A Comparison of New Factor Models

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Abstract

This paper conducts a gigantic replication study of asset pricing anomalies by compiling an extensive data library with 437 variables. After microcaps are controlled for, 276 anomalies with NYSE breakpoints and value-weighted returns, as well as 221 with all-but-micro breakpoints and equal-weighted returns, including a vast majority of liquidity variables, are insignificant at the 5% level. When explaining the remaining hundreds of significant anomalies, the q-factor model and a closely related five-factor model are the two best performing models among a long list of models. Investment and profitability are the dominating driving forces in the broad cross section of average stock returns.

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1 Introduction

This paper compiles an extensive, largest-to-date data library with 437 anomaly variables. To control for microcaps (stocks with market equity below the 20th percentile at New York Stock Exchange, NYSE), we define the broad cross section as testing deciles constructed with NYSE breakpoints and value-weighted returns, as well as with all-but-micro breakpoints and equal-weighted returns. We document that in the former set of deciles, 276 out of 437 variables (or 63%) have insignificant high-minus-low average returns at the 5% level, and in the latter set, 221 variables (51%) are insignificant. As such, our evidence shows the necessity of controlling for microcaps in asset pricing tests. Perhaps more important, the broad cross section still features robust cross-sectional predictability, with 161 and 216 significant anomalies across the two sets of testing deciles, respectively. Even after applying the stringent cutoff t-statistic of three in Harvey, Liu, and Zhu (2016), we still observe 67 and 122 significant anomalies across the two sets, respectively.

We then compare the performance of a large array of factor models in explaining the hundreds of significant anomalies in the broad cross section. We consider the classic models, including the Capital Asset Pricing Model (CAPM), the Fama-French (1993) three-factor model, the Carhart (1997) four-factor model, and the Pastor-Stambaugh (2003) model that adds their liquidity factor to the three-factor model. In addition, we consider several newly proposed factor models that have recently attracted much attention, including the Jagannathan-Wang (2007) fourth-quarter consumption growth model, the Adrian-Etula-Muir (2014) financial intermediary leverage factor model, the Hou-Xue-Zhang (2015) q-factor model, and the Fama-French (2015) five-factor model.

The q-factor model and the five-factor model seem to be the best performing models in explaining anomalies. Across the 161 significant anomalies with NYSE breakpoints and value-weighted returns, the average magnitude of the high-minus-low alphas is 0.26% per month in the q-factor model and 0.37% in the five-factor model. The number of significant high-minus-low alphas is 46 in the q-factor model and 84 in the five-factor model. The number of rejections by the Gibbons, Ross, and Shanken (1989, GRS) test is 107 in the q-factor model and 108 in the five-factor model. Across the 216 significant anomalies with all-but-micro breakpoints and equal-weighted returns, the average magnitude of the high-minus-low alphas is 0.26% in the q-factor model and 0.38% in the five-factor model. The number of significant high-minus-low alphas is 66 in the q-factor model and 128 in the five-factor model. However, the number of rejections by the GRS test is lower in the five-factor model, 151, than 172 in the q-factor model.

The q-factor model outperforms the five-factor model (as well as the Carhart model that contains a momentum factor) in explaining momentum. Across the 37 significant momentum anomalies with NYSE breakpoints and value-weighted returns, the average winner-minus-loser alpha is 0.26% per month in the q-factor model, 0.3% in the Carhart model, and 0.65% in the five-factor model. The number of significant winner-minus-loser alphas is nine in the q-factor model, which is lower than 18 in the Carhart model and 35 in the five-factor model. The q-factor model also outperforms the five-factor model in the profitability category. The two models are largely comparable in the investment, intangibles, and trading frictions categories, but the five-factor model has an edge in the value-versus-growth category, benefited from having the value factor, HML.[1]

Surprisingly, liquidity matters little in the broad cross section. In the trading frictions category, 89 variables with NYSE breakpoints and value-weighted returns and 80 variables with all-but-micro breakpoints and equal-weighted returns (out of in total 96 variables) are insignificant. Prominent but insignificant variables include the Ang-Hodrick-Xing-Zhang (2006) idiosyncratic volatility, the Liu (2006) number of zero trading volume, the Amihud (2002) absolute return-to-volume, the Acharya-Pedersen (2005) liquidity betas, and the Adrian-Etula-Muir (2014) leverage beta.

Relatedly, adding the Pastor-Stambaugh liquidity factor to the three-factor model adds little ex-

[1]In factor spanning tests, from January 1967 to December 2014, the q-factor alphas of the RMW (robustness-minus-weak profitability) and CMA (conservative-minus-aggressive investment) factors are 0.04% and 0.01% per month ($t =$ 0.42 and 0.32), but the five-factor alphas of the investment and ROE factors in the q-factor model are 0.12% and 0.45% ($t = 3.35$ and 5.6), respectively. As such, RMW and CMA might be noisy versions of the q-factors. The q-factor model also explains the Carhart momentum factor, UMD. The average return of UMD is 0.67% ($t = 3.66$), but its q-factor alpha is only 0.11% ($t = 0.43$). In contrast, the five-factor model cannot explain UMD, with an alpha of 0.69% ($t = 3.11$).

planatory power. Across the 161 significant anomalies with NYSE breakpoints and value-weighted returns, the three-factor and Pastor-Stambaugh models have the identical average magnitude of the high-minus-low alphas, 0.49% per month, and the same mean absolute alpha across all the deciles, 0.144%. Across the 216 significant anomalies with all-but-micro breakpoints and equal-weighted returns, the two models have virtually identical average magnitudes of the high-minus-low alphas, 0.55–0.56%, and the same mean absolute alpha, 0.142%. In all, liquidity only matters in microcaps, but fundamentals, including investment and profitability, dominate the broad cross section.

Finally, the performance of the Jagannathan-Wang (2007) fourth-quarter consumption growth model and the Adrian-Etula-Muir (2014) financial intermediary leverage factor model is very sensitive to the basis assets used to form factor mimicking portfolios. When we follow Adrian et al. to use the six size and book-to-market portfolios as well as UMD as basis assets to form the leverage factor, across the 161 significant anomalies with NYSE breakpoints and value-weighted returns, the average magnitude of the high-minus-low alphas is 0.4% per month, the number of significant high-minus-low alphas 96, the mean absolute alpha across all the deciles 0.159%, and the number of rejections by the GRS test 69. However, when we change the basis assets to the 17 Fama and French (1997) industry portfolios, the average magnitude of the high-minus-low alphas becomes 0.5% per month, the number of significant high-minus-low alphas 151 (94%), the mean absolute alpha 0.508%, and the number of rejections by the GRS test 147 (91%). The results for the fourth-quarter consumption growth model are quantitatively similar. We interpret the evidence as saying that, while suggestive of the underlying macroeconomic risks of financial assets, the leverage and consumption growth models are unlikely to be good workhorse models for estimating expected stock returns.

Our work makes two major contributions to the empirical asset pricing literature. First, using a common set of procedures across all 437 variables and over an extended sample period, we provide the largest-to-date replication study of asset pricing anomalies. Several prominent authors, such as Harvey, Liu, and Zhu (2016), have recently cast doubt on the credibility of the anomalies literature. Emphasizing the danger of data mining, Harvey et al. conclude that "most claimed research findings in financial economics are likely false (p. 5)." Their sharp critique echoes a recent *Nature* article by Baker (2016), who reports that two-thirds of surveyed researchers consider current levels of reproducibility of published scientific articles as a major problem. Selective reporting, pressure to publish, and poor use of statistics are three leading causes for the severe lack of reproducibility.

Our gigantic replication yields important new insights. Once microcaps are controlled for, many anomalies are insignificant. Most shockingly, most liquidity variables (93% with NYSE breakpoints and value-weighted returns and 83% with all-but-micro breakpoints and equal-weighted returns) are insignificant. Reinforcing the data mining concern of Harvey, Liu, and Zhu (2016), this evidence highlights the extreme importance of controlling for microcaps in asset pricing tests. However, the broad cross section still features robust anomalies, with 161 and 216 significant variables across our two sets of testing deciles, respectively. Even after imposing the cutoff t-statistic of three in Harvey et al., we still count 67 and 122 significant anomalies across the two sets, respectively. As such, Harvey et al.'s conclusion that most anomaly findings are likely false is probably too strong.

Second, using hundreds of significant anomalies in the broad cross section, we evaluate the performance of a large array of factor models. Workhorse factor models for estimating expected stock returns are of immense importance, both in academic research and investment management practice (Ang 2014). Our key insight is that the q-factor model and the closely related Fama-French (2015) five-factor model are the two best performing models among a long list of models and across a vast universe of testing assets. In addition, the q-factor model performs a bit better than the five-factor model in factor spanning tests and in explaining momentum and profitability anomalies. However, the five-factor model has an edge in explaining value-versus-growth anomalies.

The rest of the paper is organized as follows. Section 2 reports return factor spanning tests. Section 3 constructs 437 anomalies, and shows insignificant anomalies. Section 4 compares the return factor models in explaining significant anomalies. Section 5 furnishes the results for the intermediary leverage model and the fourth-quarter consumption growth model. Finally, Section 6 concludes.

2 Factors

We innovate on the construction of the q-factors by extending the sample backward from January 1972 to January 1967 in Section 2.1. We perform factor spanning tests in Section 2.2.

2.1 Extending the q-factors

Monthly returns are from the Center for Research in Security Prices (CRSP) and accounting information from the Compustat Annual and Quarterly Fundamental Files. The sample is from January 1967 to December 2014. Financial firms and firms with negative book equity are excluded.

Following Hou, Xue, and Zhang (2015), we construct the size, investment, and ROE factors from a triple $2 \times 3 \times 3$ sort on size, investment-to-assets (I/A), and ROE. Size is the market equity, which is stock price per share times shares outstanding from CRSP, I/A is the annual change in total assets (Compustat annual item AT) divided by one-year-lagged total assets, and ROE is income before extraordinary items (Compustat quarterly item IBQ) divided by one-quarter-lagged book equity.[2] At the end of June of each year t, we use the median NYSE size to split NYSE, Amex, and NASDAQ stocks into two groups, small and big. Independently, at the end of June of year t, we break stocks into three I/A groups using the NYSE breakpoints for the low 30%, middle 40%, and high 30% of the ranked values of I/A for the fiscal year ending in calendar year $t-1$. Also, independently, at the beginning of each month, we sort all stocks into three groups based on the NYSE breakpoints for the low 30%, middle 40%, and high 30% of the ranked values of ROE. Earnings data in Compustat quarterly files are used in the months immediately after the most recent public quarterly earnings announcement dates (item RDQ). For a firm to enter the factor construction, we require the end of the fiscal quarter that corresponds to its announced earnings to be within six months prior to the portfolio formation month.

[2] Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (Compustat quarterly item TXDITCQ) if available, minus the book value of preferred stock (item PSTKQ). Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the book value of preferred stock, or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity.

Taking the intersection of the two size, three I/A, and three ROE groups, we form 18 benchmark portfolios. Monthly value-weighted portfolio returns are calculated for the current month, and the portfolios are rebalanced monthly. The size factor is the difference (small-minus-big), each month, between the simple average of the returns on the nine small size portfolios and the simple average of the returns on the nine big size portfolios. The investment factor is the difference (low-minus-high), each month, between the simple average of the returns on the six low I/A portfolios and the simple average of the returns on the six high I/A portfolios. Finally, the ROE factor is the difference (high-minus-low), each month, between the simple average of the returns on the six high ROE portfolios and the simple average of the returns on the six low ROE portfolios.

Hou, Xue, and Zhang (2015) start the q-factors sample in January 1972, restricted by the limited coverage of earnings announcement dates and book equity in Compustat quarterly files. We extend the sample backward to January 1967. To overcome the lack of coverage for quarterly earnings announcement dates, we use the most recent quarterly earnings from the fiscal quarter ending at least four months prior to the portfolio formation month. To expand the coverage for quarterly book equity, we use book equity from Compustat annual files and impute quarterly book equity with clean surplus accounting. We first use quarterly book equity from Compustat quarterly files whenever available, and then supplement the coverage for the fourth fiscal quarter with book equity from Compustat annual files.[3] If neither estimate is available, we apply the clean surplus relation to impute the book equity. We first backward impute the beginning-of-quarter book equity as the end-of-quarter book equity minus quarterly earnings plus quarterly dividends.[4] Because we impose a four-month lag between earnings and the holding period month (and the book equity in

[3]Following Davis, Fama, and French (2000), we measure annual book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (Compustat annual item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if available. Otherwise, we use the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption value (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock.

[4]Quarterly dividends are zero if dividends per share (item DVPSXQ) are zero. Otherwise, total dividends are dividends per share times beginning-of-quarter shares outstanding adjusted for stock splits during the quarter. Shares outstanding are from Compustat (quarterly item CSHOQ supplemented with annual item CSHO for fiscal quarter four) or CRSP (item SHROUT), and the share adjustment factor is from Compustat (quarterly item AJEXQ supplemented with annual item AJEX for fiscal quarter four) or CRSP (item CFACSHR).

the denominator of ROE is one-quarter-lagged relative to earnings), all the Compustat data in the backward imputation are at least four-month lagged relative to the portfolio formation month.

If data are unavailable for the backward imputation, we impute the book equity for quarter t forward based on book equity from prior quarters. Let BEQ_{t-j}, with $1 \leq j \leq 4$, denote the latest available quarterly book equity as of quarter t, and $\text{IBQ}_{t-j+1,t}$ and $\text{DVQ}_{t-j+1,t}$ be the sum of quarterly earnings and quarterly dividends from quarter $t-j+1$ to t, respectively. BEQ_t can then be imputed as $\text{BEQ}_{t-j}+\text{IBQ}_{t-j+1,t}-\text{DVQ}_{t-j+1,t}$. We do not use prior book equity from more than four quarters ago to reduce imputation errors ($1 \leq j \leq 4$). We start the sample in January 1967 to ensure that all the 18 benchmark portfolios from the triple sort on size, I/A, and ROE have at least ten firms.

Following Beaver, McNichols, and Price (2007), we adjust monthly stock returns for delisting returns by compounding returns in the month before delisting with delisting returns from CRSP. When a delisting return is missing, we replace it with the mean of available delisting returns of the same delisting type and stock exchange in the prior 60 months. Appendix A details our delisting adjustment procedure. Adjusting for delisting returns matters little for the returns of both q-factors and testing deciles, likely because microcaps are explicitly controlled for (Section 3.1).

For the 18 benchmark portfolios, Table 1 reports descriptive statistics, including the mean and volatility of monthly excess returns, the average number of firms, as well as portfolio size, I/A, and ROE. Among the portfolios, the small-low I/A-high ROE portfolio earns the highest average excess return of 1.39% per month, and the small-high I/A-low ROE portfolio the lowest, −0.07%. The largest average return spread between the low and high I/A portfolios, 0.74%, resides in the small-low ROE stocks. In contrast, the spread is only 0.09% in the big-high ROE stocks. The largest average return spread between the high and low ROE portfolios, 1.1%, is in the small-high I/A stocks, and the spread is only 0.1% in the big-low I/A stocks.

2.2 Factor Spanning Tests

We construct the market factor, MKT, as value-weighted market returns minus one-month Treasury bill rates from CRSP. The data of SMB and HML in the three-factor model, SMB, HML, RMW, and CMA in the five-factor model, as well as UMD are from Kenneth French's Web site. The data of the Pastor-Stambaugh liquidity factor, LIQ, are from Robert Stambaugh's Web site.

Table 2 reports factor spanning tests in the sample from January 1967 to December 2014 (the sample of LIQ starts in January 1968). Panel A shows that the size, investment, and ROE factors in the q-factor model earn on average 0.32%, 0.43%, and 0.56% per month ($t = 2.42, 5.08$, and 5.24), respectively. The investment and ROE factor premiums cannot be explained by the Carhart model, with alphas of 0.29% ($t = 4.57$) and 0.51% ($t = 5.58$), or the Pastor-Stambaugh model, with alphas of 0.35% ($t = 5.73$) and 0.75% ($t = 7.61$), respectively. The loadings of q-factor returns on LIQ are close to zero. Finally, the five-factor model cannot explain the q-factor premiums either, with alphas of 0.12% ($t = 3.35$) and 0.45% ($t = 5.6$), respectively.

Panel B shows that SMB, HML, RMW, and CMA earn on average 0.26%, 0.36%, 0.27%, and 0.34% per month ($t = 1.92, 2.57, 2.58$, and 3.63), respectively. The Carhart alphas of RMW and CMA are 0.33% ($t = 3.31$) and 0.19% ($t = 2.83$), and their Pastor-Stambaugh alphas are 0.34% ($t = 3.19$) and 0.24% ($t = 3.71$), respectively. Most important, the q-factor model explains the average RMW and CMA returns, leaving tiny alphas of 0.04% ($t = 0.42$) and 0.01% ($t = 0.32$), respectively. As such, RMW and CMA are likely noisy versions of the q-factors. The q-factor model also explains the HML return, with an alpha of 0.03% ($t = 0.28$).

Panel C shows that UMD is on average 0.67% per month ($t = 3.66$). The q-factor model has a small alpha of 0.11% ($t = 0.43$). The ROE-factor loading is 0.91 ($t = 5.59$). The five-factor model cannot capture UMD, with an alpha of 0.69% ($t = 3.11$). The RMW loading is only 0.25 ($t = 1.23$). The Pastor-Stambaugh model cannot explain UMD either, with a large alpha of 0.89% ($t = 5.25$). Panel D shows that the LIQ premium is 0.42% ($t = 2.81$). None of the other factor models can explain LIQ, and all leave significantly positive alphas for LIQ.

Panel E reports pairwise correlations for the factors. The investment factor has a high correlation of 0.69 with HML, and the ROE factor has a high correlation of 0.49 with UMD. Both are highly significant. The investment factor has an almost perfect correlation of 0.91 with CMA, but the ROE factor has a lower correlation of 0.68 with RMW. LIQ is largely orthogonal to all the other factors. Its correlations with the other factors are all economically small and statistically insignificant.

3 Testing Portfolios

A major contribution of this paper is to construct the largest-to-date data library with in total 437 anomaly variables. Table 3 provides the list. Using the categorization from Hou, Xue, and Zhang (2015), we count 57, 68, 38, 78, 100, and 96 variables across the momentum, value-versus-growth, investment, profitability, intangibles, and trading frictions categories, respectively. Appendix B details variable definition and portfolio construction for all 437 sets of testing deciles.

3.1 Principles of Portfolio Construction

We focus on the broad cross section by forming testing deciles with NYSE breakpoints and value-weighted returns to alleviate the impact of microcaps. Fama and French (2008) argue that microcaps can be influential in equal-weighted high-minus-low portfolio returns. Microcaps are on average only 3% of the market value of the NYSE-Amex-NASDAQ universe, but account for about 60% of the total number of stocks. Also, the cross-sectional dispersion of anomaly variables is largest among microcaps, which typically account for more than 60% of the stocks in extreme deciles. Due to high transaction costs and illiquidity, anomalies in microcaps are unlikely to be exploitable in practice.

Fama and French (2015) argue that value-weighted portfolio returns can be dominated by a few big stocks, but the most serious challenges for asset pricing models are in small stocks, which value-weighted portfolios tend to underweight. To address this concern, we expand the broad cross section by also forming testing deciles with all-but-micro breakpoints and equal-weighted returns. We exclude microcaps from the NYSE-Amex-NASDAQ universe, use the remaining stocks to calculate breakpoints, and then equal-weight all the stocks within a given decile to give small stocks sufficient weights in the portfolio. By construction, microcaps are excluded in these testing deciles.

For annually sorted testing deciles, we sort all stocks at the end of June of each year t into deciles based on, for instance, book-to-market at the fiscal year ending in calendar year $t-1$, and calculate decile returns from July of year t to June of $t+1$. For monthly sorted portfolios involving latest earnings data, such as the ROE deciles, we follow the timing in constructing the ROE factor. In particular, earnings data in Compustat quarterly files are used in the months immediately after the quarterly earnings announcement dates. For monthly sorted portfolios involving quarterly accounting data other than earnings, we impose a four-month lag between the sorting variable and subsequent stock returns to guard against look-ahead bias. The crux is that unlike earnings, other quarterly items are typically not available upon earnings announcement dates. Many firms announce their earnings for a given quarter through a press release, and then file SEC reports several weeks later. In particular, Easton and Zmijewski (1993) document a median reporting lag of 46 days for NYSE/Amex firms and 52 days for NASDAQ firms. Chen, DeFond, and Park (2002) also report that only 37% of quarterly earnings announcements include balance sheet information.

For monthly sorted anomalies, we include three different holding periods (1-, 6-, and 12-month). Chan, Jegadeesh, and Lakonishok (1996), for example, emphasize the short-lived nature of momentum, by examining how momentum profits vary with the holding periods. As such, it seems economically interesting to study the robustness of monthly sorted anomalies across different holding periods. Even if we treat different holding periods with one underlying variable as a single anomaly, we still count in total 233 anomaly variables. Our data library is the largest in the existing literature. For comparison, Green, Hand, and Zhang (2013) reference 330 anomaly papers, but code up only 39 variables. Green, Hand, and Zhang (2016) and McLean and Pontiff (2016) program about 100 anomaly variables. Harvey, Liu, and Zhu (2016) compile a list of 313 papers on cross-sectional predictability, but many are about macroeconomic variables, such as aggregate consumption growth. More important, Harvey et al. do not attempt to replicate any of these variables.

3.2 Insignificant Anomalies in the Broad Cross-section

Table 4 shows that with NYSE breakpoints and value-weighted returns (NYSE-VW), 276 out of 437 variables (or 63%) have high-minus-low deciles that earn insignificant average returns at the 5% level (Panel A). With all-but-micro breakpoints and equal-weighted returns (ABM-EW), 221 anomaly variables (or 51%) have insignificant high-minus-low decile returns (Panel B).

With NYSE-VW, 20 out of 57 anomalies in the momentum category are insignificant. Standardized unexpected earnings (Sue), revenue surprises (Rs), segment momentum (Sm), and supplier industries momentum (Sim) are insignificant at the 6- and 12-month horizons. Tax expense surprises (Tes) are insignificant at all holding periods, including 1-, 6-, and 12-month. The 52-week high (52w) is insignificant at the 1- and 12-month holding periods. With ABM-EW, the number of insignificant variables drops to eight. Sue, prior 11-month returns, Rs, Tes, and the number of consecutive quarters with earnings increases (Nei) are all insignificant at the 12-month horizon.

In the value-versus-growth category, 37 out of 68 anomalies are insignificant with NYSE-VW. Debt-to-market (Dm), assets-to-market (Am), dividend yield (Dp), payout yield (Op), and net debt-to-price (Ndp) are insignificant in both annual sorts and monthly sorts with the 1-, 6-, and 12-month horizons. Net payout yield (Nop) and enterprise book-to-price (Ebp) are significant in annual sorts, but not in monthly sorts at any horizon. Both five-year sales growth rank and annual sales growth are insignificant in annual sorts. With ABM-EW, the number of insignificant anomalies drops to 30. Dm, Am, and Dp are still insignificant in annual sorts and monthly sorts at all horizons, and analysts' earnings forecasts-to-price (Efp), Ebp, and Ndp are insignificant in all monthly sorts.

In the investment category, 11 out of 38 anomalies are insignificant with NYSE-VW, including three-year investment growth (3Ig), total accruals (Ta), change in book equity (dBe), net external financing (Nxf), and net equity financing (Nef). With ABM-EW, only two anomalies are insignificant, change in non-current operating liabilities (dNcl) and change in short-term investments (dSti).

