-0.09 [-0.03]	0.90 [0.37]	0.25 [0.10]	-0.92 [-0.37]	1.65 [0.65]	-5.55 [-2.17]
smb	-6.10 [-1.75]	-4.63 [-1.18]	-3.81 [-1.01]	-6.14 [-1.63]	0.08 [0.02]	-6.35 [-1.69]	-2.19 [-0.55]
hml	-11.95 [-2.64]	-11.49 [-1.48]	-11.65 [-2.13]	-19.33 [-3.77]	1.34 [0.16]	-9.55 [-1.33]	8.70 [0.91]
rmw	-4.28 [-0.88]	-21.39 [-4.51]	-16.24 [-3.34]	-18.57 [-3.77]	-28.41 [-5.61]	-23.14 [-4.84]	-8.32 [-1.50]
cma	21.26 [3.33]	3.91 [0.57]	13.03 [1.95]	11.09 [1.64]	10.05 [1.51]	6.46 [0.96]	19.01 [2.76]
umd	-0.03 [-0.01]	0.13 [0.05]	-6.57 [-2.28]	-3.29 [-1.14]	1.28 [0.55]	-2.16 [-0.84]	-2.44 [-0.78]
# months	440	444	440	440	440	440	440
$\bar{R}^2(\%)$	29	18	19	17	19	17	29



**Figure 8:** Combination strategy performance

This figure plots the growth of a \$1 invested in trading strategies that combine multiple anomalies following [Chen and Velikov \(2022\)](#). In all panels, the blue solid lines indicate combination trading strategies that utilize 159 anomalies. The red solid lines indicate combination trading strategies that utilize the 159 anomalies as well as TDPI. Panel A shows results using "Average rank" as the combination method. See [Section 7](#) for details on the combination methods.



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