In the profitability category, 45 out of 78 anomalies are insignificant with NYSE-VW. The high-minus-low decile formed on operating profits-to-book equity (Ope, the sorting variable underlying RMW) earns an average return of only 0.25% ($t = 1.2$). The high-minus-low decile on operating profits-to-book assets (Opa, Ball, Gerakos, Linnainmaa, and Nikolaev 2015a) earns an average return of 0.37% ($t = 1.87$). The high-minus-low decile on the fundamental score (F, Piotroski 2000) has an average return of only 0.29% ($t = 1.06$). Profit margin, O-score, Z-score, and book leverage (Bl) are insignificant in both annual sorts and monthly sorts at all holding periods. With ABM-EW, the number of insignificant profitability anomalies drops to 31. Ope, Opa, and F become significant (Table 7), but Z-score and Bl are still insignificant in both annual and monthly sorts.

In the intangibles category, 74 out of 100 anomalies are insignificant with NYSE-VW, and 71 are insignificant with ABM-EW. In both sets of testing deciles, R&D-to-sales (Rds), firm age (Age), analysts coverage (Ana), asset tangibility (Tan), cash flow volatility (Vcf), asset liquidity scaled by book assets (Ala), cash-to-assets (Cta), dispersion of analysts' earnings forecasts (Dis), dispersion in analysts' long-term growth forecasts (Dlg), and disparity between short- and long-term earnings growth forecasts (Dls) are insignificant in monthly sorts at all horizons. Corporate governance (Gind) and accrual quality (Acq) are insignificant in annual sorts in both sets of testing deciles.

Most surprisingly, 89 out of 96 trading frictions variables (or 93%) are insignificant with NYSE-VW, and 80 (or 83%) are insignificant with ABM-EW. Insignificant anomalies in both sets of testing deciles include total volatility (Tv), all versions of idiosyncratic volatilities (Iv, Ivc, Ivff, and Ivq), share turnover (Tur) and its coefficient of variation (Cvt), the coefficient of variation for dollar trading volume (Cvd), share price (Pps), prior 1-month turnover-adjusted number of zero daily trading volume (Lm^1), coskewness (Cs), downside beta (β^-), tail risk (Tail), all versions of liquidity betas (illiquidity-illiquidity, β^{lcc}, return-illiquidity, β^{lrc}, illiquidity-return, β^{lcr}), two versions of the bid-ask spread (Shl and Sba), and leverage beta (β^{Lev}). Total skewness (Ts), different versions of idiosyncratic skewness (Isc, Isff, and Isq), and maximum daily return (Mdr) are also mostly insignificant. Short-term reversal (Srev) is significant with ABM-EW, but not with NYSE-VW.

In particular, all nine Acharya-Pedersen (2005) liquidity betas are insignificant. With NYSE-VW, the average returns of their high-minus-low deciles vary from -0.05% to 0.34% per month, and all but one are within 1.5 standard errors from zero. With ABM-EW, the average returns vary from 0.01% to 0.17%, all of which are within 1.5 standard errors from zero. Similarly, the Adrian-Etula-Muir (2014) leverage beta is also insignificant. Across the 1-, 6-, and 12-month horizons, the high-minus-low decile earns on average 0.43%, 0.3%, and 0.25% ($t = 1.78$, 1.31, and 1.15) with NYSE-VW, and 0.32%, 0.27%, and 0.24% ($t = 1.62$, 1.37, and 1.24) with ABM-EW, respectively.

In sum, microcaps impact greatly on the magnitude of anomalies. Although most of the 437 variables have shown significance in the prior literature, controlling for microcaps yields more than one half of the anomalies insignificant at the 5% level. Most important, a vast majority of trading frictions variables (about 90%), including many prominent liquidity variables, is insignificant. However, with microcaps controlled for, the broad cross section features robust cross-sectional predictability patterns, including 161 anomalies significant at the 5% level with NYSE-VW and 216 with ABM-EW. Even after applying the stringent cutoff t-value of three from Harvey, Liu, and Zhu (2016), we still count 67 significant anomalies with NYSE-VW and 122 with ABM-EW. While emphasizing the hidden danger of microcaps, our largest-to-date replication evidence counteracts Harvey et al.'s conclusion that most findings in the anomalies literature are likely false.

4 Explaining Anomalies in the Broad Cross Section

We turn our attention to significant anomalies in the broad cross section. To be inclusive, we use the conventional t-value of 1.96 for significance (the results with the cutoff t-value of three are a subset of our reported results). We discuss the overall performance of factor models in Section 4.1, and report factor regressions, including alphas in Section 4.2 as well as betas in Section 4.3.

4.1 Overall Performance

We examine six return factor models, including the CAPM, the Fama-French (1993) three-factor model, the Carhart (1997) model, the Pastor-Stambaugh (2003) model, the Fama-French (2015) five-factor model, and the q-factor model. We use four measures of overall performance, including the average magnitude of the high-minus-low alphas, the number of significant high-minus-low alphas at the 5% level, the mean absolute alpha across all the anomaly deciles, and the number of the sets of anomaly deciles across which a factor model is rejected by the GRS test.

From Panel A of Table 5, across the 161 significant anomalies with NYSE-VW, the average magnitude of the high-minus-low alphas is 0.26% per month in the q-factor model, in contrast to 0.36% in the Carhart model and 0.37% in the five-factor model. The number of significant high-minus-low alphas is 46 in the q-factor model, which is lower than 84 in the five-factor model and 94 in the Carhart model. The mean absolute alpha across all the deciles is 0.122% in the q-factor model, in contrast to 0.126% in the Carhart model and 0.13% in the five-factor model. Finally, the number of rejections by the GRS test is 107 in the q-factor model, 108 in the five-factor model, and 119 in the Carhart model.

From Panel B, across the 216 significant anomalies with ABM-EW, the average magnitude of the high-minus-low alphas is 0.26% per month in the q-factor model, which is lower than 0.38% in the five-factor model and 0.42% in the Carhart model. The number of significant high-minus-low alphas is 66 in the q-factor model, which is lower than 128 in the five-factor model and 154 in the Carhart model. However, the five-factor model has the lowest mean absolute alpha across all the testing deciles, 0.115%, in contrast to 0.145% in the q-factor model and 0.171% in the Carhart model. The number of rejections by the GRS test is also lowest in the five-factor model, 151, in contrast to 172 in the q-factor model and 183 in the Carhart model.

In the descending ranking of overall performance, the next models are the three-factor model and the Pastor-Stambaugh model. Surprisingly, the Pastor-Stambaugh liquidity factor adds little explanatory power in the broad cross section. Across the 161 significant anomalies with NYSE-

VW, the three-factor and Pastor-Stambaugh models have the identical average magnitude of the high-minus-low alphas, 0.49% per month, and the same mean absolute alpha, 0.144%. Adding the liquidity factor reduces the number of significant high-minus-low alphas slightly from 116 to 113, and the number of rejections by the GRS test from 128 to 126. Across the 216 significant anomalies with ABM-EW, the two models have similar magnitudes of the high-minus-low alphas, 0.55–0.56%, and the same mean absolute alpha, 0.142%. Adding the liquidity factor reduces the number of significant high-minus-low alphas from 185 to 184, and the number of rejections by the GRS test from 173 to 172. In all, the evidence is consistent with Table 4, which shows that a vast majority of trading frictions variables are insignificant in the broad cross section.

Not surprisingly, the CAPM is ranked at the bottom. The average magnitude of the high-minus-low alphas is 0.56% per month with NYSE-VW, and 0.67% with ABM-EW. Across the two sets of testing deciles, almost all the anomalies with significant high-minus-low average returns also have significant CAPM alphas, 152 out of 161 (or 94%) and 212 out of 216 (or 98%), respectively. As such, using the significance of the CAPM alphas for the high-minus-low deciles to select significant anomalies would yield largely similar results as using the significant of average returns as the yardstick.

4.1.1 Performance by Category

Across different categories, the q-factor model outperforms the five-factor model in explaining momentum and profitability anomalies. The two models are largely comparable in the investment, intangibles, and trading frictions categories, but the five-factor model has an edge in the value-versus-growth category. In the momentum category, with NYSE-VW, the average magnitude of the winner-minus-loser alphas across the 37 significant anomalies is 0.26% per month in the q-factor model, which is lower than 0.3% in the Carhart model and 0.65% in the five-factor model. The number of significant alphas is nine in the q-factor model, which is even lower than 18 in the Carhart model that includes UMD as an explanatory factor. Almost all the alphas, 35 out of 37, in the five-factor model are significant. The mean absolute alpha across all the momentum deciles is

0.11% in the q-factor model, which is close to 0.109% in the Carhart model, but lower than 0.16% in the five-factor model. The number of rejections by the GRS test is 25 in the q-factor model, which is close to 27 in the Carhart model, but lower than 35 in the five-factor model.

With ABM-EW, the average magnitude of the winner-minus-loser alphas across the 50 significant anomalies is 0.28% per month in the q-factor model, in contrast to 0.31% in the Carhart model and 0.61% in the five-factor model. The number of significant alphas is 14 in the q-factor model, which is lower than 27 in the Carhart model and 44 in the five-factor model. The mean absolute alpha across all the deciles is 0.133% in the q-factor model, which is lower than 0.14% in the Carhart model and 0.155% in the five-factor model. The number of rejections by the GRS test is 37 in the q-factor model, in contrast to 34 in the Carhart model and 43 in the five-factor model.

In the value-versus-growth category, the average magnitude of the high-minus-low alphas across the 31 significant anomalies with NYSE-VW is 0.23% per month in the q-factor model and 0.25% in the Carhart model, but only 0.13% in the five-factor model. The number of significant high-minus-low alphas is six in the q-factor model and ten in the Carhart model, but only two in the five-factor model. The five-factor model also has the lowest mean absolute alpha, 0.093%, in contrast to 0.121% in the q-factor model and 0.118% in the Carhart model, as well as the lowest number of rejections by the GRS test, ten, in contrast to 18 in the q-factor model and 15 in the Carhart model. The relative performance of the q-factor model improves with ABM-EW. Across the 38 significant anomalies, the average magnitude of the high-minus-low alphas is 0.19%, which is close to 0.18% in the five-factor model, and lower than 0.36% in the Carhart model. The number of significant alphas is only two in the q-factor model, but seven in the five-factor model and 22 in the Carhart model.

In the investment category, the average magnitude of the high-minus-low alphas across the 27 significant anomalies with NYSE-VW is 0.19% per month in the q-factor model, which is lower than 0.22% in the five-factor model and 0.28% in the Carhart model. Seven high-minus-low alphas are significant in the q-factor model, in contrast to 11 five-factor alphas, and 17 Carhart alphas.

The mean absolute alphas across the deciles are largely comparable: 0.099% in the q-factor model, 0.09% in the five-factor model, and 0.115% in the Carhart model. The number of rejections by the GRS test is 17 in the q-factor model, which is close to 16 in the five-factor model, but lower than 24 in the Carhart model. The evidence with ABM-EW is largely similar. The average magnitude of the high-minus-low alphas is lower in the q-factor model than the five-factor model, 0.28% versus 0.35%, but the mean absolute alpha is higher, 0.136% versus 0.094%.

In the profitability category, the average magnitude of the high-minus-low alphas across the 33 significant anomalies with NYSE-VW is 0.23% per month in the q-factor model, which is lower than 0.39% in the five-factor model and 0.52% in the Carhart model. The number of significant high-minus-low alphas is nine in the q-factor model, in contrast to 23 in the five-factor model and 29 in the Carhart model. The mean absolute alpha across the deciles is also the lowest in the q-factor model, 0.121%, in contrast to 0.139% in the Carhart model and 0.161% in the five-factor model. The number of rejections by the GRS test is 20 in the q-factor model, which is lower than 26 in the five-factor model and 30 in the Carhart model. With ABM-EW, the average magnitude of the high-minus-low alphas across 47 significant anomalies is 0.22%, in contrast to 0.37% in the five-factor model and 0.55% in the Carhart model. The number of significant high-minus-low alphas is 11 in the q-factor model, in contrast to 27 in the five-factor model and 39 in the Carhart model. However, the mean absolute alpha is 0.141% in the q-factor model, which is higher than 0.116% in the five-factor model, but lower than 0.18% in the Carhart model. The number of rejections by the GRS test is 38 in the five-factor model, which is lower than 42 in the q-factor model and 45 in the Carhart model.

The q-factor and five-factor models are largely comparable in the remaining categories. The average magnitude of the high-minus-low alphas across the 26 significant intangibles anomalies with NYSE-VW is 0.41% per month, which is close to 0.39% in the five-factor model, but lower than 0.49% in the Carhart model. This average magnitude is higher in the q-factor model than the five-factor model across the seven trading frictions anomalies with NYSE-VW, 0.24% versus 0.2%, but lower across the 16 significant anomalies with ABM-EW, 0.12% versus 0.18%. However, the five-factor model has a mean absolute alpha of only 0.08% across the 16 deciles, in contrast to 0.152% in the q-factor model, although the difference is smaller, 0.081% versus 0.102%, with NYSE-VW.

4.2 Alphas

We detail factor regressions, with this subsection on alphas, and the next subsection on betas. Table 6 shows, for the 161 significant anomalies with NYSE-VW, the high-minus-low alphas and their t-statistics, as well as mean absolute alphas across a given set of deciles and the corresponding GRS p-values. Table 7 reports the results for the 216 significant anomalies with ABM-EW. To save space, we restrict the scope of our discussion to the two best performing models, which are the q-factor and five-factor models. For momentum, we also discuss the Carhart model.

4.2.1 Momentum

Columns 1–37 in Table 6 present the results for the 37 significant momentum anomalies with NYSE-VW, and columns 1–50 in Table 7 for the 50 significant variables with ABM-EW. The q-factor model outperforms the Carhart model, which in turn outperforms the five-factor model in this category.

For standarized unexpected earnings (Sue) with NYSE-VW, the average return of the high-minus-low decile is significant only at the 1-month horizon (Sue1), 0.47% per month ($t = 3.42$). The q-factor model captures this average return, with a tiny alpha of 0.05% ($t = 0.4$). In contrast, the Carhart alpha is 0.43% ($t = 3.61$), and the five-factor alpha is 0.51% ($t = 3.69$). With ABM-EW, both Sue1 and Sue6 are significant, with average returns of 0.84% ($t = 6.31$) and 0.4% ($t = 3.59$), respectively. The q-model alphas are 0.37% ($t = 3.5$) and 0.00% ($t = 0.03$), which are smaller than the Carhart alphas of 0.74% ($t = 6.21$) and 0.36% ($t = 3.6$), and the five-factor alphas of 0.84% ($t = 6.73$) and 0.43% ($t = 4.06$), respectively. However, all the models are still rejected by the GRS test.

For prior 6-month returns at the 1-, 6-, and 12-month horizons ($R^6 1$, $R^6 6$, and $R^6 12$), the winner-minus-loser average returns with NYSE-VW are significant, 0.6%, 0.82%, and 0.55% per month ($t = 2.04$, 3.49, and 2.9), respectively. The Carhart alphas are -0.26%, 0.08%, and 0.09%

($t = -1.31, 0.79$, and 0.9), and the q-factor alphas are -0.04%, 0.24%, and 0.16% ($t = -0.1$, 0.78, and 0.75), in contrast to the large and significant five-factor alphas, 0.73%, 0.97%, and 0.77% ($t = 2.11$, 3.5, and 3.93), respectively. With ABM-EW, the average returns are 1.06%, 0.91%, and 0.56%, all of which are significant. The Carhart alphas are 0.18%, 0.04%, and 0.01%, and the q-factor alphas are 0.38%, 0.08%, and 0.01%, all of which are within one standard error from zero. In contrast, the five-factor alphas are 1.13%, 0.91%, and 0.68% ($t = 3.26$, 2.8, and 2.91), respectively.

Several alternative measures of earnings momentum deliver stronger results than the more popular Sue, including cumulative abnormal returns around earnings announcement (Abr), revisions in analysts' earnings forecasts (Re), and change in analysts' forecasts (dEf).[5] At the 1-month horizon, the winner-minus-loser average returns from sorting on Abr, Re, and dEf with NYSE-VW are 0.74%, 0.81%, and 1.03% per month ($t = 5.85$, 3.28, and 4.65), respectively. the Carhart alphas are 0.63%, 0.52%, 0.76% ($t = 4.62$, 2.61, and 3.85), the q-factor alphas 0.66%, 0.11%, and 0.64% ($t = 4.49$, 0.45, and 2.81), and the five-factor alphas 0.85%, 0.88%, and 1.22% ($t = 6.12$, 3.46, and 5.23), respectively. With ABM-EW, the winner-minus-loser average returns are 0.95%, 0.76%, and 1.2% ($t = 8.67$, 4.01, and 6.23), the Carhart alphas 0.87%, 0.45%, and 0.98% ($t = 8.6$, 2.66, and 5.81), the q-factor alphas 0.85%, 0.24%, and 0.95% ($t = 5.66$, 1.43, and 4.54), and the five-factor alphas 1.01%, 0.82%, and 1.37% ($t = 8.13$, 4.53, and 6.57), respectively.

We also examine several new momentum variables, including customer momentum (Cm) (Cohen and Frazzini 2008), as well as supplier industries momentum (Sim) and customer industries momentum (Cim) (Menzly and Ozbas 2010). At the 1-month horizon, the high-minus-low deciles formed on Cm, Sim, and Cim earn average returns of 0.79%, 0.77%, and 0.78% per month ($t = 3.74$, 3.37, and 3.45) with NYSE-VW, and 0.53%, 1.15%, and 1% ($t = 2.78$, 5.24, and 4.12) with ABM-EW, respectively. The Carhart alphas are 0.76%, 0.51%, and 0.65% ($t = 2.98$, 2.19, and 2.98) with NYSE-VW, and 0.43%, 0.99%, and 0.8% ($t = 1.94$, 4.3, and 3.5) with ABM-EW, the q-factor

[5] dEf is the month-to-month change in the consensus mean forecast of earnings per share, whereas Re is the 6-month moving average of prior changes in analysts' earnings forecasts scaled by share price (see Appendix B for details).

alphas 0.72%, 0.54%, and 0.64% (t = 2.75, 1.65, and 2.29) with NYSE-VW, and 0.38%, 0.95%, and 0.87% (t = 1.48, 2.76, and 2.53) with ABM-EW, and the five-factor alphas 0.82%, 0.81%, and 0.76% (t = 3.52, 2.76, and 2.99) with NYSE-VW, and 0.53%, 1.17%, and 1.06% (t = 2.38, 3.98, and 3.45) with ABM-EW, respectively. However, the average returns are more than halved, once the horizon extends to 6-month, and are further weakened at the 12-month.

4.2.2 Value-versus-growth

Columns 38–68 in Table 6 report the results for the 31 significant value-versus-growth anomalies with NYSE-VW, and columns 51–88 in Table 7 for the 38 significant anomalies with ABM-EW.

The high-minus-low book-to-market (Bm) decile earns an average return of 0.59% per month (t = 2.84) with NYSE-VW and 0.74% (t = 3.24) with ABM-EW. The q-factor and five-factor alphas are 0.18% (t = 1.15) and 0.01% (t = 0.12) with NYSE-VW, as well as 0.08% (t = 0.37) and 0.01% (t = 0.08) with ABM-EW, respectively.

In addition to annual sorts commonly applied to the value-versus-growth anomalies, we also perform monthly sorts on quarterly variables, such as earnings-to-price, cash flow-to-price (Cp^{q}), (net) payout yield, enterprise multiple, and sales-to-price (Sp^{q}). The q-factor model underperforms the five-factor model in explaining the Cp^{q} effect with NYSE-VW. At the 1-, 6-, and 12-month, the average returns of the high-minus-low decile are 0.69%, 0.55%, and 0.45% per month (t = 3.25, 2.77, and 2.44), the q-factor alphas 0.5%, 0.38%, and 0.22% (t = 2.27, 1.98, and 1.24), but the five-factor alphas only 0.17%, 0.07%, and −0.04%, respectively, all of which are within one standard error from zero. With ABM-EW, the average returns are 0.83%, 0.53%, and 0.54% (t = 3.49, 2.38, and 2.62), the q-factor alphas 0.43%, 0.14%, and 0.07% (t = 1.54, 0.56, 0.31), and the five-factor alphas 0.14%, −0.11%, and −0.1% (t = 0.78, −0.71, and −0.82), respectively.

For most of the other value-minus-growth anomalies, the performance of the q-factor model is largely comparable with that of the five-factor model. For example, with NYSE-VW, the average returns of the high-minus-low Sp^{q} decile at the 1-, 6-, and 12-month horizons are 0.61%, 0.58%, and

0.55% per month ($t = 2.39$, 2.43, and 2.49), the q-factor alphas 0.21%, 0.15%, and 0.06% ($t = 0.7$, 0.59, and 0.28), and the five-factor alphas −0.2%, −0.23%, and −0.22% ($t = -0.98$, −1.33, and −1.52), respectively. With ABM-EW, the average returns are 0.77%, 0.67%, and 0.64% ($t = 2.53$, 2.37, and 2.35), the q-factor alphas −0.02%, −0.16%, and −0.27% ($t = -0.05$, −0.53, and −0.98), and the five-factor alphas −0.39%, −0.46%, and −0.48% ($t = -1.83$, −2.69, and −3.2), respectively.

4.2.3 Investment

Columns 69–95 in Table 6 report the results for the 27 significant investment anomalies with NYSE-VW, and columns 89–124 in Table 7 for the 36 significant anomalies with ABM-EW.

The high-minus-low decile formed on abnormal corporate investment (Aci, Titman, Wei, and Xie 2004) earns on average −0.31% per month ($t = -2.2$) with NYSE-VW and −0.31% ($t = -3.64$) with ABM-EW. The q-factor and five-factor alphas are −0.17% per month ($t = -1.05$) and −0.31% ($t = -2.05$) with NYSE-VW, as well as −0.12% ($t = -1.27$) and −0.24% ($t = -2.72$) with ABM-EW, respectively. The high-minus-low decile on composite equity issuance (Cei, Daniel and Titman 2006) earns an average return of −0.56% ($t = -3.16$) with NYSE-VW and −0.67% ($t = -4.09$) with ABM-EW. The q-factor and five-factor alphas are −0.24% ($t = -1.85$) and −0.25% ($t = -2.4$) with NYSE-VW, as well as −0.31% ($t = -2.4$) and −0.47% ($t = -4.35$) with ABM-EW, respectively.

Neither of the models explains the operating accruals anomaly (Oa, Sloan 1996). The high-minus-low average return is −0.27% per month ($t = -2.13$) with NYSE-VW and −0.28% ($t = -2.27$) with ABM-EW. The q-factor and five-factor alphas are −0.54% ($t = -3.77$) and −0.52% ($t = -4.06$) with NYSE-VW and −0.5% ($t = -3.82$) and −0.47% ($t = -4.36$) with ABM-EW, respectively. The models do better for percent operating accruals (Poa, Hafzalla, Lundholm, and Van Winkle 2011), in which accruals are scaled by absolute earnings. The high-minus-low Poa decile earns an average return of −0.4% ($t = -2.85$) with NYSE-VW and −0.41% ($t = -3.75$) with ABM-EW. The q-factor and five-factor alphas are −0.07% ($t = -0.57$) and −0.11% ($t = -0.95$) with NYSE-VW and −0.15% ($t = -1.54$) and −0.24% ($t = -2.8$) with ABM-EW, respectively.

4.2.4 Profitability

Columns 96–128 in Table 6 report factor regressions for the 33 significant profitability anomalies with NYSE-VW, and columns 125–171 in Table 7 for the 47 significant anomalies with ABM-EW.

Sorting on the change in return on equity (dRoe, current Roe minus four-quarter-lagged Roe) yields more precise average returns than sorting on the Roe level. At the 1-, 6-, and 12-month, the high-minus-low dRoe decile earns average returns of 0.76%, 0.39%, and 0.27% per month ($t = 5.43$, 3.28, and 2.57) with NYSE-VW, and 0.87%, 0.44%, and 0.24% ($t = 6.6$, 4.03, and 2.62) with ABM-EW, respectively. In contrast, across the three horizons, the high-minus-low Roe decile earns on average 0.69%, 0.42%, and 0.24% ($t = 3.07$, 1.95, and 1.19) with NYSE-VW, and 0.97%, 0.66%, and 0.35% ($t = 4.53$, 3.39, and 1.84), respectively. We interpret the evidence as indicating earnings seasonality. Sorting on the fourth-quarter Roe change controls for seasonality, and likely better captures the underlying economic profitability than the Roe level.

The high-minus-low decile on gross profits-to-current assets (Gpa) earns significant average returns of 0.38% per month ($t = 2.62$) with NYSE-VW and 0.62% ($t = 3.52$) with ABM-EW. Both the q-factor and five-factor models capture the average returns. However, Table 4 shows that sorting on gross profits-to-lagged assets (Gla) yields insignificant average returns of 0.16% ($t = 1.04$) with NYSE-VW and 0.29% ($t = 1.85$) with ABM-EW. Intuitively, the gross profits-to-current assets ratio equals the gross profits-to-lagged assets ratio divided by asset growth (current assets-to-lagged assets). As such, the Gpa effect is mixed with a hidden investment effect, and once the hidden effect is purged, the remaining Gla effect is insignificant.

Which deflator should be used to scale economic profits, lagged or current assets? Economic logic would imply that profits should be scaled by one-period-lagged assets. Intuitively, profits are generated by one-period-lagged assets. Contemporaneous assets at the end of the period are accumulated via the investment process over the course of the current period. Under, for instance, one-period time-to-build, current assets can start to generate profits only at the end of the period.

The q-factor model outperforms the five-factor model for profitability anomalies. At the 1-, 6-, and 12-month, the high-minus-low quarterly F-score ($\mathrm{F^q}$) decile earns average returns of 0.58%, 0.53%, and 0.42% per month ($t = 2.47$, 2.52, and 2.22) with NYSE-VW and 0.93%, 0.7%, and 0.54% ($t = 3.82$, 3.29, and 2.75) with ABM-EW, respectively. The q-factor alphas are 0.13%, 0.15%, and 0.07% ($t = 0.58$, 0.86, and 0.49) with NYSE-VW and 0.41%, 0.16%, and 0.01% ($t = 1.98$, 0.92, and 0.04) with ABM-EW. The five-factor alphas are 0.39%, 0.39%, and 0.3% ($t = 1.72$, 2.25, and 2.16) with NYSE-VW and 0.7%, 0.47%, and 0.32% ($t = 3.69$, 2.99, and 2.33) with ABM-EW, respectively.

4.2.5 Intangibles and Trading Frictions

Columns 129–154 in Table 6 report the results for the 26 significant intangibles anomalies with NYSE-VW, and columns 172–200 in Table 7 for the 29 significant anomalies in the same category for ABM-EW. The remaining columns in both tables report significant trading frictions anomalies.

The q-factor model underperforms the five-factor model in capturing the R&D-to-market (Rdm) anomaly. In annual sorts, the high-minus-low decile earns on average 0.68% per month ($t = 2.58$) with NYSE-VW and 1% ($t = 3.99$) in ABM-EW. The q-factor alpha is 0.7% ($t = 2.89$) with NYSE-VW, in contrast to the five-factor alpha of 0.46% ($t = 1.93$). The q-factor alpha is 0.9% ($t = 3.23$) with ABM-EW, which is still higher than 0.8% ($t = 3.28$) for the five-factor alpha. The underperformance is starker in monthly sorts on quarterly R&D-to-market ($\mathrm{Rdm^q}$). At the 1-, 6-, and 12-month horizons, the high-minus-low decile earns average returns of 1.19%, 0.83%, and 0.83% ($t = 2.93$, 2.12, and 2.32) with NYSE-VW, respectively. The q-factor alphas are 1.47%, 0.97%, and 0.8% ($t = 2.97$, 2.73, and 2.8), whereas the five-factor alphas are 0.85%, 0.57%, and 0.5% ($t = 2.05$, 1.67, and 1.73), respectively. The results with ABM-EW are largely similar.

All the factor models fail to capture the Heston-Sadka (2008) seasonality anomalies. At the beginning of each month t, we split stocks into deciles based on various measures of past performance, including returns in month $t{-}12$ (R_{a}^{1}), average returns across months $t{-}24, t{-}36, t{-}48$, and $t{-}60$ ($R_{\mathrm{a}}^{[2,5]}$), average returns across months $t{-}72, t{-}84, t{-}96, t{-}108$, and $t{-}120$ ($R_{\mathrm{a}}^{[6,10]}$), average returns across months $t-132, t-144, t-156, t-168$, and $t-180$ ($R_{\mathrm{a}}^{[11,15]}$), and average returns across months $t-192, t-204, t-216, t-228$, and $t-240$ ($R_{\mathrm{a}}^{[16,20]}$). Monthly decile returns are calculated for the current month t, and the deciles are rebalanced at the beginning of month $t+1$.

With NYSE-VW, the average returns of the high-minus-low deciles formed on R_{a}^{1}, $R_{\mathrm{a}}^{[2,5]}$, $R_{\mathrm{a}}^{[6,10]}$, $R_{\mathrm{a}}^{[11,15]}$, and $R_{\mathrm{a}}^{[16,20]}$ are 0.65%, 0.69%, 0.83%, 0.67%, and 0.56% per month ($t = 3.23$, 4, 4.91, 4.66, and 3.29), the q-factor alphas 0.55%, 0.81%, 1.13%, 0.65%, and 0.64% ($t = 2.48$, 3.9, 4.88, 3.6, and 3.14), and the five-factor alphas 0.65%, 0.73%, 1.05%, 0.73%, and 0.61% ($t = 3.35$, 3.93, 5.22, 4.07, and 3.67), respectively. With ABM-EW, the average returns are 0.6%, 0.54%, 0.65%, 0.44%, and 0.49% ($t = 3.4$, 4.04, 5.77, 4.09, and 4.5), the q-factor alphas 0.51%, 0.73%, 0.82%, 0.37%, and 0.59% ($t = 2.89$, 4.76, 5.05, 2.74, and 4.6), and the five-factor alphas 0.64%, 0.64%, 0.74%, 0.43%, and 0.53% ($t = 3.75$, 4.55, 5.53, 3.39, and 4.66), respectively.

Finally, the q-factor model does a better job than the five-factor model in capturing several trading frictions anomalies with ABM-EW. For instance, at the 1-month horizon, the high-minus-low deciles formed on the idiosyncratic volatility per the CAPM (Ivc), the idiosyncratic volatility per the q-factor model (Ivq), and maximum daily return (Mdr) earn average returns of -0.69%, -0.63%, and -0.67% per month ($t = -2.1$, -1.97, and -2.22), respectively. The q-factor alphas are -0.14%, -0.08%, and -0.18% ($t = -0.69$, -0.42, and -0.86), whereas the five-factor alphas -0.34%, -0.27%, and -0.31% ($t = -2.28$, -1.97, and -2.32), respectively.

4.3 Betas

To shed light on the driving forces behind the model performance, we examine factor loadings (betas). Table 8 reports their factor loadings for the 161 significant anomalies with NYSE-VW, and Table 9 for the 216 significant anomalies with ABM-EW.

4.3.1 Momentum

Columns 1–37 in Table 8 report the factor loadings for the 37 significant momentum anomalies with NYSE-VW, and columns 1–50 in Table 9 for the 50 significant anomalies with ABM-EW.

The ROE factor is the main source of the q-factor model's success in capturing momentum. With NYSE-VW, 35 out of 37 winner-minus-loser deciles have positive ROE-factor loadings, and the two negative loadings are tiny and insignificant. The average loading is 0.57. All but three of the positive loadings are significant, including 28 with t-statistics above three. In contrast, the investment-factor loadings are generally small, on average only -0.029, with mixed signs, and most (29) are insignificant. With ABM-EW, the ROE-factor loadings are all positive, with an average of 0.56. Most (45 out of 50) loadings are significant, including 41 with t-statistics above three. In contrast, the investment-factor loadings are again small, with an average of -0.015, and 39 are insignificant.

The RMW loadings of the winner-minus-loser deciles are generally small, and mostly insignificant, rendering the five-factor model ineffective in explaining momentum. With NYSE-VW, only eight out of 37 loadings are significantly positive, and 12 are negative. The average loading is only 0.1. With ABM-EW, 15 out of 50 loadings are significantly positive, and 15 are negative, albeit insignificant. The average is 0.15. Intuitively, formed monthly on the latest announced quarterly earnings, the ROE factor is more powerful in capturing the expected profitability differences between winners and losers. In contrast, formed annually on earnings from the last fiscal year end, RMW is weak. The evidence echoes Table 4, which reports insignificant average returns for the high-minus-low decile formed on the sorting variable underlying RMW (operating profits-to-book equity, Ope).

Two specific examples are in order. First, with NYSE-VW, the high-minus-low Sue1 decile has a large ROE-factor loading of 0.86 ($t = 11.24$), in contrast to the RMW loading of 0.47 ($t = 3.9$). The investment-factor loading is only -0.09 ($t = -0.95$). With ABM-EW, the ROE-factor loading is 0.89 ($t = 14.01$), which is higher than the RMW loading of 0.48 ($t = 6.96$). The investment-factor loading is -0.05 ($t = -0.8$). Second, the high-minus-low decile on $R^6 6$ (prior 6-month returns, with the 6-month holding period) with NYSE-VW has an ROE-factor loading of 0.99 ($t = 5.33$), in contrast to the RMW loading of 0.09 ($t = 0.37$). The investment-factor loading is tiny, -0.01 ($t = -0.04$). With ABM-EW, the ROE-factor loading is 1.19 ($t = 4.98$), which is higher than the RMW loading of 0.23 ($t = 0.69$). The investment-factor loading is only 0.1 ($t = 0.33$).

4.3.2 Value-versus-growth

Columns 38–68 in Table 8 report the loadings for the 31 significant value-minus-growth anomalies with NYSE-VW, and columns 51–88 in Table 9 for the 38 significant variables with ABM-EW.

The investment factor is the main source of the q-factor model's explanatory power for the value-versus-growth anomalies. All 31 high-minus-low deciles with NYSE-VW and all 38 with ABM-EW have investment-factor loadings that go in the right direction in explaining average returns. In particular, all the value-minus-growth deciles have significantly positive loadings on the low-minus-high investment factor. Intuitively, value firms invest less than growth firms in the data. All the loadings have t-statistics with magnitudes above three. The average magnitude of the loadings is 1.01 with NYSE-VW, and 1.24 with ABM-EW. In contrast, the ROE-factor loadings often go in the wrong direction in capturing average returns, and many (18 with NYSE-VW and 12 with ABM-EW) are significant. Intuitively, value firms are less profitable than growth firms in the data. More important, however, the investment-factor loadings dominate the ROE-factor loadings quantitatively, allowing the q-factor model to fit the value-minus-growth anomalies.

In particular, the high-minus-low book-to-market decile has an investment-factor loadings of 1.33 ($t = 3.09$), in contrast to an ROE-factor loading of -0.55 ($t = -6.64$) with NYSE-VW. With ABM-EW, the two loadings are 1.78 ($t = 8.62$) and -0.13 ($t = -0.76$), respectively. Also, the strong ROE-factor loadings of the high-minus-low quarterly cash flow-to-price deciles are the source of the q-factor model's underperformance with NYSE-VW. At the 1-, 6-, and 12-month, these loadings are -0.61, -0.56, and -0.45 ($t = -4.3$, -4.7, and -4.16), despite their strong investment-factor loadings of 0.99, 0.97,and 1.01 ($t = 6.12$, 6.74, and 7.57), respectively. With

ABM-EW, the ROE-factor loadings are weaker, -0.17, -0.13, and -0.04 ($t = -0.87$, -0.72, and -0.23), but the investment-factor loadings remain strong, 1.22, 1.22, and 1.25 ($t = 5.73$, 5.96, and 6.71), respectively. As such, the q-factor model's underperformance largely vanishes.

Not surprisingly, the value factor, HML, is the main source of the five-factor model's power in fitting the value-versus-growth anomalies. All the value-minus-growth deciles have significantly positive HML loadings. All but two loadings with NYSE-VW and all the loadings with ABM-EW have t-statistics above three, and many are highly significant. The investment factor, CMA, also helps, but its loadings are often insignificant, and their signs can be opposite to the HML loadings.

4.3.3 Investment

Columns 69–95 in Table 8 report the loadings for the 27 significant investment anomalies with NYSE-VW, and columns 89–124 in Table 9 for the 36 significant variables with ABM-EW. This category includes not only investment, but also financing, inventory, and accruals anomalies.

The investment factor is the main source of the q-factor model's explanatory power for the investment anomalies. Except for abnormal corporate investment (Aci), net operating assets (Noa), operating accruals (Oa), change in net financial assets (dFin), discretionary accruals (Dac), and percent discretionary accruals (Pda), the remaining high-minus-low deciles all have significantly negative loadings on the low-minus-high investment factor. All the remaining 21 loadings with NYSE-VW and 30 with ABM-EW have t-statistics above three. The average of the 21 loadings with NYSE-VW is -0.86, and the average of the 30 loading with ABM-EW is -0.79. Intuitively, high investment, financing, and accruals firms invest more than low investment, financing, and accruals firms. In contrast, the ROE-factor loadings have mixed signs. Even though the ROE-factor loadings can occasionally be significantly positive, going in the wrong direction in capturing average returns, their loadings are dominated by the strong investment-factor loadings.

The high-minus-low Noa decile has tiny investment-factor loadings of -0.07 ($t = -0.44$) with NYSE-VW and 0.01 ($t = 0.07$) with ABM-EW. The ROE-factor loadings are also small and insignificant. As a result, the q-factor alpha is -0.41% per month ($t = -2.24$) with NYSE-VW (Table 6), and -0.74% ($t = -3.45$) with ABM-EW (Table 7). Although often viewed as an accrual variable, Noa is a stock, not a flow variable as accruals. Taking the first difference transforms the stock into a flow variable, the change in Noa (dNoa). With NYSE-VW, the high-minus-low dNoa decile earns on average -0.53% ($t = -3.89$), the q-factor alpha is only -0.1% ($t = -0.66$), and the investment-factor loading -1.05 ($t = -9.49$). With ABM-EW, the average return is -0.74% ($t = -5.79$), the q-factor alpha -0.44% ($t = -3.55$), and the investment-factor loading -0.83 ($t = -10.06$). The five-factor model also fails to capture the Noa anomaly. The HML and CMA loadings, which are both large and significant, have opposite signs that work to offset each other. The model does better for the dNoa effect, as the CMA loading dominates the HML loading.

The high-minus-low Oa decile has only small investment-factor loadings of -0.02 ($t = -0.23$) with NYSE-VW and -0.19 ($t = -1.75$) with ABM-EW. In contrast, the ROE-factor loadings are both large and significant, 0.26 ($t = 4.13$) and 0.42 ($t = 4.88$), which go in the wrong direction in capturing average returns. The same problem also plagues the five-factor model. The high-minus-low Oa decile has small and insignificant CMA loadings of 0.04 and -0.11, but large and significant RMW loadings of 0.41 and 0.62, with NYSE-VW and ABM-EW, respectively.

The problem deepens with discretionary accruals (Dac, Xie 2001), which purges information on the sales change and property, plant, and equipment from Oa. The high-minus-low Dac decile earns average returns of -0.36% per month ($t = -2.73$) with NYSE-VW and -0.32% ($t = -3.32$) with ABM-EW. The q-factor alphas are -0.64% ($t = -4.37$) and -0.46% ($t = -4.23$), and the five-factor alphas -0.6% ($t = -4.3$) and -0.45% ($t = -5.03$), respectively. With NYSE-VW, both investment- and ROE-factor loadings go in the wrong direction, 0.23 and 0.19, respectively, both of which are significant. With ABM-EW, the investment-factor loading is close to zero, but the ROE-factor loading is still 0.22 ($t = 2.5$). The five-factor loadings paint a similar picture.

4.3.4 Profitability

Columns 96–128 in Table 8 report the loadings for the 33 significant profitability anomalies with NYSE-VW, and columns 125–171 in Table 9 for the 47 significant variables with ABM-EW.

Naturally, the ROE factor is the main source of the q-factor model's ability to fit the profitability anomalies. All but one ROE-factor loadings with NYSE-VW are highly significant, with the t-value magnitudes above five.[6] The average magnitude of the loadings is 0.73. In addition, all the ROE-factor loadings with ABM-EW are significant, with the t-value magnitudes all above four. The average magnitude of the loadings is 0.88. In the five-factor model, RMW is the main source of explanatory power. The magnitude of the RMW loadings is largely similar to that of the ROE-factor loadings. However, six RMW loadings with NYSE VW and seven with ABM-EW are insignificant.

In particular, at the 1-, 6-, and 12-month, the high-minus-low decile formed on the change in return on equity (dRoe) have ROE-factor loadings of 0.58, 0.56, and 0.52 ($t = 6.76$, 6.02, and 8.01) with NYSE-VW, and 0.54, 0.49, and 0.46 ($t = 4.79$, 6, and 9.13) with ABM-EW, respectively. In contrast, the RMW loadings are 0.02, 0.06, and 0.15 ($t = 0.19$, 0.61, and 1.92) with NYSE-VW, and 0.01, 0.02, and 0.07 ($t = 0.08$, 0.24, and 1.09) with ABM-EW, respectively. As a result, the q-factor alphas are mostly insignificant, whereas the five-factor alphas are all significant (Tables 6 and 7).

4.3.5 Intangibles and Trading Frictions

Columns 129–154 in Table 8 report the loadings for the 26 significant intangibles anomalies with NYSE-VW, and columns 172–200 in Table 9 for the 29 significant anomalies in the same category for ABM-EW. The remaining columns in both tables report significant trading frictions anomalies.

The q-factor model fails to capture the Heston-Sadka (2008) seasonality deciles because the loadings are mostly small and insignificant. With NYSE-VW, the high-minus-low deciles formed

[6]The only exception is quarterly taxable income-to-book income (Tbi^{q}12), with the 12-month holding period. With NYSE-VW, the high-minus-low decile has an ROE-factor loading of 0.05 ($t = 0.66$) and an investment-factor loading of -0.14 ($t = -2.07$). The average return is marginally significant, 0.22% per month ($t = 1.96$), the q-factor alpha 0.34% ($t = 2.93$), and the five-factor alpha 0.26% ($t = 2.33$). However, the average returns at the 1- and 6-month horizons are both insignificant. With ABM-EW, the average returns are insignificant at all horizons.

on R_{a}^{1}, $R_{\text{a}}^{[2,5]}$, $R_{\text{a}}^{[6,10]}$, $R_{\text{a}}^{[11,15]}$, and $R_{\text{a}}^{[16,20]}$ have investment-factor loadings of −0.15, −0.28, −0.37, −0.03, and −0.04 ($t = -0.97, -2.46, -2.22, -0.23$, and -0.34), as well as ROE-factor loadings of 0.18, 0.05, −0.23, 0.1, and −0.001 ($t = 1.25, 0.47, -1.97, 1.09$, and -0.01), respectively. The loadings with ABM-EW, as well as the results for the five-factor model, are largely similar. Finally, both investment- and ROE-factor loadings help explain the average returns of the high-minus-low deciles formed on Ivc, Ivq, and Mdr at the 1-month horizon with ABM-EW. Their investment-factor loadings are −1.36, −1.34, and −1.2 ($t = -7.46$, -7.62, and -6.4), and the ROE-factor loadings are −0.89, −0.85, and −0.78 ($t = -5.34$, -5.38, and -4.6), respectively.

5 Intermediary Leverage and Consumption Growth Factors

This section reports the performance of the Adrian-Etula-Muir (2014) financial intermediary leverage factor model and the Jagannathan-Wang (2007) fourth-quarter consumption growth model.

5.1 Macro Factors

Following Adrian, Etula, and Muir (2014), we construct the leverage of security broker-dealers using aggregate quarterly data on total financial assets and total financial liabilities of security broker-dealers from Table L.129 of the Federal Reserve Flow of Funds. The leverage is total financial assets/(total financial assets − total financial liabilities). The sample starts in the first quarter of 1968. The nontraded leverage factor is seasonally adjusted log changes in the level of broker-dealer leverage. The log changes are seasonally adjusted using quarterly seasonal dummies in an expanding window regression. To construct a traded leverage factor in factor regressions, we project the nontraded broker-dealer leverage factor onto the space of excess returns. We use the excess returns of the six (quarterly rebalanced) size and book-to-market portfolios, as well as the momentum factor, UMD. The data are from Kenneth French's Web site. Panel A in Table 10 reports the normalized coefficients that sum up to one. The coefficients from the 1968–2014 quarterly sample are close to those from the 1968–2009 quarterly sample reported in the Adrian et al. paper. We are able to replicate closely their coefficients and R^2 in their 1968–2009 sample. Panel A also reports the normalized coefficients with the Fama-French (1997) 17 industry portfolios as the basis assets.

Following Jagannathan and Wang (2007), we measure consumption as real per capita consumption expenditure on nondurables and services from National Income and Product Accounts (NIPA). To form a traded factor, we construct a factor mimicking portfolio by projecting the fourth-quarter consumption growth onto the excess returns of the six size and book-to-market portfolios and UMD. Jagannathan and Wang do not specify the sorting frequency of the size and book-to-market portfolios, and we use the more common annually sorted portfolios. Also, Jagannathan and Wang do not use UMD, but we add UMD because doing so helps the model's overall performance. Panel B of Table 10 reports the normalized coefficients from these characteristics-based basis assets (Panel A), as well as industry portfolios basis assets (Panel B).

Table 11 reports factor spanning tests for the macro factors. The leverage and consumption growth factors with characteristics-based basis assets earn significantly positive returns. With industry basis assets, the average returns are large, 0.61% per month for the leverage factor and 0.74% for the consumption growth factor, but are insignificant. The Carhart model cannot capture the two characteristics-based factors, but does a good job in capturing the two industry-based factors. The q-factor model cannot capture the industry-based leverage factor, with an alpha of -1.04% ($t = -2.81$). The q-factor alpha of the industry-based consumption growth factor is large, 0.75%, albeit insignificant. The q-factor model largely subsumes the two characteristics-based factors. In contrast, the five-factor model cannot capture any of the leverage and consumption growth factors.

5.2 Model Performance

Table 12 reports the performance of the leverage and consumption growth factor models. Our key finding is that their performance is very sensitive to the underlying basis assets.

In particular, for the characteristics-based leverage factor model, Panel A shows that across the 161 significant anomalies with NYSE-VW, the average magnitude of the high-minus-low alphas is 0.4% per month, the number of significant high-minus-low alphas 96, the mean absolute alpha across all the deciles 0.159%, and the number of rejections by the GRS test 69. However, when we change the basis assets to the 17 industry portfolios, the average magnitude of the high-minus-low alphas becomes 0.5%, the number of significant high-minus-low alphas 151, the mean absolute alpha 0.508%, and the number of rejections by the GRS test 147.

Panel B shows further that across the 216 significant anomalies with ABM-EW, the characteristics-based leverage model has an average magnitude of the high-minus-low alphas of 0.43%, 124 significant high-minus-low alphas, a mean absolute alpha of 0.14%, and 130 rejections by the GRS test. However, for the industry-based leverage factor model, the average magnitude of the high-minus-low alphas is 0.55%, the number of significant high-minus-low alphas 196, the mean absolute alpha 0.648%, and the number of rejections by the GRS test 215.

For the characteristics-based fourth-quarter consumption growth model, across the 161 significant anomalies with NYSE-VW, the average magnitude of the high-minus-low alphas is 0.38% per month, the number of significant high-minus-low alphas 77, the mean absolute alpha across all the deciles 0.256%, and the number of rejections by the GRS test 59. However, when we change the basis assets to the 17 industry portfolios, the average magnitude of the high-minus-low alphas becomes 0.51%, the number of significant high-minus-low alphas 156, the mean absolute alpha 0.568%, and the number of rejections by the GRS test 154.

Across the 216 significant anomalies with ABM-EW, the characteristics-based consumption growth model has an average magnitude of the high-minus-low alphas of 0.41%, 112 significant high-minus-low alphas, a mean absolute alpha of 0.187%, and 97 rejections by the GRS test. However, for the industry-based consumption growth model, the average magnitude of the high-minus-low alphas is 0.59%, the number of significant high-minus-low alphas 216 (or 100%), the mean absolute alpha 0.724%, and the number of rejections by the GRS test 216.

6 Conclusion

This paper makes two major contributions. First, compiling the largest-to-date data library with 437 anomaly variables, we conduct a gigantic replication study of asset pricing anomalies. We find that 276 anomalies (63% out of 437) with NYSE breakpoints and value-weighted returns and 221 (51%) with all-but-macro breakpoints and equal-weighted returns are insignificant at the 5% level. In particular, 80–89 (83–93% out of 96) liquidity variables are insignificant. As such, liquidity only matters in microcaps, and controlling for microcaps seems quite important in asset pricing tests.

Second, using the hundreds of remaining significant anomalies in the broad cross section, we compare the performance of a large array of empirical asset pricing models, including the CAPM, the Fama-French three-factor model, the Carhart four-factor model, the Pastor-Stambaugh four-factor model, the Jagannathan-Wang fourth-quarter consumption growth model, the Adrian-Etula-Muir intermediary leverage model, the Hou-Xue-Zhang q-factor model, and the Fama-French five-factor model. The q-factor model and the five-factor model are the two best performing models. The q-factor model performs a bit better than the five-factor model in factor spanning tests and in explaining momentum and profitability anomalies, but the five-factor model has an edge in explaining value-versus-growth anomalies. In all, economic fundamentals, such as investment and profitability, not liquidity, are the dominating driving forces in the broad cross section of average stock returns.

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Table 1 : Descriptive Statistics of the 18 Benchmark Size, I/A, and ROE Portfolios underlying the q-Factors, January 1967–December 2014, 576 Months

Size is price per share times shares outstanding. Investment-to-assets (I/A) is the annual change in total assets (Compustat annual item AT) divided by lagged total assets. ROE is income before extraordinary items (Compustat quarterly item IBQ) divided by one-quarter-lagged book equity. Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (Compustat quarterly item TXDITCQ) if available, minus the book value of preferred stock (item PSTKQ). Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the book value of preferred stock, or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity. At the end of June of each year t, we use the median NYSE size at the end of June to split NYSE, Amex, and NASDAQ stocks into two groups, small and big. Independently, at the end of June of each year t, we sort stocks into three groups using the NYSE breakpoints for the low 30%, middle 40%, and high 30% of the ranked I/A for the fiscal year ending in calendar year $t-1$. Also independently, at the beginning of each month, we sort stocks into three groups based on NYSE breakpoints for the low 30%, middle 40%, and high 30% of the ranked ROE. Earnings in Compustat quarterly files are used in the months immediately after the most recent quarterly earnings announcement dates (item RDQ). Taking the intersections of the two size, three I/A, and three ROE groups, we form 18 portfolios. Monthly value-weighted returns on the 18 portfolios are calculated for the current month, and the portfolios are rebalanced monthly. Portfolio size is the value-weighted market capitalization (in billions of dollars) across all firms in the portfolio. Portfolio I/A (in percent) is the sum of changes in assets across all firms in the portfolio divided by the sum of their one-year-lagged assets. Portfolio ROE (in percent) is the sum of quarterly earnings across all firms in the portfolio divided by the sum of their one-quarter-lagged book equity.

	Small			Big			Small			Big		
	Low ROE	2	High ROE	Low ROE	2	High ROE	Low ROE	2	High ROE	Low ROE	2	High ROE
	Mean excess returns						Size (billions of dollars)					
Low I/A	0.67	1.10	1.39	0.63	0.63	0.73	0.29	0.37	0.37	11.74	30.18	29.23
2	0.63	0.93	1.33	0.44	0.56	0.59	0.35	0.40	0.41	15.42	25.95	50.18
High I/A	−0.07	0.53	1.03	0.05	0.39	0.64	0.33	0.40	0.41	15.11	28.60	50.73
	Volatility of excess returns						I/A (percent per annum)					
Low I/A	7.33	5.61	6.35	5.55	4.45	4.71	−8.56	−6.01	−7.91	−4.54	−3.76	−4.20
2	6.34	5.19	5.71	5.24	4.26	4.31	7.26	7.66	7.83	7.02	7.44	8.09
High I/A	7.61	6.27	6.79	6.34	5.35	5.42	40.47	32.93	36.51	37.23	30.83	28.78
	Average number of firms						ROE (percent per quarter)					
Low I/A	439	171	120	43	60	41	−3.14	2.68	7.31	−0.91	2.75	6.47
2	233	219	123	54	129	98	−1.56	2.77	6.33	−0.08	2.82	6.07
High I/A	287	216	194	45	91	112	−2.84	2.83	6.50	−0.86	2.92	6.18

Table 2 : Factor Spanning Tests, January 1967 to December 2014, 576 Months

r_{ME}, $r_{\mathrm{I/A}}$, and r_{ROE} are the size, investment, ROE factors in the q-factor model, respectively. MKT is the value-weighted market return minus the one-month Treasury bill rate from CRSP. SMB, HML, RMW, and CMA are the size, value, profitability, and investment factors from the five-factor model, respectively. The data for SMB and HML in the three-factor model, SMB, HML, RMW, and CMA in the five-factor model (b, s, h, r, and c are the loadings, respectively), as well as the momentum factor UMD are from Kenneth French's Web site. LIQ is the liquidity factor from Robert Stambaugh's Web site. m is the average return, α_{C} is the Carhart alpha, α_q the q-model alpha, a is the five-factor alpha, and α_{PS} is the alpha from the four-factor model with the Fama-French three factors and LIQ. The numbers in parentheses in Panels A–D are heteroscedasticity-and-autocorrelation-adjusted t-statistics. In Panel E, the numbers in parentheses are p-values testing that a given correlation is zero. The sample when LIQ is used starts in January 1968. For all the other tests, the sample starts in January 1967.

Panel A: The Hou-Xue-Zhang q-factors

	m	α_{C}	β_{MKT}	β_{SMB}	β_{HML}	β_{UMD}	R^2
r_{ME}	0.32	0.01	0.01	0.97	0.17	0.03	0.94
	(2.42)	(0.25)	(1.08)	(67.08)	(7.21)	(1.87)	
$r_{\mathrm{I/A}}$	0.43	0.29	−0.06	−0.04	0.41	0.05	0.53
	(5.08)	(4.57)	(−4.51)	(−1.88)	(13.36)	(1.93)	
r_{ROE}	0.56	0.51	−0.04	−0.30	−0.12	0.27	0.40
	(5.24)	(5.58)	(−1.39)	(−4.31)	(−1.79)	(6.19)	
		α_{PS}	β_{MKT}	β_{SMB}	β_{HML}	β_{LIQ}	R^2
r_{ME}		0.05	0.01	0.98	0.17	−0.01	0.93
		(1.51)	(0.58)	(62.58)	(7.05)	(−1.24)	
$r_{\mathrm{I/A}}$		0.35	−0.07	−0.04	0.40	0.00	0.52
		(5.73)	(−4.63)	(−1.55)	(13.30)	(−0.22)	
r_{ROE}		0.75	−0.09	−0.33	−0.21	−0.05	0.22
		(7.61)	(−2.45)	(−6.23)	(−2.71)	(−1.47)	
	a	b	s	h	r	c	R^2
r_{ME}	0.05	0.00	0.98	0.02	−0.01	0.04	0.95
	(1.39)	(0.39)	(68.34)	(1.14)	(−0.21)	(1.19)	
$r_{\mathrm{I/A}}$	0.12	0.01	−0.05	0.04	0.07	0.82	0.84
	(3.35)	(0.73)	(−2.86)	(1.60)	(2.77)	(26.52)	
r_{ROE}	0.45	−0.04	−0.11	−0.24	0.75	0.13	0.52
	(5.60)	(−1.45)	(−2.69)	(−3.54)	(13.46)	(1.34)	

Panel B: The Fama-French five factors

	m	α_{C}	β_{MKT}	β_{SMB}	β_{HML}	β_{UMD}	R^2
SMB	0.26	−0.02	0.00	1.00	0.13	0.00	0.99
	(1.92)	(−1.24)	(0.96)	(89.87)	(8.07)	(0.11)	
HML	0.36	−0.00	0.00	−0.00	1.00	−0.00	1.00
	(2.57)	(−1.79)	(1.79)	(−1.69)	(13282.85)	(−0.87)	
RMW	0.27	0.33	−0.04	−0.28	−0.00	0.04	0.19
	(2.58)	(3.31)	(−1.32)	(−3.20)	(−0.03)	(0.81)	
CMA	0.34	0.19	−0.09	0.03	0.46	0.04	0.55
	(3.63)	(2.83)	(−4.42)	(0.86)	(13.52)	(1.51)	
		α_{PS}	β_{MKT}	β_{SMB}	β_{HML}	β_{LIQ}	R^2
SMB		−0.02	0.00	1.00	0.12	−0.01	0.99
		(−1.01)	(0.77)	(89.07)	(8.11)	(−1.08)	
HML		0.00	0.00	0.00	1.00	0.00	1.00
		(−2.04)	(1.89)	(−1.70)	(12795.89)	(1.11)	
RMW		0.34	−0.05	−0.28	−0.01	0.01	0.19
		(3.19)	(−1.38)	(−3.38)	(−0.17)	(0.34)	
CMA		0.24	−0.09	0.04	0.45	0.00	0.54
		(3.71)	(−4.13)	(0.98)	(12.77)	(−0.04)	
		α_q	β_{MKT}	β_{ME}	$\beta_{\mathrm{I/A}}$	β_{ROE}	R^2
SMB		0.05	−0.00	0.94	−0.09	−0.10	0.96
		(1.48)	(−0.17)	(62.40)	(−4.91)	(−5.94)	
HML		0.03	−0.05	0.00	1.03	−0.17	0.50
		(0.28)	(−1.33)	(0.03)	(11.72)	(−2.17)	
RMW		0.04	−0.03	−0.12	−0.03	0.53	0.49
		(0.42)	(−0.99)	(−1.78)	(−0.35)	(8.59)	
CMA		0.01	−0.05	0.04	0.94	−0.11	0.85
		(0.32)	(−3.63)	(1.68)	(35.26)	(−3.95)	

Panel C: The Carhart momentum factor, UMD

	m	α_q	β_{MKT}	β_{ME}	$\beta_{\mathrm{I/A}}$	β_{ROE}	R^2
UMD	0.67	0.11	−0.07	0.24	0.03	0.91	0.27
	(3.66)	(0.43)	(−1.09)	(1.75)	(0.17)	(5.59)	
		α_{PS}	β_{MKT}	β_{SMB}	β_{HML}	β_{LIQ}	R^2
		0.89	−0.19	−0.02	−0.32	−0.04	0.06
		(5.25)	(−2.52)	(−0.20)	(−2.21)	(−0.57)	
	a	b	s	h	r	c	R^2
	0.69	−0.14	0.03	−0.54	0.25	0.47	0.09
	(3.11)	(−1.82)	(0.29)	(−2.98)	(1.23)	(1.88)	

Panel D: The Pastor-Stambaugh liquidity factor, LIQ

	m	α	β_{MKT}	β_{SMB}	β_{HML}	β_{UMD}	R^2
LIQ	0.42	0.46	−0.04	−0.01	0.00	−0.03	0.00
	(2.81)	(2.61)	(−0.66)	(−0.18)	(0.02)	(−0.56)	
		α_q	β_{MKT}	β_{ME}	$\beta_{\mathrm{I/A}}$	β_{ROE}	R^2
		0.53	−0.05	−0.06	−0.01	−0.12	0.01
		(2.99)	(−0.79)	(−0.93)	(−0.13)	(−1.48)	
	a	b	s	h	r	c	R^2
	0.43	−0.03	−0.01	0.01	0.02	0.00	0.00
	(2.66)	(−0.57)	(−0.18)	(0.06)	(0.30)	(0.03)	

Panel E: Correlation matrix

	$r_{\mathrm{I/A}}$	r_{ROE}	MKT	SMB	HML	UMD	RMW	CMA	LIQ
r_{ME}	−0.15	−0.31	0.27	0.95	−0.07	−0.01	−0.37	−0.06	−0.04
	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(0.72)	(0.00)	(0.16)	(0.36)
$r_{\mathrm{I/A}}$		0.04	−0.39	−0.27	0.69	0.04	0.05	0.91	0.02
		(0.35)	(0.00)	(0.00)	(0.00)	(0.37)	(0.24)	(0.00)	(0.65)
r_{ROE}			−0.20	−0.38	−0.11	0.49	0.68	−0.10	−0.06
			(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.18)
MKT				0.32	−0.31	−0.14	−0.22	−0.40	−0.05
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.21)
SMB					−0.23	−0.03	−0.42	−0.17	−0.03
					(0.00)	(0.50)	(0.00)	(0.00)	(0.53)
HML						−0.16	0.10	0.71	0.03
						(0.00)	(0.01)	(0.00)	(0.54)
UMD							0.10	0.01	−0.03
							(0.02)	(0.88)	(0.55)
RMW								−0.08	0.03
								(0.06)	(0.48)
CMA									0.03
									(0.55)

Table 3 : List of Anomaly Variables

The anomalies are grouped into six categories: (i) momentum; (ii) value-versus-growth; (iii) investment; (iv) profitability; (v) intangibles; and (vi) trading frictions. The number in parenthesis in the title of a panel is the number of anomalies in the category. The total number of anomalies is 437. For each anomaly variable, we list its symbol, brief description, and its academic source. Appendix B details variable definition and portfolio construction.

Panel A: Momentum (57)			
Sue1	Earnings surprise (1-month holding period), Foster, Olsen, and Shevlin (1984)	Sue6	Earnings surprise (6-month holding period), Foster, Olsen, and Shevlin (1984)
Sue12	Earnings surprise (12-month holding period), Foster, Olsen, and Shevlin (1984)	Abr1	Cumulative abnormal stock returns around earnings announcements (1-month holding period), Chan, Jegadeesh, and Lakonishok (1996)
Abr6	Cumulative abnormal stock returns around earnings announcements (6-month holding period), Chan, Jegadeesh, and Lakonishok (1996)	Abr12	Cumulative abnormal stock returns around earnings announcements (12-month holding period), Chan, Jegadeesh, and Lakonishok (1996)
Re1	Revisions in analysts' earnings forecasts (1-month holding period), Chan, Jegadeesh, and Lakonishok (1996)	Re6	Revisions in analysts' earnings forecasts (6-month holding period), Chan, Jegadeesh, and Lakonishok (1996)
Re12	Revisions in analysts' earnings forecasts (12-month holding period), Chan, Jegadeesh, and Lakonishok (1996)	$R^6 1$	Price momentum (6-month prior returns, 1-month holding period), Jegadeesh and Titman (1993)
$R^6 6$	Price momentum (6-month prior returns, 6-month holding period), Jegadeesh and Titman (1993)	$R^6 12$	Price momentum (6-month prior returns, 12-month holding period), Jegadeesh and Titman (1993)
$R^{11} 1$	Price momentum (11-month prior returns, 1-month holding period), Fama and French (1996)	$R^{11} 6$	Price momentum (11-month prior returns, 6-month holding period), Fama and French (1996)
$R^{11} 12$	Price momentum, (11-month prior returns, 12-month holding period), Fama and French (1996)	Im1	Industry momentum, (1-month holding period), Moskowitz and Grinblatt (1999)
Im6	Industry momentum (6-month holding period), Moskowitz and Grinblatt (1999)	Im12	Industry momentum (12-month holding period), Moskowitz and Grinblatt (1999)
Rs1	Revenue surprise (1-month holding period), Jegadeesh and Livnat (2006)	Rs6	Revenue surprise (6-month holding period), Jegadeesh and Livnat (2006)
Rs12	Revenue surprise (12-month holding period), Jegadeesh and Livnat (2006)	Tes1	Tax expense surprise (1-month holding period), Thomas and Zhang (2011)
Tes6	Tax expense surprise (6-month holding period), Thomas and Zhang (2011)	Tes12	Tax expense surprise (12-month holding period), Thomas and Zhang (2011)
dEf1	Analysts' forecast change (1-month hold period), Hawkins, Chamberlin, and Daniel (1984)	dEf6	Analysts' forecast change (6-month hold period), Hawkins, Chamberlin, and Daniel (1984)
dEf12	Analysts' forecast change (12-month hold period), Hawkins, Chamberlin, and Daniel (1984)	Nei1	# of consecutive quarters with earnings increases (1-month holding period), Barth, Elliott, and Finn (1999)
Nei6	# consecutive quarters with earnings increases (6-month holding period), Barth, Elliott, and Finn (1999)	Nei12	# consecutive quarters with earnings increases (12-month holding period), Barth, Elliott, and Finn (1999)
52w1	52-week high (1-month holding period), George and Hwang (2004)	52w6	52-week high (6-month holding period), George and Hwang (2004)
52w12	52-week high (12-month holding period), George and Hwang (2004)	$\epsilon^6 1$	Six-month residual momentum (1-month holding period), Blitz, Huij, and Martens (2011)
$\epsilon^6 6$	Six-month residual momentum (6-month holding period), Blitz, Huij, and Martens (2011)	$\epsilon^6 12$	Six-month residual momentum (12-month holding period), Blitz, Huij, and Martens (2011)

$\epsilon^{11}1$	11-month residual momentum (1-month holding period), Blitz, Huij, and Martens (2011)	$\epsilon^{11}6$	11-month residual momentum (6-month holding period), Blitz, Huij, and Martens (2011)
$\epsilon^{11}12$	11-month residual momentum (12-month holding period), Blitz, Huij, and Martens (2011)	Sm1	Segment momentum (1-month holding period), Cohen and Lou (2012)
Sm6	Segment momentum (6-month holding period), Cohen and Lou (2012)	Sm12	Segment momentum (12-month holding period), Cohen and Lou (2012)
Ilr1	Industry lead-lag effect in prior returns (1-month holding period), Hou (2007)	Ilr6	Industry lead-lag effect in prior returns (6-month holding period), Hou (2007)
Ilr12	Industry lead-lag effect in prior returns (12-month holding period), Hou (2007)	Ile1	Industry lead-lag effect in earnings surprises (1-month holding period), Hou (2007)
Ile6	Industry lead-lag effect in earnings surprises (6-month holding period), Hou (2007)	Ile12	Industry lead-lag effect in earnings surprises (12-month holding period), Hou (2007)
Cm1	Customer momentum (1-month holding period), Cohen and Frazzini (2008)	Cm6	Customer momentum (6-month holding period), Cohen and Frazzini (2008)
Cm12	Customer momentum (12-month holding period), Cohen and Frazzini (2008)	Sim1	Supplier industries momentum (1-month holding period), Menzly and Ozbas (2010)
Sim6	Supplier industries momentum (6-month holding period), Menzly and Ozbas (2010)	Sim12	Supplier industries momentum (12-month holding period), Menzly and Ozbas (2010)
Cim1	Customer industries momentum (1-month holding period), Menzly and Ozbas (2010)	Cim6	Customer industries momentum (6-month holding period), Menzly and Ozbas (2010)
Cim12	Customer industries momentum (12-month holding period), Menzly and Ozbas (2010)		
	Panel B: Value-versus-growth (68)		
Bm	Book-to-market equity, Rosenberg, Reid, and Lanstein (1985)	Bmj	Book-to-June-end market equity, Asness and Frazzini (2013)
Bm^{q}1	Quarterly Book-to-market equity (1-month holding period)	Bm^{q}6	Quarterly Book-to-market equity (6-month holding period)
Bm^{q}12	Quarterly Book-to-market equity (12-month holding period)	Dm	Debt-to-market, Bhandari (1988)
Dm^{q}1	Quarterly Debt-to-market (1-month holding period)	Dm^{q}6	Quarterly Debt-to-market (6-month holding period)
Dm^{q}12	Quarterly Debt-to-market (12-month holding period)	Am	Assets-to-market, Fama and French (1992)
Am^{q}1	Quarterly Assets-to-market (1-month holding period)	Am^{q}6	Quarterly Assets-to-market (6-month holding period)
Am^{q}12	Quarterly Assets-to-market (12-month holding period)	Rev1	Reversal (1-month holding period) De Bondt and Thaler (1985)
Rev6	Reversal (6-month holding period), De Bondt and Thaler (1985)	Rev12	Reversal (12-month holding period) De Bondt and Thaler (1985)
Ep	Earnings-to-price, Basu (1983)	Ep^{q}1	Quarterly Earnings-to-price (1-month holding period)
Ep^{q}6	Quarterly Earnings-to-price (6-month holding period)	Ep^{q}12	Quarterly Earnings-to-price (12-month holding period)
Efp1	Analysts' earnings forecasts-to-price (1-month holding period), Elgers, Lo, and Pfeiffer (2001)	Efp6	Analysts' earnings forecasts-to-price (6-month holding period) Elgers, Lo, and Pfeiffer (2001)
Efp12	Analysts' earnings forecasts-to-price (12-month holding period), Elgers, Lo, and Pfeiffer (2001)	Cp	Cash flow-to-price, Lakonishok, Shleifer, and Vishny (1994)
Cp^{q}1	Quarterly Cash flow-to-price (1-month holding period)	Cp^{q}6	Quarterly Cash flow-to-price (6-month holding period)
Cp^{q}12	Quarterly Cash flow-to-price (12-month holding period)	Dp	Dividend yield, Litzenberger and Ramaswamy (1979)

Dp^{q}1	Quarterly Dividend yield (1-month holding period)	Dp^{q}6	Quarterly Dividend yield (6-month holding period)
Dp^{q}12	Quarterly Dividend yield (12-month holding period)	Op	Payout yield, Boudoukh, Michaely, Richardson, and Roberts (2007)
Op^{q}1	Quarterly Payout yield (1-month holding period)	Op^{q}6	Quarterly Payout yield (6-month holding period)
Op^{q}12	Quarterly Payout yield (12-month holding period)	Nop	Net payout yield, Boudoukh, Michaely, Richardson, and Roberts (2007)
Nop^{q}1	Quarterly Net payout yield (1-month holding period)	Nop^{q}6	Quarterly Net payout yield (6-month holding period)
Nop^{q}12	Quarterly Net payout yield (12-month holding period)	Sr	Five-year sales growth rank, Lakonishok, Shleifer, and Vishny (1994)
Sg	Annual sales growth, Lakonishok, Shleifer, and Vishny (1994)	Em	Enterprise multiple, Loughran and Wellman (2011)
Em^{q}1	Quarterly Enterprise multiple (1-month holding period)	Em^{q}6	Quarterly Enterprise multiple (6-month holding period)
Em^{q}12	Quarterly Enterprise multiple (12-month holding period)	Sp	Sales-to-price, Barbee, Mukherji, and Raines (1996)
Sp^{q}1	Quarterly Sales-to-price (1-month holding period)	Sp^{q}6	Quarterly Sales-to-price (6-month holding period)
Sp^{q}12	Quarterly Sales-to-price (12-month holding period)	Ocp	Operating cash flow-to-price, Desai, Rajgopal, and Venkatachalam (2004)
Ocp^{q}1	Quarterly Operating cash flow-to-price (1-month holding period)	Ocp^{q}6	Quarterly Operating cash flow-to-price (6-month holding period)
Ocp^{q}12	Quarterly Operating cash flow-to-price (12-month holding period)	Ir	Intangible return, Daniel and Titman (2006)
Vhp	Intrinsic value-to-market, Frankel and Lee (1998)	Vfp	Analysts-based intrinsic value-to-market, Frankel and Lee (1998)
Ebp	Enterprise book-to-price Penman, Richardson, and Tuna (2007)	Ebp^{q}1	Quarterly enterprise book-to-price (1-month holding period)
Ebp^{q}6	Quarterly enterprise book-to-price (6-month holding period)	Ebp^{q}12	Quarterly enterprise book-to-price (12-month holding period)
Ndp	Net debt-to-price Penman, Richardson, and Tuna (2007)	Ndp^{q}1	Quarterly net debt-to-price (1-month holding period)
Ndp^{q}6	Quarterly net debt-to-price (6-month holding period)	Ndp^{q}12	Quarterly net debt-to-price (12-month holding period)
Dur	Equity duration, Dechow, Sloan, and Soliman (2004)	Ltg1	Long-term growth forecasts of analysts (1-month holding period), La Porta (1996)
Ltg6	Long-term growth forecasts of analysts (6-month holding period), La Porta (1996)	Ltg12	Long-term growth forecasts of analysts (12-month holding period), La Porta (1996)
Panel C: Investment (38)			
Aci	Abnormal corporate investment, Titman, Wei, and Xie (2004)	I/A	Investment-to-assets, Cooper, Gulen, and Schill (2008)
Ia^{q}1	Quarterly Investment-to-assets (1-month holding period)	Ia^{q}6	Quarterly Investment-to-assets (6-month holding period)
Ia^{q}12	Quarterly Investment-to-assets (12-month holding period)	dPia	Changes in PPE and inventory/assets, Lyandres, Sun, and Zhang (2008)
Noa	Net operating assets, Hirshleifer, Hou, Teoh, and Zhang (2004)	dNoa	Changes in net operating assets, Hou, Xue, and Zhang (2015)
dLno	Change in long-term net operating assets, Fairfield, Whisenant, and Yohn (2003)	Ig	Investment growth, Xing (2008)
2Ig	Two-year investment growth, Anderson and Garcia-Feijoo (2006)	3Ig	Three-year investment growth, Anderson and Garcia-Feijoo (2006)
Nsi	Net stock issues, Pontiff and Woodgate (2008)	dIi	% change in investment − % change in industry investment, Abarbanell and Bushee (1998)
Cei	Composite equity issuance, Daniel and Titman (2006)	Cdi	Composite debt issuance, Lyandres, Sun, and Zhang (2008)

Ivg	Inventory growth, Belo and Lin (2011)	Ivc	Inventory changes, Thomas and Zhang (2002)
Oa	Operating accruals, Sloan (1996)	Ta	Total accruals, Richardson, Sloan, Soliman, and Tuna (2005)
dWc	Change in net non-cash working capital, Richardson, Sloan, Soliman, and Tuna (2005)	dCoa	Change in current operating assets, Richardson, Sloan, Soliman, and Tuna (2005)
dCol	Change in current operating liabilities, Richardson, Sloan, Soliman, and Tuna (2005)	dNco	Change in net non-current operating assets, Richardson, Sloan, Soliman, and Tuna (2005)
dNca	Change in non-current operating assets, Richardson, Sloan, Soliman, and Tuna (2005)	dNcl	Change in non-current operating liabilities, Richardson, Sloan, Soliman, and Tuna (2005)
dFin	Change in net financial assets, Richardson, Sloan, Soliman, and Tuna (2005)	dSti	Change in short-term investments, Richardson, Sloan, Soliman, and Tuna (2005)
dLti	Change in long-term investments, Richardson, Sloan, Soliman, and Tuna (2005)	dFnl	Change in financial liabilities, Richardson, Sloan, Soliman, and Tuna (2005)
dBe	Change in common equity, Richardson, Sloan, Soliman, and Tuna (2005)	Dac	Discretionary accruals, Xie (2001)
Poa	Percent operating accruals, Hafzalla, Lundholm, and Van Winkle (2011)	Pta	Percent total accruals, Hafzalla, Lundholm, and Van Winkle (2011)
Pda	Percent discretionary accruals	Nxf	Net external financing, Bradshaw, Richardson, and Sloan (2006)
Nef	Net equity financing, Bradshaw, Richardson, and Sloan (2006)	Ndf	Net debt financing, Bradshaw, Richardson, and Sloan (2006)
	Panel D: Profitability (78)		
Roe1	Return on equity (1-month holding period), Hou, Xue, and Zhang (2015)	Roe6	Return on equity (6-month holding period), Hou, Xue, and Zhang (2015)
Roe12	Return on equity (12-month holding period), Hou, Xue, and Zhang (2015)	dRoe1	Change in Roe (1-month holding period),
dRoe6	Change in Roe (6-month holding period)	dRoe12	Change in Roe (12-month holding period)
Roa1	Return on assets (1-month holding period), Balakrishnan, Bartov, and Faurel (2010)	Roa6	Return on assets (6-month holding period), Balakrishnan, Bartov, and Faurel (2010)
Roa12	Return on assets (12-month holding period), Balakrishnan, Bartov, and Faurel (2010)	dRoa1	Change in Roa (1-month holding period)
dRoa6	Change in Roa (6-month holding period)	dRoa12	Change in Roa (12-month holding period)
Rna	Return on net operating assets, Soliman (2008)	Pm	Profit margin, Soliman (2008)
Ato	Asset turnover, Soliman (2008)	Cto	Capital turnover, Haugen and Baker (1996)
Rna^{q}1	Quarterly return on net operating assets (1-month holding period)	Rna^{q}6	Quarterly return on net operating assets (6-month holding period)
Rna^{q}12	Quarterly return on net operating assets (12-month holding period)	Pm^{q}1	Quarterly profit margin (1-month holding period)
Pm^{q}6	Quarterly profit margin (6-month holding period)	Pm^{q}12	Quarterly profit margin (12-month holding period)
Ato^{q}1	Quarterly asset turnover (1-month holding period)	Ato^{q}6	Quarterly asset turnover (6-month holding period)
Ato^{q}12	Quarterly asset turnover (12-month holding period)	Cto^{q}1	Quarterly capital turnover (1-month holding period)
Cto^{q}6	Quarterly capital turnover (6-month holding period)	Cto^{q}12	Quarterly capital turnover (12-month holding period)
Gpa	Gross profits-to-assets, Novy-Marx (2013)	Gla	Gross profits-to-lagged assets
Gla^{q}1	Gross profits-to-lagged assets (1-month holding period)	Gla^{q}6	Gross profits-to-lagged assets (6-month holding period)
Gla^{q}12	Gross profits-to-lagged assets (12-month holding period)	Ope	Operating profits-to-equity, Fama and French (2015)
Ole	Operating profits-to-lagged equity	Ole^{q}1	Operating profits-to-lagged equity (1-month holding period)
Ole^{q}6	Operating profits-to-lagged equity (6-month holding period)	Ole^{q}12	Operating profits-to-lagged equity (12-month holding period)

Opa	Operating profits-to-assets, Ball, Gerakos, Linnainmaa, and Nikolaev (2015a)	Ola	Operating profits-to-lagged assets
Ola^{q}1	Operating profits-to-lagged assets (1-month holding period)	Ola^{q}6	Operating profits-to-lagged assets (6-month holding period)
Ola^{q}12	Operating profits-to-lagged assets (12-month holding period)	Cop	Cash-based operating profitability, Ball, Gerakos, Linnainmaa, and Nikolaev (2015b)
Cla	Cash-based operating profits-to-lagged assets	Cla^{q}1	Cash-based operating profits-to-lagged assets (1-month holding period)
Cla^{q}6	Cash-based operating profits-to-lagged assets (6-month holding period)	Cla^{q}12	Cash-based operating profits-to-lagged assets (12-month holding period)
F	Fundamental (F) score, Piotroski (2000)	F^{q}1	Quarterly F-score (1-month holding period)
F^{q}6	Quarterly F-score (6-month holding period)	F^{q}12	Quarterly F-score (12-month holding period)
Fp1	Failure probability (1-month holding period), Campbell, Hilscher, and Szilagyi (2008)	Fp6	Failure probability (6-month holding period) Campbell, Hilscher, and Szilagyi (2008)
Fp12	Failure probability (12-month holding period), Campbell, Hilscher, and Szilagyi (2008)	O	O-score, Dichev (1998)
O^{q}1	Quarterly O-score (1-month holding period)	O^{q}6	Quarterly O-score (6-month holding period)
O^{q}12	Quarterly O-score (12-month holding period)	Z	Z-score, Dichev (1998)
Z^{q}1	Quarterly Z-score (1-month holding period)	Z^{q}6	Quarterly Z-score (6-month holding period)
Z^{q}12	Quarterly Z-score (12-month holding period)	G	Growth (G) score, Mohanram (2005)
Cr1	Credit ratings (1-month holding period) Avramov, Chordia, Jostova, and Philipov (2009)	Cr6	Credit ratings (6-month holding period) Avramov, Chordia, Jostova, and Philipov (2009)
Cr12	Credit ratings (12-month holding period) Avramov, Chordia, Jostova, and Philipov (2009)	Tbi	Taxable income-to-book income, Green, Hand, and Zhang (2013)
Tbi^{q}1	Quarterly taxable income-to-book income (1-month holding period)	Tbi^{q}6	Quarterly taxable income-to-book income (6-month holding period)
Tbi^{q}12	Quarterly taxable income-to-book income (12-month holding period)	Bl	Book leverage, Fama and French (1992)
Bl^{q}1	Quarterly book leverage (1-month holding period)	Bl^{q}6	Quarterly book leverage (6-month holding period)
Bl^{q}12	Quarterly book leverage (12-month holding period)	Sg^{q}1	Quarterly sales growth (1-month holding period)
Sg^{q}6	Quarterly sales growth (6-month holding period)	Sg^{q}12	Quarterly sales growth (12-month holding period)

Panel E: Intangibles (100)

Oca	Organizational capital/assets, Eisfeldt and Papanikolaou (2013)	Ioca	Industry-adjusted organizational capital /assets, Eisfeldt and Papanikolaou (2013)
Adm	Advertising expense-to-market, Chan, Lakonishok, and Sougiannis (2001)	gAd	Growth in advertising expense, Lou (2014)
Rdm	R&D-to-market, Chan, Lakonishok, and Sougiannis (2001)	Rdm^{q}1	Quarterly R&D-to-market (1-month holding period)
Rdm^{q}6	Quarterly R&D-to-market (6-month holding period)	Rdm^{q}12	Quarterly R&D-to-market (12-month holding period)
Rds	R&D-to-sales, Chan, Lakonishok, and Sougiannis (2001)	Rds^{q}1	Quarterly R&D-to-sales (1-month holding period)
Rds^{q}6	Quarterly R&D-to-sales (6-month holding period)	Rds^{q}12	Quarterly R&D-to-sales (12-month holding period)
Ol	Operating leverage, Novy-Marx (2011)	Ol^{q}1	Quarterly operating leverage (1-month holding period)
Ol^{q}6	Quarterly operating leverage (6-month holding period)	Ol^{q}12	Quarterly operating leverage (12-month holding period)
Hn	Hiring rate, Belo, Lin, and Bazdresch (2014)	Rca	R&D capital-to-assets, Li (2011)
Bca	Brand capital-to-assets, Belo, Lin, and Vitorino (2014)	Aop	Analysts optimism, Frankel and Lee (1998)
Pafe	Predicted analysts forecast error, Frankel and Lee (1998)	Parc	Patent-to-R&D capital, Hirshleifer, Hsu, and Li (2013)

Crd	Citations-to-R&D expense, Hirshleifer, Hsu, and Li (2013)	Hs	Industry concentration (sales), Hou and Robinson (2006)
Ha	Industry concentration (total assets), Hou and Robinson (2006)	He	Industry concentration (book equity), Hou and Robinson (2006)
Age1	Firm age (1-month holding period), Jiang, Lee, and Zhang (2005)	Age6	Firm age (6-month holding period), Jiang, Lee, and Zhang (2005)
Age12	Firm age (12-month holding period), Jiang, Lee, and Zhang (2005)	D1	Price delay based on R^2, Hou and Moskowitz (2005)
D2	Price delay based on slopes, Hou and Moskowitz (2005)	D3	Price delay based on slopes adjusted for standard errors, Hou and Moskowitz (2005)
dSi	% change in sales − % change in inventory, Abarbanell and Bushee (1998)	dSa	% change in sales − % change in accounts receivable, Abarbanell and Bushee (1998)
dGs	% change in gross margin − % change in sales, Abarbanell and Bushee (1998)	dSs	% change in sales − % change in SG&A, Abarbanell and Bushee (1998)
Etr	Effective tax rate, Abarbanell and Bushee (1998)	Lfe	Labor force efficiency, Abarbanell and Bushee (1998)
Ana1	Analysts coverage (1-month holding period), Elgers, Lo, and Pfeiffer (2001)	Ana6	Analysts coverage (6-month holding period), Elgers, Lo, and Pfeiffer (2001)
Ana12	Analysts coverage (12-month holding period), Elgers, Lo, and Pfeiffer (2001)	Tan	Tangibility of assets, Hahn and Lee (2009)
Tan^{q}1	Quarterly tangibility (1-month holding period)	Tan^{q}6	Quarterly tangibility (6-month holding period)
Tan^{q}12	Quarterly tangibility (12-month holding period)	Rer	Real estate ratio, Tuzel (2010)
Kz	Financial constraints (the Kaplan-Zingales index), Lamont, Polk, and Saa-Requejo (2001)	Kz^{q}1	Quarterly Kaplan-Zingales index (1-month holding period)
Kz^{q}6	Quarterly Kaplan-Zingales index (6-month holding period)	Kz^{q}12	Quarterly Kaplan-Zingales index (12-month holding period)
Ww	Financial constraints (the Whited-Wu index), Whited and Wu (2006)	Ww^{q}1	Quarterly Whited-Wu index (1-month holding period)
Ww^{q}6	Quarterly Whited-Wu index (6-month holding period)	Ww^{q}12	Quarterly Whited-Wu index (12-month holding period)
Sdd	Secured debt-to-total debt, Valta (2016)	Cdd	Convertible debt-to-total debt, Valta (2016)
Vcf1	Cash flow volatility (1-month holding period), Huang (2009)	Vcf6	Cash flow volatility (6-month holding period), Huang (2009)
Vcf12	Cash flow volatility (12-month holding period), Huang (2009)	Cta1	Cash-to-assets (1-month holding period), Palazzo (2012)
Cta6	Cash-to-assets (6-month holding period), Palazzo (2012)	Cta12	Cash-to-assets (12-month holding period), Palazzo (2012)
Gind	Corporate governance, Gompers, Ishii, and Metrick (2003)	Acq	Accrual quality, Francis, Lafond, Olsson, and Schipper (2005)
Eper	Earnings persistence, Francis, Lafond, Olsson, and Schipper (2004)	Eprd	Earnings predictability, Francis, Lafond, Olsson, and Schipper (2004)
Esm	Earnings smoothness, Francis, Lafond, Olsson, and Schipper (2004)	Evr	Value relevance of earnings, Francis, Lafond, Olsson, and Schipper (2004)
Etl	Earnings timeliness, Francis, Lafond, Olsson, and Schipper (2004)	Ecs	Earnings conservatism, Francis, Lafond, Olsson, and Schipper (2004)
Frm	Pension funding rate (scaled by market equity), Franzoni and Martin (2006)	Fra	Pension funding rate (scaled by assets), Franzoni and Martin (2006)
Ala	Asset liquidity (scaled by book assets) Ortiz-Molina and Phillips (2014)	Alm	Asset liquidity (scaled by market assets), Ortiz-Molina and Phillips (2014)
Ala^{q}1	Quarterly asset liquidity (book assets) (1-month holding period)	Ala^{q}6	Quarterly asset liquidity (book assets) (1-month holding period)
Ala^{q}12	Quarterly asset liquidity (book assets) (12-month holding period)	Alm^{q}1	Quarterly asset liquidity (market assets) (1-month holding period)
Alm^{q}6	Quarterly asset liquidity (market assets) (6-month holding period)	Alm^{q}12	Quarterly asset liquidity (market assets) (12-month holding period)

Dls1	Disparity between long- and short-term earnings growth forecasts (1-month holding period), Da and Warachka (2011)	Dls6	Disparity between long- and short-term earnings growth forecasts (6-month holding period), Da and Warachka (2011)
Dls12	Disparity between long- and short-term earnings growth forecasts (12-month holding period), Da and Warachka (2011)	Dis1	Dispersion of analysts' earnings forecasts (1-month holding period), Diether, Malloy, and Scherbina (2002)
Dis6	Dispersion of analysts' earnings forecasts (6-month holding period), Diether, Malloy, and Scherbina (2002)	Dis12	Dispersion of analysts' earnings forecasts (12-month holding period), Diether, Malloy, and Scherbina (2002)
Dlg1	Dispersion in analyst long-term growth forecasts (1-month holding period), Anderson, Ghysels, and Juergens (2005)	Dlg6	Dispersion in analyst long-term growth forecasts (6-month holding period), Anderson, Ghysels, and Juergens (2005)
Dlg12	Dispersion in analyst long-term growth forecasts (12-month holding period), Anderson, Ghysels, and Juergens (2005)	R_{a}^{1}	12-month-lagged return, Heston and Sadka (2008)
R_{n}^{1}	Year 1–lagged return, nonannual Heston and Sadka (2008)	$R_{\mathrm{a}}^{[2,5]}$	Years 2–5 lagged returns, annual Heston and Sadka (2008)
$R_{\mathrm{n}}^{[2,5]}$	Years 2–5 lagged returns, nonannual Heston and Sadka (2008)	$R_{\mathrm{a}}^{[6,10]}$	Years 6–10 lagged returns, annual Heston and Sadka (2008)
$R_{\mathrm{n}}^{[6,10]}$	Years 6–10 lagged returns, nonannual Heston and Sadka (2008)	$R_{\mathrm{a}}^{[11,15]}$	Years 11–15 lagged returns, annual Heston and Sadka (2008)
$R_{\mathrm{n}}^{[11,15]}$	Years 11–15 lagged returns, nonannual Heston and Sadka (2008)	$R_{\mathrm{a}}^{[16,20]}$	Years 16–20 lagged returns, annual Heston and Sadka (2008)
$R_{\mathrm{n}}^{[16,20]}$	Years 16–20 lagged returns, nonannual Heston and Sadka (2008)	Ob	Order backlog, Rajgopal, Shevlin, and Venkatachalam (2003)
	Panel F: Trading frictions (96)		
Me	Market equity, Banz (1981)	Iv	Idiosyncratic volatility, Ali, Hwang, and Trombley (2003)
Ivff1	Idiosyncratic volatility per the FF 3-factor model (1-month holding period), Ang, Hodrick, Xing, and Zhang (2006)	Ivff6	Idiosyncratic volatility per the FF 3-factor model (6-month holding period), Ang, Hodrick, Xing, and Zhang (2006)
Ivff12	Idiosyncratic volatility per the FF 3-factor model (12-month holding period), Ang, Hodrick, Xing, and Zhang (2006)	Ivc1	Idiosyncratic volatility per the CAPM (1-month holding period)
Ivc6	Idiosyncratic volatility per the CAPM (6-month holding period)	Ivc12	Idiosyncratic volatility per the CAPM (12-month holding period)
Ivq1	Idiosyncratic volatility per the q-factor model (1-month holding period)	Ivq6	Idiosyncratic volatility per the q-factor model (6-month holding period)
Ivq12	Idiosyncratic volatility per the q-factor model (12-month holding period), Ang, Hodrick, Xing, and Zhang (2006)	Tv1	Total volatility (1-month holding period), Ang, Hodrick, Xing, and Zhang (2006)
Tv6	Total volatility (6-month holding period), Ang, Hodrick, Xing, and Zhang (2006)	Tv12	Total volatility (12-month holding period), Ang, Hodrick, Xing, and Zhang (2006)
Sv1	Systematic volatility risk (1-month holding period), Ang, Hodrick, Xing, and Zhang (2006)	Sv6	Systematic volatility risk (6-month holding period), Ang, Hodrick, Xing, and Zhang (2006)
Sv12	Systematic volatility risk (12-month holding period), Ang, Hodrick, Xing, and Zhang (2006)	$\beta 1$	Market beta (1-month holding period) Fama and MacBeth (1973)
$\beta 6$	Market beta (6-month holding period) Fama and MacBeth (1973)	$\beta 12$	Market beta (12-month holding period) Fama and MacBeth (1973)
$\beta^{\mathrm{FP}}1$	The Frazzini-Pedersen (2014) beta (1-month holding period)	$\beta^{\mathrm{FP}}6$	The Frazzini-Pedersen (2014) beta (6-month holding period)
$\beta^{\mathrm{FP}}12$	The Frazzini-Pedersen (2014) beta (12-month holding period)	$\beta^{\mathrm{D}}1$	The Dimson (1979) beta (1-month holding period)

$\beta^{\mathrm{D}}6$	The Dimson (1979) beta (6-month holding period)
$\beta^{\mathrm{D}}12$	The Dimson (1979) beta (12-month holding period)
Tur1	Share turnover (1-month holding period), Datar, Naik, and Radcliffe (1998)
Tur6	Share turnover (6-month holding period), Datar, Naik, and Radcliffe (1998)
Tur12	Share turnover (12-month holding period), Datar, Naik, and Radcliffe (1998)
Cvt1	Coefficient of variation for share turnover (1-month holding period), Chordia, Subrahmanyam, and Anshuman (2001)
Cvt6	Coefficient of variation for share turnover (1-month holding period), Chordia, Subrahmanyam, and Anshuman (2001)
Cvt12	Coefficient of variation for share turnover (12-month holding period), Chordia, Subrahmanyam, and Anshuman (2001)
Dtv1	Dollar trading volume (1-month holding period), Brennan, Chordia, and Subrahmanyam (1998)
Dtv6	Dollar trading volume (6-month holding period), Brennan, Chordia, and Subrahmanyam (1998)
Dtv12	Dollar trading volume (12-month holding period), Brennan, Chordia, and Subrahmanyam (1998)
Cvd1	Coefficient of variation for dollar trading volume (1-month holding period), Chordia, Subrahmanyam, and Anshuman (2001)
Cvd6	Coefficient of variation for dollar trading volume (6-month holding period), Chordia, Subrahmanyam, and Anshuman (2001)
Cvd12	Coefficient of variation for dollar trading volume (12-month holding period), Chordia, Subrahmanyam, and Anshuman (2001)
Pps1	Share price (1-month holding period), Miller and Scholes (1982)
Pps6	Share price (6-month holding period), Miller and Scholes (1982)
Pps12	Share price (12-month holding period), Miller and Scholes (1982)
Ami1	Absolute return-to-volume (1-month holding period), Amihud (2002)
Ami6	Absolute return-to-volume (6-month holding period), Amihud (2002)
Ami12	Absolute return-to-volume (12-month holding period), Amihud (2002)
$\mathrm{Lm}^{1}1$	Prior 1-month turnover-adjusted number of zero daily trading volume (1-month holding period), Liu (2006)
$\mathrm{Lm}^{1}6$	Prior 1-month turnover-adjusted number of zero daily trading volume (6-month holding period), Liu (2006)
$\mathrm{Lm}^{1}12$	Prior 1-month turnover-adjusted number of zero daily trading volume (12-month holding period), Liu (2006)
$\mathrm{Lm}^{6}1$	Prior 6-month turnover-adjusted number of zero daily trading volume (1-month holding period), Liu (2006)
$\mathrm{Lm}^{6}6$	Prior 6-month turnover-adjusted number of zero daily trading volume (6-month holding period), Liu (2006)
$\mathrm{Lm}^{6}12$	Prior 6-month turnover-adjusted number of zero daily trading volume (12-month holding period), Liu (2006)
$\mathrm{Lm}^{12}1$	Prior 12-month turnover-adjusted number of zero daily trading volume (1-month holding period), Liu (2006)
$\mathrm{Lm}^{12}6$	Prior 12-month turnover-adjusted number of zero daily trading volume (6-month holding period), Liu (2006)
$\mathrm{Lm}^{12}12$	Prior 12-month turnover-adjusted number of zero daily trading volume (12-month holding period), Liu (2006)
Mdr1	Maximum daily return (1-month holding period), Bali, Cakici, and Whitelaw (2011)
Mdr6	Maximum daily returns (6-month holding period), Bali, Cakici, and Whitelaw (2011)
Mdr12	Maximum daily return (12-month holding period), Bali, Cakici, and Whitelaw (2011)
Ts1	Total skewness (1-month holding period), Bali, Engle, and Murray (2015)
Ts6	Total skewness (6-month holding period), Bali, Engle, and Murray (2015)
Ts12	Total skewness (12-month holding period), Bali, Engle, and Murray (2015)
Isc1	Idiosyncratic skewness per the CAPM (1-month holding period)
Isc6	Idiosyncratic skewness per the CAPM (6-month holding period)
Isc12	Idiosyncratic skewness per the CAPM (12-month holding period)
Isff1	Idiosyncratic skewness per the FF 3-factor model (1-month holding period)
Isff6	Idiosyncratic skewness per the FF 3-factor model (6-month holding period)
Isff12	Idiosyncratic skewness per the FF 3-factor model (12-month holding period)
Isq1	Idiosyncratic skewness per the q-factor model (1-month holding period)
Isq6	Idiosyncratic skewness per the q-factor model (6-month holding period)
Isq12	Idiosyncratic skewness per the q-factor model (12-month holding period)
Cs1	Coskewness (1-month holding period), Harvey and Siddique (2000)
Cs6	Coskewness (6-month holding period), Harvey and Siddique (2000)

Cs12	Coskewness (12-month holding period), Harvey and Siddique (2000)	Srev	Short-term reversal, Jegadeesh (1990)
$\beta^{-}1$	Downside beta (1-month holding period) Ang, Chen, and Xing (2006)	$\beta^{-}6$	Downside beta (6-month holding period) Ang, Chen, and Xing (2006)
$\beta^{-}12$	Downside beta (12-month holding period) Ang, Chen, and Xing (2006)	Tail1	Tail risk (1-month holding period) Kelly and Jiang (2014)
Tail6	Tail risk (6-month holding period) Kelly and Jiang (2014)	Tail12	Tail risk (12-month holding period) Kelly and Jiang (2014)
$\beta^{\mathrm{lcc}}1$	Liquidity beta (illiquidity-illiquidity) (1-month holding period), Acharya and Pedersen (2005)	$\beta^{\mathrm{lcc}}6$	Liquidity beta (illiquidity-illiquidity) (6-month holding period), Acharya and Pedersen (2005)
$\beta^{\mathrm{lcc}}12$	Liquidity beta (illiquidity-illiquidity) (12-month holding period), Acharya and Pedersen (2005)	$\beta^{\mathrm{lrc}}1$	Liquidity beta (return-illiquidity) (1-month holding period), Acharya and Pedersen (2005)
$\beta^{\mathrm{lrc}}6$	Liquidity beta (return-illiquidity) (6-month holding period), Acharya and Pedersen (2005)	$\beta^{\mathrm{lrc}}12$	Liquidity beta (return-illiquidity) (12-month holding period), Acharya and Pedersen (2005)
$\beta^{\mathrm{lcr}}1$	Liquidity beta (illiquidity-return) (1-month holding period), Acharya and Pedersen (2005)	$\beta^{\mathrm{lcr}}6$	Liquidity beta (illiquidity-return) (6-month holding period), Acharya and Pedersen (2005)
$\beta^{\mathrm{lcr}}12$	Liquidity beta (illiquidity-return) (12-month holding period), Acharya and Pedersen (2005)	Shl1	The high-low bid-ask spread estimator (1-month holding period), Corwin and Schultz (2012)
Shl6	The high-low bid-ask spread estimator (6-month holding period), Corwin and Schultz (2012)	Shl12	The high-low bid-ask spread estimator (12-month holding period), Corwin and Schultz (2012)
Sba1	Bid-ask spread (1-month holding period) Hou and Loh (2015)	Sba6	Bid-ask spread (6-month holding period) Hou and Loh (2015)
Sba12	Bid-ask spread (12-month holding period) Hou and Loh (2015)	$\beta^{\mathrm{Lev}}1$	Leverage beta (1-month holding period) Adrian, Etula, and Muir (2014)
$\beta^{\mathrm{Lev}}6$	Leverage beta (6-month holding period) Adrian, Etula, and Muir (2014)	$\beta^{\mathrm{Lev}}12$	Leverage beta (12-month holding period) Adrian, Etula, and Muir (2014)

Table 4 : Anomalies That Are Insignificant at the 5% Level in the Broad Cross Section, January 1967 to December 2014, 576 Months

We report the average returns (m) of the high-minus-low deciles and their t-statistic (t_m) adjusted for heteroscedasticity and autocorrelations. Table 3 provides a brief description of the symbols. Appendix B details variable definition and portfolio construction.

Panel A: NYSE breakpoints with value-weighted returns

	Sue6	Sue12	Re12	$R^{11}12$	Rs6	Rs12	Tes1	Tes6	Tes12	Nei12	52w1	52w12	$\epsilon^6 1$	Sm6	Sm12	Ile6	Ile12	Cm6	Sim6
m	0.19	0.11	0.28	0.43	0.14	0.06	0.26	0.28	0.18	0.14	0.14	0.45	0.20	0.09	0.14	0.27	0.11	0.18	0.12
t_m	1.65	1.00	1.47	1.92	1.01	0.44	1.56	1.90	1.34	1.36	0.43	1.88	1.20	0.88	1.87	1.79	0.84	1.83	1.11
	Sim12	$\text{Bm}^{q}1$	$\text{Bm}^{q}6$	Dm	$\text{Dm}^{q}1$	$\text{Dm}^{q}6$	$\text{Dm}^{q}12$	Am	$\text{Am}^{q}1$	$\text{Am}^{q}6$	$\text{Am}^{q}12$	Efp6	Efp12	Dp	$\text{Dp}^{q}1$	$\text{Dp}^{q}6$	$\text{Dp}^{q}12$	Op	$\text{Op}^{q}1$
m	0.15	0.46	0.45	0.31	0.30	0.27	0.32	0.36	0.37	0.42	0.40	0.43	0.40	0.21	0.26	0.19	0.20	0.37	0.10
t_m	1.80	1.79	1.90	1.59	1.26	1.17	1.50	1.72	1.33	1.58	1.69	1.78	1.71	0.86	1.02	0.76	0.85	1.70	0.42
	$\text{Op}^{q}6$	$\text{Op}^{q}12$	$\text{Nop}^{q}1$	$\text{Nop}^{q}6$	$\text{Nop}^{q}12$	Sr	Sg	$\text{Ocp}^{q}6$	$\text{Ocp}^{q}12$	$\text{Ebp}^{q}1$	$\text{Ebp}^{q}6$	$\text{Ebp}^{q}12$	Ndp	$\text{Ndp}^{q}1$	$\text{Ndp}^{q}6$	$\text{Ndp}^{q}12$	Ltg1	Ltg6	Ltg12
m	0.10	0.17	0.22	0.25	0.31	−0.20	−0.01	0.51	0.41	0.27	0.26	0.35	0.31	0.17	0.18	0.27	−0.03	−0.04	−0.01
t_m	0.52	0.87	0.91	1.14	1.48	−1.08	−0.08	1.89	1.71	1.00	1.01	1.44	1.62	0.71	0.77	1.22	−0.09	−0.10	−0.02
	$\text{Ia}^{q}1$	3Ig	Cdi	Ta	dCol	dNcl	dSti	dLti	dBe	Nxf	Nef	Roe6	Roe12	Roa6	Roa12	dRoa12	Rna	Pm	Ato
m	−0.32	−0.21	0.00	−0.23	−0.11	−0.11	0.15	−0.22	−0.31	−0.27	−0.17	0.42	0.24	0.39	0.25	0.21	0.12	0.01	0.32
t_m	−1.72	−1.46	−0.01	−1.63	−0.76	−0.95	0.98	−1.44	−1.89	−1.44	−0.86	1.95	1.19	1.78	1.26	1.78	0.63	0.03	1.76
	Cto	$\text{Rna}^{q}1$	$\text{Rna}^{q}12$	$\text{Pm}^{q}1$	$\text{Pm}^{q}6$	$\text{Pm}^{q}12$	Gla	Ope	Ole	$\text{Ole}^{q}12$	Opa	Ola	F	Fp1	Fp12	O	$\text{O}^{q}1$	$\text{O}^{q}6$	$\text{O}^{q}12$
m	0.27	0.43	0.35	0.35	0.17	0.18	0.16	0.25	0.07	0.35	0.37	0.20	0.29	−0.48	−0.36	−0.06	−0.36	−0.21	−0.14
t_m	1.60	1.95	1.63	1.59	0.82	0.89	1.04	1.20	0.37	1.78	1.87	1.07	1.06	−1.43	−1.25	−0.30	−1.57	−0.96	−0.64
	Z	$\text{Z}^{q}1$	$\text{Z}^{q}6$	$\text{Z}^{q}12$	G	Cr1	Cr6	Cr12	Tbi	$\text{Tbi}^{q}1$	$\text{Tbi}^{q}6$	Bl	$\text{Bl}^{q}1$	$\text{Bl}^{q}6$	$\text{Bl}^{q}12$	$\text{Sg}^{q}1$	$\text{Sg}^{q}6$	$\text{Sg}^{q}12$	gAd
m	−0.00	0.01	−0.03	−0.09	0.27	0.00	−0.03	−0.02	0.16	0.17	0.21	−0.02	0.10	0.13	0.10	0.32	0.14	−0.06	−0.06
t_m	−0.02	0.06	−0.15	−0.46	1.35	0.01	−0.08	−0.06	1.20	1.28	1.84	−0.10	0.58	0.73	0.55	1.81	0.86	−0.40	−0.31
	Rds	$\text{Rds}^{q}1$	$\text{Rds}^{q}6$	$\text{Rds}^{q}12$	Hn	Rca	Bca	Aop	Pafe	Parc	Crd	Ha	He	Age1	Age6	Age12	D1	D2	D3
m	0.08	0.33	0.44	0.47	−0.27	0.34	0.17	−0.21	0.20	0.09	0.16	−0.23	−0.22	0.01	0.02	0.00	0.21	0.27	0.27
t_m	0.31	1.08	1.57	1.68	−1.79	1.40	0.71	−1.18	0.58	0.39	0.64	−1.54	−1.48	0.04	0.09	0.02	0.97	1.22	1.25
	dSi	dSa	dGs	dSs	Lfe	Ana1	Ana6	Ana12	Tan	$\text{Tan}^{q}1$	$\text{Tan}^{q}6$	$\text{Tan}^{q}12$	Kz	$\text{Kz}^{q}1$	$\text{Kz}^{q}6$	$\text{Kz}^{q}12$	Ww	$\text{Ww}^{q}1$	$\text{Ww}^{q}6$
m	0.14	0.16	0.06	0.04	0.20	−0.15	−0.12	−0.11	0.04	0.22	0.21	0.15	−0.09	−0.11	−0.13	−0.11	0.22	0.04	0.09
t_m	1.02	1.25	0.46	0.24	1.59	−0.89	−0.73	−0.65	0.27	1.14	1.22	0.93	−0.46	−0.56	−0.64	−0.56	0.90	0.16	0.31
	$\text{Ww}^{q}12$	Sdd	Cdd	Vcf1	Vcf6	Vcf12	Cta1	Cta6	Cta12	Gind	Acq	Eper	Esm	Evr	Ecs	Frm	Fra	Ala	Alm
m	0.09	0.09	−0.05	−0.37	−0.33	−0.27	0.22	0.11	0.09	0.02	−0.07	0.01	−0.06	0.18	0.07	0.09	−0.11	−0.10	0.14
t_m	0.32	0.36	−0.21	−1.68	−1.56	−1.31	1.08	0.55	0.45	0.06	−0.36	0.10	−0.45	1.32	0.65	0.46	−0.77	−0.49	0.73
	$\text{Ala}^{q}1$	$\text{Ala}^{q}6$	$\text{Ala}^{q}12$	Dls1	Dls6	Dls12	Dis1	Dis6	Dis12	Dlg1	Dlg6	Dlg12	R_n^1	$R_n^{[11,15]}$	$R_n^{[16,20]}$	Ob	Me	Iv	Ivff1
m	0.42	0.28	0.19	−0.24	0.01	0.06	−0.24	−0.22	−0.13	−0.13	−0.08	−0.10	0.54	−0.31	−0.26	0.17	−0.28	−0.22	−0.51
t_m	1.68	1.12	0.79	−1.19	0.05	0.44	−0.89	−0.87	−0.53	−0.52	−0.34	−0.41	1.74	−1.86	−1.60	0.71	−1.12	−0.66	−1.62
	Ivff6	Ivff12	Ivc1	Ivc6	Ivc12	Ivq1	Ivq6	Ivq12	Tv1	Tv6	Tv12	Sv6	Sv12	$\beta 1$	$\beta 6$	$\beta 12$	$\beta^{\text{FP}}1$	$\beta^{\text{FP}}6$	$\beta^{\text{FP}}12$
m	−0.33	−0.18	−0.48	−0.32	−0.20	−0.48	−0.30	−0.19	−0.40	−0.25	−0.20	−0.19	−0.16	0.06	0.06	0.01	−0.22	−0.23	−0.18
t_m	−1.11	−0.62	−1.48	−1.07	−0.69	−1.53	−1.05	−0.68	−1.16	−0.77	−0.62	−1.36	−1.43	0.18	0.17	0.04	−0.65	−0.72	−0.57
	$\beta^{\text{D}}1$	$\beta^{\text{D}}6$	$\beta^{\text{D}}12$	Tur1	Tur6	Tur12	Cvt1	Cvt6	Cvt12	Dtv1	Cvd1	Cvd6	Cvd12	Pps1	Pps6	Pps12	Ami1	Ami6	$\text{Lm}^{1}1$
m	0.04	0.05	0.03	−0.15	−0.14	−0.10	0.13	0.11	0.17	−0.27	0.10	0.12	0.18	−0.02	0.04	−0.04	0.28	0.37	−0.07
t_m	0.21	0.30	0.19	−0.57	−0.53	−0.38	0.87	0.73	1.26	−1.45	0.65	0.85	1.25	−0.06	0.15	−0.14	1.31	1.73	−0.33
	$\text{Lm}^{1}6$	$\text{Lm}^{1}12$	$\text{Lm}^{6}1$	$\text{Lm}^{6}6$	$\text{Lm}^{6}12$	$\text{Lm}^{12}1$	$\text{Lm}^{12}6$	$\text{Lm}^{12}12$	Mdr1	Mdr6	Mdr12	Ts6	Ts12	Isc1	Isc6	Isc12	Isff6	Isff12	Isq1
m	0.21	0.20	0.38	0.35	0.30	0.38	0.33	0.24	−0.34	−0.17	−0.07	0.03	0.03	0.17	−0.02	0.05	0.08	0.10	0.07
t_m	0.95	0.93	1.82	1.67	1.40	1.78	1.57	1.13	−1.14	−0.62	−0.24	0.50	0.56	1.66	−0.33	1.04	1.48	1.88	1.14
	Isq12	Cs1	Cs6	Cs12	Srev	$\beta^{-}1$	$\beta^{-}6$	$\beta^{-}12$	Tail1	Tail6	Tail12	$\beta^{\text{lcc}}1$	$\beta^{\text{lcc}}6$	$\beta^{\text{lcc}}12$	$\beta^{\text{lrc}}1$	$\beta^{\text{lrc}}6$	$\beta^{\text{lrc}}12$	$\beta^{\text{lcr}}1$	$\beta^{\text{lcr}}6$
m	0.08	−0.10	−0.02	−0.03	−0.26	−0.12	−0.17	−0.12	0.11	0.15	0.19	0.34	0.31	0.31	0.05	0.02	0.05	0.06	−0.02
t_m	1.71	−0.85	−0.40	−0.59	−1.31	−0.41	−0.60	−0.45	0.57	0.79	1.13	1.54	1.45	1.49	0.17	0.07	0.17	0.46	−0.17
	$\beta^{\text{lcr}}12$	Shl1	Shl6	Shl12	Sba1	Sba6	Sba12	$\beta^{\text{Lev}}1$	$\beta^{\text{Lev}}6$	$\beta^{\text{Lev}}12$									
m	−0.05	−0.16	−0.16	−0.12	−0.20	−0.10	−0.07	0.43	0.30	0.25									
t_m	−0.49	−0.54	−0.57	−0.45	−0.73	−0.36	−0.26	1.78	1.31	1.15									

Panel B: All-but-micro breakpoints with equal-weighted returns

	Sue12	R^{11}12	Rs12	Tes12	Nei12	52w1	Ile12	Bm^{q}1	Bm^{q}6	Dm	Dm^{q}1	Dm^{q}6	Dm^{q}12	Am^{q}1	Am^{q}6	Am^{q}12	Efp1	Efp6	Efp12
m	0.18	0.31	0.11	0.12	0.13	0.32	0.13	0.39	0.35	0.39	0.36	0.36	0.38	0.37	0.32	0.42	0.50	0.34	0.36
t_m	1.85	1.39	1.01	1.15	1.30	1.04	1.01	1.45	1.38	1.84	1.36	1.44	1.60	1.16	1.06	1.46	1.60	1.14	1.29
	Dp	Dp^{q}1	Dp^{q}6	Dp^{q}12	Nop^{q}1	Sr	Ocp^{q}6	Ocp^{q}12	Vfp	Ebp^{q}1	Ebp^{q}6	Ebp^{q}12	Ndp^{q}1	Ndp^{q}6	Ndp^{q}12	Ltg1	Ltg6	Ltg12	dNcl
m	0.18	0.20	0.12	0.15	0.45	−0.26	0.39	0.44	0.28	0.32	0.35	0.46	0.24	0.24	0.24	−0.52	−0.53	−0.50	−0.16
t_m	0.87	0.94	0.57	0.73	1.77	−1.73	1.43	1.76	1.07	0.96	1.08	1.52	1.05	1.15	1.26	−1.13	−1.20	−1.16	−1.90
	dSti	Roe12	Roa12	Rna	Pm	Ato	Pm^{q}6	Pm^{q}12	Gla	Ole	Ola	Fp1	Fp12	O^{q}6	O^{q}12	Z	Z^{q}1	Z^{q}6	Z^{q}12
m	0.03	0.35	0.37	0.22	0.20	0.21	0.31	0.22	0.29	0.18	0.28	−0.48	−0.44	−0.23	−0.21	−0.12	−0.11	−0.19	−0.20
t_m	0.22	1.84	1.85	1.35	0.85	1.22	1.41	1.04	1.85	0.97	1.64	−1.67	−1.73	−1.43	−1.41	−0.54	−0.45	−0.82	−0.88
	Cr1	Cr6	Cr12	Tbi	Tbi^{q}1	Tbi^{q}6	Tbi^{q}12	Bl	Bl^{q}1	Bl^{q}6	Bl^{q}12	Sg^{q}1	Sg^{q}6	Rds	Rds^{q}1	Rds^{q}6	Rds^{q}12	Rca	Bca
m	−0.28	−0.35	−0.38	0.15	0.11	0.12	0.13	0.05	0.31	0.23	0.16	0.28	−0.09	0.02	−0.14	0.12	0.07	0.41	0.30
t_m	−0.89	−1.08	−1.16	1.42	1.08	1.36	1.51	0.30	1.50	1.15	0.84	1.66	−0.55	0.06	−0.26	0.25	0.15	1.25	1.40
	Aop	Pafe	Crd	Hs	Ha	He	Age1	Age6	Age12	D1	D2	D3	dSa	dGs	dSs	Etr	Lfe	Ana1	Ana6
m	−0.13	0.06	0.15	−0.16	−0.13	−0.04	0.24	0.31	0.33	0.07	0.13	0.11	0.11	0.05	−0.12	0.01	0.04	−0.16	−0.12
t_m	−0.96	0.17	1.06	−1.06	−0.77	−0.20	0.96	1.09	1.50	0.55	1.66	0.85	1.42	0.48	−1.19	0.10	0.46	−1.07	−0.86
	Ana12	Tan	Tan^{q}1	Tan^{q}6	Tan^{q}12	Kz	Kz^{q}1	Kz^{q}6	Kz^{q}12	Ww	Ww^{q}1	Ww^{q}6	Ww^{q}12	Sdd	Cdd	Vcf1	Vcf6	Vcf12	Cta1
m	−0.06	0.14	0.32	0.29	0.21	0.03	0.13	0.11	0.07	0.03	−0.09	−0.07	−0.10	−0.19	−0.05	−0.50	−0.48	−0.47	−0.02
t_m	−0.41	0.91	1.77	1.75	1.34	0.20	0.68	0.59	0.35	0.13	−0.29	−0.24	−0.35	−1.36	−0.23	−1.73	−1.79	−1.79	−0.06
	Cta6	Cta12	Gind	Acq	Eper	Esm	Evr	Etl	Ecs	Frm	Fra	Alm	Ala^{q}1	Ala^{q}6	Ala^{q}12	Dls1	Dls6	Dls12	Dis1
m	−0.03	−0.08	−0.02	−0.07	−0.08	−0.04	0.14	0.16	0.10	0.11	0.04	0.13	0.03	−0.03	−0.17	−0.36	−0.14	−0.12	−0.41
t_m	−0.11	−0.31	−0.11	−0.32	−0.71	−0.33	1.62	1.82	1.60	0.76	0.37	0.89	0.09	−0.12	−0.66	−1.83	−0.84	−0.83	−1.80
	Dis6	Dis12	Dlg1	Dlg6	Dlg12	$R_n^{[11,15]}$	$R_n^{[16,20]}$	Ob	Me	Iv	Ivff1	Ivff6	Ivff12	Ivc6	Ivc12	Ivq6	Ivq12	Tv1	Tv6
m	−0.36	−0.25	−0.22	−0.16	−0.15	−0.23	−0.15	0.07	−0.20	−0.55	−0.63	−0.52	−0.45	−0.54	−0.46	−0.53	−0.46	−0.67	−0.52
t_m	−1.72	−1.25	−0.90	−0.68	−0.64	−1.74	−1.31	0.43	−1.13	−1.49	−1.95	−1.72	−1.51	−1.77	−1.53	−1.77	−1.56	−1.91	−1.59
	Tv12	Sv6	Sv12	β1	β6	β12	β^{FP}1	β^{FP}6	β^{FP}12	β^{D}1	β^{D}6	β^{D}12	Tur1	Tur6	Tur12	Cvt1	Cvt6	Cvt12	Cvd1
m	−0.46	−0.16	−0.13	−0.09	−0.05	−0.12	−0.29	−0.21	−0.20	−0.12	0.01	−0.06	−0.44	−0.48	−0.47	0.07	0.08	0.11	0.10
t_m	−1.43	−1.24	−1.25	−0.25	−0.14	−0.35	−0.80	−0.61	−0.59	−0.55	0.07	−0.36	−1.71	−1.87	−1.90	0.52	0.65	0.90	0.67
	Cvd6	Cvd12	Pps1	Pps6	Pps12	Ami1	Lm^{1}1	Lm^{1}6	Lm^{1}12	Mdr6	Mdr12	Ts1	Ts6	Ts12	Isc1	Isc6	Isc12	Isff1	Isff6
m	0.10	0.12	0.08	0.15	0.07	0.28	0.08	0.42	0.41	−0.40	−0.33	−0.12	−0.02	−0.01	−0.03	0.00	0.02	0.04	0.02
t_m	0.74	0.89	0.31	0.63	0.31	1.87	0.38	1.96	1.93	−1.44	−1.20	−1.32	−0.29	−0.23	−0.37	0.01	0.38	0.52	0.28
	Isff12	Isq1	Isq6	Isq12	Cs1	Cs6	Cs12	β^-1	β^-6	β^-12	Tail1	Tail6	Tail12	β^{lcc}1	β^{lcc}6	β^{lcc}12	β^{lrc}1	β^{lrc}6	β^{lrc}12
m	0.02	0.11	0.01	0.02	−0.12	−0.02	−0.01	−0.53	−0.52	−0.42	0.18	0.20	0.22	0.17	0.16	0.11	0.10	0.08	0.14
t_m	0.45	1.42	0.14	0.49	−1.19	−0.35	−0.38	−1.51	−1.49	−1.28	1.01	1.25	1.55	1.07	1.10	0.75	0.40	0.31	0.58
	β^{lcr}1	β^{lcr}6	β^{lcr}12	Shl1	Shl6	Shl12	Sba1	Sba6	Sba12	β^{Lev}1	β^{Lev}6	β^{Lev}12							
m	0.02	0.01	0.04	−0.44	−0.41	−0.35	−0.19	−0.20	−0.14	0.32	0.27	0.24							
t_m	0.25	0.07	0.51	−1.50	−1.54	−1.39	−0.91	−1.08	−0.81	1.62	1.37	1.24							

Table 5 : Overall Performance of Factor Models, January 1967 to December 2014, 576 Months

"Mom," "V−G," "Inv," "Prof," "Intan," and "Fric" denote momentum, value-versus-growth, investment, profitability, intangibles, and frictions categories of anomalies, respectively, and "All" is all the significant anomalies combined. The number in the parenthesis beside a given category is the number of significant anomalies in the category. $\overline{|\alpha_{\mathrm{H-L}}|}$ is the average magnitude of the high-minus-low alphas, $\#^{\star}_{\mathrm{H-L}}$ is the number of significant high-minus-low alphas, $\overline{|\alpha|}$ is the mean absolute alpha across the significant anomalies in each category, and $\#^{\star}_{\mathrm{GRS}}$ is the number of the sets of anomaly deciles across which a given factor model is rejected by the GRS test. All the significance is at the 5% level. CAPM is the CAPM, FF3 the Fama-French three-factor model, PS4 the four-factor model in Pastor and Stambaugh (2003) that augments the three-factor model with their liquidity factor, CARH the Carhart four-factor model, HXZ-q the Hou-Xue-Zhang q-factor model, and FF5 the Fama-French five-factor model.

Panel A: NYSE breakpoints with value-weighted returns

	All (161)		Mom (37)		V−G (31)		Inv (27)		Prof (33)		Intan (26)		Fric (7)	
	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$
CAPM	0.56	152	0.61	37	0.61	31	0.48	26	0.57	30	0.58	24	0.36	4
FF3	0.49	116	0.73	37	0.18	4	0.34	21	0.72	33	0.46	17	0.21	4
PS4	0.49	113	0.74	37	0.16	3	0.35	21	0.72	32	0.46	17	0.22	3
CARH	0.36	94	0.30	18	0.25	10	0.28	17	0.52	29	0.49	16	0.21	4
HXZ-q	0.26	46	0.26	9	0.23	6	0.19	7	0.23	9	0.41	11	0.24	4
FF5	0.37	84	0.65	35	0.13	2	0.22	11	0.39	23	0.39	10	0.20	3
	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$
CAPM	0.159	129	0.152	33	0.210	26	0.143	27	0.140	27	0.162	15	0.118	2
FF3	0.144	128	0.170	34	0.098	14	0.125	24	0.179	32	0.153	17	0.086	7
PS4	0.144	126	0.173	35	0.095	12	0.125	24	0.179	32	0.151	17	0.086	6
CARH	0.126	119	0.109	27	0.118	15	0.115	24	0.139	30	0.166	17	0.083	6
HXZ-q	0.122	107	0.110	25	0.121	18	0.099	17	0.121	20	0.174	20	0.102	7
FF5	0.130	108	0.160	35	0.093	10	0.090	16	0.161	26	0.148	15	0.081	6

Panel B: All-but-micro breakpoints with equal-weighted returns

	All (216)		Mom (50)		V−G (38)		Inv (36)		Prof (47)		Intan (29)		Fric (16)	
	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$
CAPM	0.67	212	0.62	48	0.76	38	0.61	36	0.71	46	0.65	29	0.74	15
FF3	0.55	185	0.70	50	0.28	19	0.48	36	0.74	44	0.52	24	0.49	12
PS4	0.56	184	0.72	50	0.26	18	0.49	36	0.75	45	0.51	24	0.47	11
CARH	0.42	154	0.31	27	0.36	22	0.39	34	0.55	39	0.52	21	0.40	11
HXZ-q	0.26	66	0.28	14	0.19	2	0.28	24	0.22	11	0.41	14	0.12	1
FF5	0.38	128	0.61	44	0.18	7	0.35	31	0.37	27	0.41	16	0.18	3
	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$
CAPM	0.224	202	0.204	46	0.260	34	0.236	36	0.221	46	0.209	24	0.203	16
FF3	0.142	173	0.168	45	0.099	16	0.127	36	0.177	44	0.131	20	0.120	12
PS4	0.142	172	0.172	45	0.093	14	0.125	36	0.180	45	0.131	20	0.117	12
CARH	0.171	183	0.140	34	0.169	28	0.183	36	0.180	45	0.201	26	0.150	14
HXZ-q	0.145	172	0.133	37	0.116	25	0.136	30	0.141	42	0.208	25	0.152	13
FF5	0.115	151	0.155	43	0.072	15	0.094	30	0.116	38	0.141	19	0.080	6

Table 6 : Significant Anomalies, NYSE-VW, January 1967 to December 2014, 576 Months

For each high-minus-low decile, $m, \alpha, \alpha_{\rm FF}, \alpha_{\rm PS}, \alpha_{\rm C}$, α_q, and a are the average return, the Fama-French three-factor alpha, the Pastor-Stambaugh alpha, the Carhart alpha, the q-model alpha, and the five-factor alpha. and $t_m, t_\alpha, t_{\rm FF}, t_{\rm PS}, t_{\rm C}$, t_q, and t_a are their t-statistics adjusted for heteroscedasticity and autocorrelations, respectively. $\overline{|\alpha|}$, $\overline{|\alpha_{\rm FF}|}$, $\overline{|\alpha_{\rm PS}|}$, $\overline{|\alpha_{\rm C}|}$, $\overline{|\alpha_q|}$, and $\overline{|a|}$ are the mean absolute alpha across a given set of deciles, and $p, p_{\rm FF}, p_{\rm PS}, p_{\rm C}, p_q$, and p_a are the p-value of the GRS test on the null that the alphas across the deciles are jointly zero. Table 3 describes the symbols, and Appendix B details variable definition and portfolio construction.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Sue1	Abr1	Abr6	Abr12	Re1	Re6	$R^6 1$	$R^6 6$	$R^6 12$	$R^{11} 1$	$R^{11} 6$	Im1	Im6	Im12	Rs1	dEf1	dEf6	dEf12
m	0.47	0.74	0.30	0.22	0.81	0.54	0.60	0.82	0.55	1.19	0.81	0.67	0.60	0.64	0.31	1.03	0.58	0.35
α	0.53	0.77	0.31	0.21	0.96	0.66	0.76	0.90	0.58	1.31	0.88	0.80	0.67	0.67	0.35	1.07	0.58	0.36
$\alpha_{\rm FF}$	0.72	0.84	0.38	0.32	1.13	0.86	0.92	1.08	0.82	1.52	1.16	0.93	0.77	0.83	0.63	1.25	0.76	0.56
$\alpha_{\rm PS}$	0.78	0.85	0.38	0.31	1.15	0.85	0.93	1.07	0.83	1.55	1.18	0.92	0.72	0.81	0.68	1.27	0.76	0.55
$\alpha_{\rm C}$	0.43	0.63	0.19	0.16	0.52	0.31	−0.26	0.08	0.09	0.19	0.10	0.09	−0.06	0.19	0.48	0.76	0.32	0.23
α_q	0.05	0.66	0.27	0.23	0.11	0.02	−0.04	0.24	0.16	0.31	0.12	0.26	0.06	0.32	0.22	0.64	0.20	0.09
a	0.51	0.85	0.44	0.40	0.88	0.68	0.73	0.97	0.77	1.26	1.02	0.73	0.64	0.82	0.53	1.22	0.78	0.54
t_m	3.42	5.85	3.24	2.84	3.28	2.49	2.04	3.49	2.90	4.06	3.14	2.74	3.08	3.71	2.21	4.65	3.23	2.45
t_α	4.11	6.21	3.48	2.76	4.18	3.29	2.85	4.09	3.17	4.91	3.65	3.34	3.49	3.88	2.50	4.89	3.29	2.54
$t_{\rm FF}$	6.08	6.24	4.08	4.47	4.99	4.48	3.53	4.98	4.78	5.83	5.14	4.01	4.06	5.00	4.80	5.88	4.56	4.37
$t_{\rm PS}$	6.35	6.13	4.00	4.41	5.34	4.64	3.46	4.81	4.75	5.79	5.12	3.84	3.64	4.61	5.33	5.99	4.76	4.44
$t_{\rm C}$	3.61	4.62	2.21	2.53	2.61	1.88	−1.31	0.79	0.90	1.58	0.89	0.45	−0.43	1.37	3.45	3.85	2.34	2.16
t_q	0.40	4.49	2.41	2.65	0.45	0.11	−0.10	0.78	0.75	0.77	0.41	0.80	0.23	1.44	1.52	2.81	1.15	0.70
t_a	3.69	6.12	4.43	5.24	3.46	3.03	2.11	3.50	3.93	3.59	3.69	2.53	2.68	4.16	3.85	5.23	4.37	4.07
$\overline{\lvert\alpha\rvert}$	0.16	0.14	0.09	0.08	0.18	0.13	0.15	0.16	0.13	0.21	0.16	0.23	0.17	0.17	0.10	0.27	0.16	0.12
$\overline{\lvert\alpha_{\rm FF}\rvert}$	0.23	0.16	0.11	0.11	0.24	0.21	0.16	0.18	0.15	0.25	0.21	0.22	0.16	0.17	0.15	0.32	0.21	0.18
$\overline{\lvert\alpha_{\rm PS}\rvert}$	0.23	0.16	0.11	0.10	0.25	0.22	0.16	0.18	0.15	0.25	0.21	0.21	0.15	0.16	0.16	0.32	0.21	0.18
$\overline{\lvert\alpha_{\rm C}\rvert}$	0.14	0.13	0.09	0.09	0.11	0.09	0.22	0.10	0.07	0.13	0.08	0.06	0.04	0.05	0.12	0.19	0.12	0.10
$\overline{\lvert\alpha_q\rvert}$	0.11	0.13	0.08	0.07	0.11	0.12	0.18	0.09	0.07	0.13	0.11	0.13	0.11	0.13	0.08	0.17	0.12	0.12
$\overline{\lvert a\rvert}$	0.20	0.16	0.09	0.09	0.19	0.17	0.13	0.16	0.15	0.23	0.20	0.23	0.21	0.22	0.14	0.27	0.17	0.15
p	0.00	0.00	0.00	0.01	0.01	0.13	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.00	0.01	0.03
$p_{\rm FF}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
$p_{\rm PS}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00
$p_{\rm C}$	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.01	0.90	0.30	0.19	0.00	0.00	0.00	0.01
p_q	0.00	0.00	0.00	0.00	0.08	0.01	0.00	0.00	0.03	0.00	0.01	0.51	0.03	0.11	0.03	0.00	0.00	0.03
p_a	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	Nei1	Nei6	52w6	$\epsilon^6 6$	$\epsilon^6 12$	$\epsilon^{11} 1$	$\epsilon^{11} 6$	$\epsilon^{11} 12$	Sm1	Ilr1	Ilr6	Ilr12	Ile1	Cm1	Cm12	Sim1	Cim1	Cim6
m	0.37	0.22	0.57	0.49	0.39	0.67	0.55	0.36	0.59	0.74	0.33	0.35	0.62	0.79	0.16	0.77	0.78	0.30
α	0.39	0.24	0.94	0.51	0.41	0.70	0.56	0.37	0.64	0.86	0.41	0.38	0.66	0.78	0.15	0.78	0.82	0.34
$\alpha_{\rm FF}$	0.58	0.45	1.10	0.53	0.49	0.73	0.63	0.47	0.64	0.91	0.45	0.44	0.89	0.79	0.18	0.76	0.82	0.34
$\alpha_{\rm PS}$	0.61	0.47	1.09	0.51	0.48	0.75	0.62	0.46	0.64	0.99	0.44	0.42	0.91	0.82	0.16	0.83	0.88	0.37
$\alpha_{\rm C}$	0.39	0.30	0.17	0.18	0.17	0.25	0.19	0.13	0.53	0.73	0.10	0.10	0.62	0.76	0.02	0.51	0.65	0.02
α_q	0.16	0.10	-0.01	0.30	0.22	0.32	0.25	0.15	0.61	0.79	0.17	0.18	0.37	0.72	0.05	0.54	0.64	0.05
a	0.44	0.33	0.73	0.52	0.47	0.63	0.61	0.46	0.76	0.89	0.37	0.38	0.71	0.82	0.13	0.81	0.76	0.26
t_m	3.31	2.03	2.02	3.86	3.92	3.91	3.94	2.96	2.57	3.61	3.18	4.18	3.70	3.74	2.30	3.37	3.45	2.83
t_α	3.52	2.20	4.33	4.05	4.14	4.10	4.06	3.09	2.73	4.14	4.01	4.82	3.93	3.58	2.14	3.30	3.51	3.20
$t_{\rm FF}$	6.00	4.87	5.71	4.10	4.67	4.12	4.32	3.82	2.71	4.14	4.46	5.49	5.32	3.67	2.50	3.07	3.60	3.07
$t_{\rm PS}$	6.15	5.06	5.62	3.90	4.54	4.15	4.23	3.68	2.73	4.35	4.19	5.15	5.18	3.80	2.28	3.33	3.72	3.24
$t_{\rm C}$	3.75	3.02	1.44	1.64	1.98	1.63	1.64	1.24	2.28	3.41	1.13	1.72	3.74	2.98	0.24	2.19	2.98	0.24
t_q	1.60	1.07	-0.04	1.79	1.66	1.46	1.39	0.94	2.18	3.15	1.22	1.59	2.13	2.75	0.49	1.65	2.29	0.27
t_a	4.55	3.68	2.93	3.56	3.95	3.17	3.79	3.37	3.16	3.71	2.97	3.67	4.17	3.52	1.45	2.76	2.99	1.73
$\overline{\lvert\alpha\rvert}$	0.17	0.13	0.20	0.11	0.10	0.18	0.14	0.10	0.16	0.23	0.12	0.13	0.15	0.20	0.06	0.22	0.22	0.10
$\overline{\lvert\alpha_{\rm FF}\rvert}$	0.21	0.17	0.23	0.11	0.11	0.18	0.15	0.12	0.16	0.21	0.08	0.09	0.18	0.22	0.08	0.21	0.21	0.08
$\overline{\lvert\alpha_{\rm PS}\rvert}$	0.21	0.17	0.23	0.11	0.11	0.19	0.16	0.13	0.16	0.23	0.08	0.09	0.18	0.24	0.08	0.22	0.23	0.09
$\overline{\lvert\alpha_{\rm C}\rvert}$	0.13	0.10	0.12	0.08	0.08	0.10	0.09	0.08	0.14	0.19	0.05	0.05	0.11	0.22	0.07	0.17	0.18	0.08
$\overline{\lvert\alpha_q\rvert}$	0.09	0.08	0.05	0.06	0.06	0.10	0.06	0.06	0.13	0.21	0.10	0.10	0.13	0.24	0.13	0.15	0.16	0.06
$\overline{\lvert\alpha_a\rvert}$	0.16	0.13	0.14	0.09	0.08	0.17	0.13	0.09	0.16	0.24	0.15	0.15	0.20	0.25	0.11	0.19	0.19	0.06
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.01	0.00	0.00	0.03	0.12	0.01	0.00	0.02
$p_{\rm FF}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.01	0.00	0.00	0.03	0.05	0.02	0.00	0.07
$p_{\rm PS}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.01	0.00	0.00	0.02	0.05	0.01	0.00	0.04
$p_{\rm C}$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.01	0.46	0.22	0.01	0.03	0.37	0.09	0.00	0.22
p_q	0.02	0.01	0.25	0.00	0.00	0.00	0.00	0.01	0.26	0.02	0.20	0.10	0.06	0.07	0.02	0.27	0.02	0.26
p_a	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.03	0.02	0.03	0.01	0.37

	37 Cim12	38 Bm	39 Bmj	40 Bm^{q}12	41 Rev1	42 Rev6	43 Rev12	44 Ep	45 Ep^{q}1	46 Ep^{q}6	47 Ep^{q}12	48 Efp1	49 Cp	50 Cp^{q}1	51 Cp^{q}6	52 Cp^{q}12	53 Nop	54 Em
m	0.26	0.59	0.49	0.51	−0.45	−0.44	−0.41	0.47	0.98	0.65	0.49	0.48	0.49	0.69	0.55	0.45	0.65	−0.59
α	0.28	0.62	0.55	0.51	−0.47	−0.47	−0.44	0.57	1.03	0.72	0.57	0.68	0.55	0.68	0.58	0.51	0.85	−0.71
α_{FF}	0.31	−0.05	−0.12	−0.16	0.04	−0.02	−0.04	−0.02	0.56	0.28	0.13	0.25	−0.09	0.12	0.03	−0.06	0.54	−0.24
α_{PS}	0.32	−0.03	−0.11	−0.15	0.04	−0.03	−0.05	−0.06	0.52	0.24	0.09	0.18	−0.12	0.03	−0.06	−0.13	0.51	−0.20
α_{C}	0.02	−0.04	0.11	0.18	−0.08	−0.11	−0.07	−0.06	0.72	0.37	0.17	0.49	−0.06	0.56	0.36	0.14	0.52	−0.16
α_q	0.06	0.18	0.30	0.39	−0.16	−0.20	−0.13	0.03	0.46	0.13	0.01	0.22	0.09	0.50	0.38	0.22	0.36	−0.27
a	0.28	0.01	−0.02	−0.01	0.06	−0.02	−0.03	−0.03	0.50	0.17	0.02	0.18	−0.09	0.17	0.07	−0.04	0.22	−0.12
t_m	3.38	2.84	2.27	2.35	−1.98	−2.04	−2.04	2.34	5.08	3.69	2.93	1.99	2.47	3.25	2.77	2.44	3.36	−3.12
t_α	3.64	2.95	2.50	2.39	−2.08	−2.19	−2.20	2.84	5.24	4.04	3.31	2.84	2.71	3.20	2.94	2.68	4.70	−3.75
t_{FF}	3.73	−0.40	−0.96	−1.23	0.24	−0.10	−0.22	−0.15	3.53	1.94	1.01	1.44	−0.77	0.76	0.21	−0.50	3.71	−1.77
t_{PS}	3.63	−0.28	−0.88	−1.24	0.21	−0.18	−0.30	−0.46	3.27	1.64	0.68	1.04	−1.01	0.21	−0.48	−1.17	3.49	−1.45
t_{C}	0.28	−0.34	0.80	1.42	−0.45	−0.59	−0.40	−0.47	4.40	2.66	1.39	2.94	−0.54	4.14	3.00	1.37	3.60	−1.18
t_q	0.49	1.15	1.70	2.25	−0.91	−1.15	−0.76	0.14	1.86	0.68	0.06	1.22	0.49	2.27	1.98	1.24	2.41	−1.56
t_a	2.44	0.12	−0.15	−0.07	0.37	−0.12	−0.17	−0.23	2.86	1.17	0.15	0.70	−0.76	0.90	0.49	−0.33	1.64	−0.89
$\overline{\lvert\alpha\rvert}$	0.09	0.19	0.17	0.16	0.21	0.18	0.18	0.20	0.27	0.21	0.19	0.20	0.20	0.23	0.19	0.19	0.24	0.20
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.08	0.06	0.07	0.05	0.10	0.09	0.10	0.09	0.17	0.12	0.10	0.10	0.08	0.09	0.06	0.06	0.16	0.10
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.08	0.07	0.07	0.06	0.10	0.09	0.10	0.08	0.16	0.12	0.10	0.09	0.09	0.07	0.05	0.07	0.15	0.09
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.06	0.06	0.09	0.09	0.10	0.08	0.08	0.09	0.20	0.15	0.11	0.16	0.08	0.18	0.11	0.08	0.15	0.09
$\overline{\lvert\alpha_q\rvert}$	0.06	0.09	0.12	0.13	0.08	0.07	0.06	0.10	0.17	0.14	0.11	0.18	0.12	0.20	0.15	0.12	0.12	0.12
$\overline{\lvert\alpha_a\rvert}$	0.07	0.06	0.09	0.09	0.05	0.04	0.03	0.08	0.16	0.11	0.09	0.10	0.10	0.13	0.09	0.07	0.10	0.11
p	0.01	0.02	0.05	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.04	0.00	0.00
p_{FF}	0.04	0.11	0.07	0.02	0.08	0.08	0.11	0.04	0.00	0.01	0.02	0.23	0.00	0.32	0.44	0.53	0.00	0.03
p_{PS}	0.04	0.05	0.11	0.03	0.13	0.13	0.16	0.07	0.02	0.00	0.01	0.43	0.01	0.53	0.52	0.34	0.00	0.07
p_{C}	0.81	0.11	0.07	0.01	0.30	0.13	0.23	0.14	0.00	0.00	0.01	0.00	0.03	0.00	0.01	0.38	0.00	0.09
p_q	0.22	0.11	0.01	0.00	0.32	0.09	0.27	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
p_a	0.13	0.55	0.13	0.07	0.57	0.54	0.77	0.27	0.00	0.00	0.02	0.17	0.01	0.03	0.08	0.25	0.01	0.02

	55 Em^{q}1	56 Em^{q}6	57 Em^{q}12	58 Sp	59 Sp^{q}1	60 Sp^{q}6	61 Sp^{q}12	62 Ocp	63 Ocp^{q}1	64 Ir	65 Vhp	66 Vfp	67 Ebp	68 Dur	69 Aci	70 I/A	71 Ia^{q}6	72 Ia^{q}12
m	−0.81	−0.53	−0.53	0.53	0.61	0.58	0.55	0.77	0.66	−0.51	0.38	0.53	0.47	−0.47	−0.31	−0.46	−0.52	−0.50
α	−0.93	−0.65	−0.66	0.50	0.54	0.54	0.52	0.84	0.63	−0.50	0.45	0.61	0.46	−0.55	−0.29	−0.56	−0.63	−0.60
α_{FF}	−0.60	−0.32	−0.31	−0.13	−0.12	−0.12	−0.12	0.16	0.21	0.13	−0.09	0.25	−0.17	0.01	−0.32	−0.23	−0.22	−0.23
α_{PS}	−0.52	−0.24	−0.23	−0.15	−0.16	−0.15	−0.14	0.12	0.14	0.12	−0.14	0.19	−0.16	0.04	−0.31	−0.27	−0.23	−0.24
α_{C}	−0.74	−0.43	−0.33	−0.02	0.31	0.23	0.12	0.22	0.61	0.05	−0.10	0.23	−0.09	0.02	−0.20	−0.18	−0.26	−0.20
α_q	−0.63	−0.34	−0.30	−0.04	0.21	0.15	0.06	0.41	0.46	−0.18	−0.01	0.22	0.09	−0.10	−0.17	0.07	−0.11	0.00
a	−0.44	−0.14	−0.12	−0.23	−0.20	−0.23	−0.22	0.12	0.17	0.04	−0.11	0.19	−0.09	−0.01	−0.31	0.02	0.01	0.03
t_m	−3.67	−2.57	−2.62	2.44	2.39	2.43	2.49	3.50	2.24	−2.41	2.03	2.42	2.36	−2.39	−2.20	−2.92	−3.04	−3.19
t_α	−4.12	−3.16	−3.28	2.27	2.18	2.27	2.32	3.72	2.15	−2.30	2.33	2.65	2.23	−2.76	−1.93	−3.57	−3.63	−3.72
t_{FF}	−3.20	−1.87	−2.00	−0.96	−0.66	−0.74	−0.79	1.18	0.95	0.92	−0.61	1.33	−1.48	0.11	−2.13	−1.79	−1.84	−2.01
t_{PS}	−2.83	−1.44	−1.50	−1.11	−0.91	−0.97	−1.02	0.89	0.65	0.88	−0.91	0.98	−1.33	0.34	−1.90	−2.06	−1.93	−2.13
t_{C}	−4.16	−2.68	−2.25	−0.14	1.62	1.42	0.85	1.68	3.26	0.38	−0.68	1.18	−0.78	0.19	−1.32	−1.33	−1.95	−1.56
t_q	−2.55	−1.59	−1.55	−0.19	0.70	0.59	0.28	2.25	1.47	−1.13	−0.05	0.95	0.66	−0.53	−1.05	0.61	−0.96	0.04
t_a	−2.29	−0.82	−0.82	−1.67	−0.98	−1.33	−1.52	0.89	0.74	0.31	−0.73	1.02	−0.83	−0.04	−2.05	0.20	0.13	0.34
$\overline{\lvert\alpha\rvert}$	0.31	0.23	0.23	0.21	0.22	0.20	0.20	0.26	0.29	0.20	0.19	0.16	0.18	0.21	0.10	0.16	0.18	0.20
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.21	0.13	0.13	0.06	0.05	0.05	0.05	0.12	0.21	0.08	0.08	0.10	0.08	0.09	0.12	0.12	0.10	0.12
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.19	0.11	0.11	0.06	0.05	0.05	0.06	0.11	0.20	0.07	0.09	0.10	0.07	0.09	0.12	0.13	0.09	0.12
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.25	0.16	0.13	0.06	0.15	0.12	0.10	0.11	0.30	0.07	0.08	0.08	0.08	0.07	0.11	0.11	0.12	0.12
$\overline{\lvert\alpha_q\rvert}$	0.23	0.15	0.13	0.06	0.08	0.07	0.07	0.11	0.19	0.07	0.14	0.15	0.12	0.08	0.13	0.09	0.07	0.06
$\overline{\lvert\alpha_a\rvert}$	0.19	0.11	0.10	0.09	0.08	0.09	0.09	0.07	0.12	0.06	0.11	0.14	0.08	0.05	0.14	0.10	0.05	0.05
p	0.00	0.00	0.00	0.09	0.21	0.17	0.08	0.00	0.00	0.01	0.00	0.10	0.01	0.00	0.01	0.00	0.00	0.00
p_{FF}	0.00	0.07	0.03	0.14	0.47	0.26	0.07	0.02	0.02	0.15	0.01	0.30	0.01	0.14	0.00	0.00	0.15	0.07
p_{PS}	0.00	0.11	0.07	0.15	0.54	0.37	0.06	0.03	0.03	0.20	0.02	0.35	0.01	0.10	0.00	0.00	0.26	0.12
p_{C}	0.00	0.01	0.02	0.24	0.10	0.12	0.05	0.03	0.00	0.44	0.06	0.29	0.02	0.31	0.00	0.00	0.03	0.03
p_q	0.00	0.00	0.00	0.27	0.32	0.41	0.21	0.03	0.28	0.44	0.01	0.06	0.00	0.42	0.00	0.00	0.05	0.14
p_a	0.00	0.01	0.00	0.10	0.54	0.44	0.17	0.38	0.44	0.18	0.06	0.09	0.10	0.69	0.00	0.00	0.19	0.24

	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	dPia	Noa	dNoa	dLno	Ig	2Ig	Nsi	dIi	Cei	Ivg	Ivc	Oa	dWc	dCoa	dNco	dNca	dFin	dFnl
m	−0.51	−0.40	−0.53	−0.40	−0.45	−0.37	−0.66	−0.30	−0.56	−0.36	−0.45	−0.27	−0.41	−0.29	−0.40	−0.41	0.28	−0.34
α	−0.57	−0.41	−0.62	−0.42	−0.49	−0.44	−0.77	−0.37	−0.79	−0.43	−0.52	−0.32	−0.48	−0.39	−0.45	−0.45	0.28	−0.39
α_{FF}	−0.40	−0.54	−0.41	−0.24	−0.30	−0.25	−0.65	−0.17	−0.54	−0.25	−0.39	−0.37	−0.47	−0.10	−0.31	−0.29	0.43	−0.35
α_{PS}	−0.44	−0.56	−0.42	−0.27	−0.29	−0.27	−0.65	−0.17	−0.51	−0.23	−0.45	−0.32	−0.47	−0.10	−0.35	−0.32	0.47	−0.39
α_{C}	−0.35	−0.44	−0.34	−0.17	−0.25	−0.12	−0.58	−0.04	−0.46	−0.16	−0.30	−0.32	−0.41	−0.06	−0.25	−0.26	0.41	−0.31
α_q	−0.22	−0.41	−0.10	0.03	−0.03	0.05	−0.29	0.12	−0.24	0.01	−0.30	−0.54	−0.48	0.12	−0.03	0.00	0.44	−0.08
a	−0.31	−0.45	−0.23	−0.07	−0.14	−0.08	−0.26	−0.02	−0.25	−0.10	−0.38	−0.52	−0.50	0.08	−0.15	−0.12	0.49	−0.16
t_m	−3.76	−2.94	−3.89	−3.03	−3.56	−2.74	−4.45	−2.70	−3.16	−2.57	−3.32	−2.13	−3.13	−2.08	−3.33	−3.32	2.31	−3.21
t_α	−4.31	−3.04	−4.60	−3.00	−3.79	−3.23	−5.34	−3.19	−5.29	−3.17	−3.74	−2.49	−3.62	−2.85	−3.72	−3.57	2.40	−3.66
t_{FF}	−3.13	−3.82	−3.16	−1.74	−2.61	−2.03	−4.78	−1.78	−4.56	−1.92	−2.95	−2.95	−3.73	−0.92	−2.50	−2.37	3.80	−3.35
t_{PS}	−3.28	−3.77	−3.21	−1.83	−2.43	−2.10	−4.59	−1.71	−4.16	−1.77	−3.45	−2.50	−3.64	−0.83	−2.82	−2.57	3.93	−3.52
t_{C}	−2.65	−3.21	−2.48	−1.10	−2.15	−1.06	−4.28	−0.39	−3.77	−1.19	−2.26	−2.30	−3.08	−0.54	−1.99	−2.03	3.45	−2.76
t_q	−1.77	−2.24	−0.66	0.16	−0.27	0.42	−2.19	1.14	−1.85	0.11	−2.11	−3.77	−3.43	1.16	−0.23	0.03	2.94	−0.73
t_a	−2.64	−2.76	−1.51	−0.47	−1.24	−0.64	−2.20	−0.23	−2.40	−0.85	−3.00	−4.06	−3.79	0.77	−1.19	−0.94	3.89	−1.54
$\overline{\lvert\alpha\rvert}$	0.15	0.15	0.18	0.13	0.12	0.13	0.20	0.13	0.17	0.14	0.15	0.15	0.14	0.14	0.15	0.16	0.11	0.13
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.13	0.17	0.14	0.11	0.12	0.12	0.18	0.10	0.15	0.10	0.11	0.13	0.13	0.10	0.13	0.13	0.12	0.13
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.14	0.17	0.14	0.11	0.12	0.12	0.19	0.10	0.15	0.10	0.12	0.12	0.13	0.09	0.14	0.14	0.12	0.13
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.12	0.15	0.13	0.11	0.10	0.11	0.16	0.07	0.14	0.09	0.10	0.12	0.12	0.09	0.12	0.12	0.11	0.12
$\overline{\lvert\alpha_q\rvert}$	0.12	0.11	0.07	0.05	0.09	0.08	0.11	0.07	0.12	0.10	0.08	0.13	0.13	0.08	0.10	0.10	0.08	0.09
$\overline{\lvert\alpha_a\rvert}$	0.10	0.10	0.08	0.06	0.07	0.06	0.11	0.05	0.10	0.10	0.08	0.12	0.12	0.06	0.08	0.09	0.09	0.08
p	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{PS}	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
p_{C}	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.03	0.00	0.07	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00
p_q	0.00	0.00	0.21	0.62	0.01	0.08	0.00	0.42	0.00	0.07	0.27	0.00	0.00	0.06	0.00	0.01	0.02	0.05
p_a	0.01	0.00	0.09	0.82	0.15	0.28	0.00	0.49	0.01	0.05	0.14	0.00	0.00	0.29	0.05	0.03	0.00	0.04

	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
	Dac	Poa	Pta	Pda	Ndf	Roe1	dRoe1	dRoe6	dRoe12	Roa1	dRoa1	dRoa6	Rna^{q}1	Ato^{q}1	Ato^{q}6	Ato^{q}12	Cto^{q}1	Cto^{q}6
m	−0.36	−0.40	−0.42	−0.37	−0.31	0.69	0.76	0.39	0.27	0.57	0.58	0.31	0.64	0.58	0.50	0.40	0.44	0.41
α	−0.36	−0.48	−0.53	−0.41	−0.38	0.86	0.80	0.42	0.30	0.75	0.58	0.30	0.86	0.48	0.41	0.30	0.39	0.35
α_{FF}	−0.46	−0.28	−0.33	−0.44	−0.29	1.07	0.89	0.51	0.38	0.95	0.66	0.39	1.10	0.69	0.65	0.56	0.45	0.43
α_{PS}	−0.41	−0.25	−0.32	−0.40	−0.30	1.11	0.93	0.53	0.39	0.99	0.70	0.43	1.14	0.70	0.65	0.56	0.46	0.44
α_{C}	−0.47	−0.21	−0.31	−0.36	−0.25	0.78	0.59	0.26	0.18	0.62	0.36	0.13	0.83	0.55	0.52	0.45	0.37	0.34
α_q	−0.64	−0.07	−0.15	−0.28	0.03	−0.03	0.34	−0.02	−0.09	0.04	0.06	−0.18	0.18	0.31	0.32	0.30	−0.11	−0.08
a	−0.60	−0.11	−0.13	−0.32	−0.04	0.51	0.79	0.41	0.28	0.49	0.53	0.26	0.50	0.37	0.38	0.33	−0.05	−0.03
t_m	−2.73	−2.85	−3.00	−3.19	−2.44	3.07	5.43	3.28	2.57	2.59	3.77	2.19	2.68	3.17	2.87	2.37	2.37	2.30
t_α	−2.66	−3.60	−4.14	−3.64	−2.94	4.09	6.14	3.83	3.17	3.63	3.84	2.25	3.99	2.56	2.25	1.76	1.97	1.85
t_{FF}	−3.56	−2.36	−2.66	−3.95	−2.37	5.55	6.29	4.17	3.68	5.23	4.28	2.76	5.70	4.22	4.36	3.91	2.44	2.44
t_{PS}	−3.13	−2.08	−2.50	−3.60	−2.46	5.55	6.17	4.10	3.61	5.46	4.50	2.97	6.12	4.06	4.22	3.76	2.42	2.43
t_{C}	−3.44	−1.78	−2.34	−3.02	−2.02	4.19	4.48	2.50	2.07	3.41	2.48	0.97	4.38	3.34	3.38	3.02	1.95	1.88
t_q	−4.37	−0.57	−1.07	−1.88	0.25	−0.27	2.29	−0.20	−0.96	0.31	0.36	−1.23	1.32	1.75	1.88	1.85	−0.65	−0.48
t_a	−4.30	−0.95	−1.03	−2.50	−0.36	3.64	5.39	3.29	2.62	3.46	3.24	1.83	3.55	2.39	2.69	2.46	−0.32	−0.23
$\overline{\lvert\alpha\rvert}$	0.11	0.12	0.13	0.12	0.12	0.16	0.20	0.13	0.10	0.15	0.19	0.12	0.16	0.13	0.11	0.08	0.12	0.11
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.12	0.12	0.11	0.15	0.10	0.23	0.21	0.15	0.12	0.22	0.19	0.14	0.23	0.16	0.14	0.12	0.13	0.13
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.12	0.11	0.11	0.14	0.10	0.23	0.22	0.16	0.13	0.23	0.20	0.14	0.23	0.16	0.14	0.12	0.12	0.13
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.12	0.11	0.11	0.14	0.09	0.15	0.13	0.10	0.09	0.13	0.12	0.07	0.16	0.13	0.12	0.12	0.10	0.11
$\overline{\lvert\alpha_q\rvert}$	0.15	0.12	0.08	0.17	0.08	0.10	0.09	0.07	0.08	0.06	0.10	0.08	0.07	0.11	0.07	0.08	0.09	0.09
$\overline{\lvert\alpha_a\rvert}$	0.13	0.12	0.07	0.16	0.05	0.11	0.15	0.09	0.06	0.14	0.16	0.10	0.14	0.15	0.11	0.10	0.08	0.09
p	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.04	0.09	0.00	0.00	0.04	0.01	0.03	0.19	0.17	0.02
p_{FF}	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.13	0.00
p_{C}	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.06	0.07	0.05	0.00	0.01	0.02	0.03	0.22	0.01
p_q	0.00	0.00	0.04	0.00	0.36	0.01	0.04	0.05	0.01	0.85	0.42	0.04	0.23	0.03	0.14	0.09	0.25	0.01
p_a	0.00	0.00	0.09	0.00	0.87	0.01	0.00	0.02	0.04	0.07	0.01	0.03	0.01	0.00	0.01	0.01	0.38	0.03

	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
	Cto^{q}12	Gpa	Gla^{q}1	Gla^{q}6	Gla^{q}12	Ole^{q}1	Ole^{q}6	Ola^{q}1	Ola^{q}6	Ola^{q}12	Cop	Cla	Cla^{q}1	Cla^{q}6	Cla^{q}12	F^{q}1	F^{q}6	F^{q}12
m	0.37	0.38	0.51	0.34	0.29	0.67	0.45	0.72	0.51	0.47	0.63	0.53	0.49	0.48	0.47	0.58	0.53	0.42
α	0.31	0.37	0.53	0.33	0.28	0.82	0.60	0.88	0.66	0.63	0.82	0.69	0.60	0.56	0.56	0.81	0.72	0.62
α_{FF}	0.41	0.55	0.71	0.53	0.47	0.80	0.59	1.16	0.94	0.90	1.08	0.99	0.80	0.74	0.75	0.73	0.66	0.54
α_{PS}	0.41	0.50	0.72	0.53	0.47	0.82	0.59	1.19	0.96	0.92	1.06	0.96	0.82	0.74	0.76	0.67	0.59	0.49
α_{C}	0.34	0.49	0.56	0.41	0.39	0.56	0.41	0.88	0.70	0.70	0.94	0.88	0.64	0.57	0.60	0.48	0.46	0.39
α_q	−0.05	0.18	0.20	0.10	0.13	−0.04	−0.16	0.37	0.25	0.33	0.69	0.74	0.43	0.40	0.46	0.13	0.15	0.07
a	−0.01	0.19	0.30	0.18	0.17	0.22	0.04	0.64	0.46	0.49	0.76	0.80	0.56	0.54	0.59	0.39	0.39	0.30
t_m	2.13	2.62	3.40	2.43	2.12	3.14	2.22	3.35	2.51	2.46	3.44	3.02	3.02	3.45	3.57	2.47	2.52	2.22
t_α	1.70	2.44	3.42	2.32	2.03	3.89	2.97	4.26	3.38	3.43	5.17	4.33	3.74	4.21	4.54	3.57	3.56	3.50
t_{FF}	2.36	3.84	4.65	3.80	3.60	4.20	3.24	6.43	5.58	5.91	8.12	7.90	5.59	6.35	7.19	3.59	3.72	3.66
t_{PS}	2.35	3.49	4.64	3.74	3.56	4.23	3.25	6.62	5.76	6.04	7.98	7.70	5.63	6.27	7.21	3.39	3.40	3.32
t_{C}	1.88	3.39	3.81	3.10	2.97	3.08	2.31	4.97	4.24	4.56	7.00	6.83	4.50	4.97	5.82	2.45	2.64	2.66
t_q	−0.31	1.24	1.41	0.79	1.01	−0.25	−1.06	2.34	1.78	2.48	4.77	4.89	2.69	2.82	3.56	0.58	0.86	0.49
t_a	−0.10	1.46	2.14	1.46	1.42	1.60	0.32	3.85	3.28	3.81	5.95	6.21	3.66	3.92	4.76	1.72	2.25	2.16
$\overline{\lvert\alpha\rvert}$	0.10	0.08	0.11	0.07	0.06	0.18	0.12	0.20	0.16	0.14	0.16	0.16	0.22	0.15	0.15	0.21	0.19	0.15
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.12	0.15	0.18	0.16	0.14	0.21	0.15	0.27	0.21	0.19	0.22	0.20	0.26	0.19	0.20	0.21	0.19	0.16
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.12	0.14	0.19	0.17	0.15	0.20	0.15	0.27	0.21	0.18	0.22	0.20	0.26	0.19	0.20	0.21	0.19	0.15
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.11	0.15	0.17	0.15	0.14	0.14	0.12	0.20	0.16	0.14	0.19	0.17	0.24	0.15	0.15	0.16	0.15	0.13
$\overline{\lvert\alpha_q\rvert}$	0.09	0.12	0.11	0.11	0.10	0.07	0.09	0.12	0.08	0.08	0.17	0.14	0.18	0.10	0.11	0.10	0.15	0.11
$\overline{\lvert\alpha_a\rvert}$	0.08	0.10	0.12	0.11	0.10	0.08	0.05	0.21	0.15	0.14	0.19	0.17	0.20	0.13	0.15	0.13	0.12	0.08
p	0.07	0.04	0.01	0.36	0.46	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{C}	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_q	0.01	0.11	0.12	0.20	0.41	0.09	0.01	0.01	0.03	0.04	0.00	0.00	0.00	0.05	0.00	0.10	0.00	0.00
p_a	0.02	0.04	0.02	0.09	0.26	0.20	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00

	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
	Fp6	Tbi^{q}12	Oca	Ioca	Adm	Rdm	Rdm^{q}1	Rdm^{q}6	Rdm^{q}12	Ol	Ol^{q}1	Ol^{q}6	Ol^{q}12	Hs	Etr	Rer	Eprd	Etl
m	−0.63	0.22	0.54	0.55	0.70	0.68	1.19	0.83	0.83	0.46	0.49	0.49	0.49	−0.31	0.25	0.32	−0.49	0.36
α	−1.04	0.26	0.66	0.62	0.72	0.50	1.06	0.74	0.78	0.49	0.56	0.57	0.57	−0.20	0.25	0.29	−0.58	0.32
α_{FF}	−1.36	0.31	0.69	0.57	0.09	0.29	0.86	0.49	0.52	0.43	0.55	0.53	0.53	−0.35	0.25	0.35	−0.94	0.36
α_{PS}	−1.37	0.21	0.71	0.56	0.06	0.29	0.78	0.45	0.49	0.39	0.53	0.50	0.52	−0.34	0.27	0.39	−1.02	0.43
α_{C}	−0.61	0.27	0.64	0.37	0.26	0.39	1.47	0.89	0.77	0.41	0.53	0.51	0.50	−0.27	0.21	0.33	−0.80	0.24
α_q	−0.17	0.34	0.13	0.07	0.08	0.70	1.47	0.97	0.80	0.03	0.07	0.09	0.12	−0.31	0.09	0.39	−0.49	0.28
a	−0.78	0.26	0.27	0.30	−0.09	0.46	0.85	0.57	0.50	0.11	0.19	0.18	0.22	−0.43	0.21	0.31	−0.80	0.38
t_m	−2.03	1.96	2.64	4.34	2.73	2.58	2.93	2.12	2.32	2.70	2.52	2.58	2.73	−2.08	2.35	2.25	−2.75	2.85
t_α	−4.04	2.42	3.09	4.65	2.80	2.00	2.62	1.87	2.08	2.75	2.77	2.93	3.11	−1.39	2.26	2.05	−3.30	2.61
t_{FF}	−6.43	2.78	3.35	4.44	0.50	1.27	2.24	1.47	1.75	2.52	2.78	2.81	2.99	−2.34	2.38	2.38	−6.02	2.87
t_{PS}	−6.63	1.88	3.34	4.23	0.33	1.27	2.04	1.38	1.70	2.21	2.67	2.64	2.85	−2.15	2.50	2.60	−6.51	3.19
t_{C}	−3.70	2.36	3.14	2.94	1.18	1.84	3.64	2.89	2.74	2.38	2.69	2.69	2.74	−1.61	1.92	2.10	−5.01	1.92
t_q	−0.63	2.93	0.65	0.53	0.31	2.89	2.97	2.73	2.80	0.19	0.37	0.54	0.69	−1.51	0.69	2.20	−2.77	1.55
t_a	−2.92	2.33	1.34	2.35	−0.44	1.93	2.05	1.67	1.73	0.68	1.05	1.08	1.34	−2.54	1.90	1.91	−5.01	2.65
$\overline{\lvert\alpha\rvert}$	0.15	0.08	0.15	0.13	0.23	0.14	0.26	0.22	0.26	0.11	0.12	0.11	0.12	0.09	0.10	0.07	0.13	0.10
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.22	0.10	0.20	0.14	0.14	0.18	0.30	0.27	0.30	0.12	0.10	0.10	0.10	0.09	0.11	0.12	0.20	0.10
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.22	0.09	0.20	0.14	0.14	0.19	0.29	0.28	0.31	0.10	0.10	0.09	0.09	0.09	0.12	0.13	0.22	0.11
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.12	0.10	0.20	0.11	0.20	0.21	0.45	0.37	0.37	0.13	0.12	0.12	0.12	0.09	0.11	0.13	0.17	0.09
$\overline{\lvert\alpha_q\rvert}$	0.12	0.10	0.12	0.10	0.07	0.27	0.55	0.49	0.47	0.11	0.09	0.09	0.09	0.14	0.10	0.15	0.17	0.08
$\overline{\lvert\alpha_a\rvert}$	0.10	0.10	0.11	0.10	0.07	0.21	0.38	0.34	0.34	0.08	0.08	0.07	0.08	0.16	0.08	0.12	0.22	0.09
p	0.00	0.02	0.03	0.00	0.08	0.24	0.10	0.45	0.19	0.23	0.13	0.01	0.02	0.27	0.01	0.69	0.01	0.04
p_{FF}	0.00	0.00	0.00	0.00	0.32	0.01	0.06	0.11	0.03	0.01	0.08	0.01	0.01	0.06	0.00	0.13	0.00	0.02
p_{PS}	0.00	0.00	0.00	0.00	0.25	0.01	0.08	0.09	0.03	0.02	0.08	0.02	0.02	0.09	0.00	0.08	0.00	0.00
p_{C}	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.01	0.00	0.01	0.08	0.01	0.02	0.07	0.01	0.05	0.00	0.19
p_q	0.00	0.00	0.05	0.01	0.69	0.00	0.00	0.00	0.00	0.03	0.15	0.03	0.01	0.03	0.02	0.02	0.01	0.23
p_a	0.00	0.00	0.10	0.01	0.77	0.01	0.01	0.02	0.01	0.06	0.24	0.10	0.04	0.00	0.05	0.06	0.00	0.06

	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161
	Alm$^{\rm q}$1	Alm$^{\rm q}$6	Alm$^{\rm q}$12	$R_{\rm a}^{1}$	$R_{\rm a}^{[2,5]}$	$R_{\rm n}^{[2,5]}$	$R_{\rm a}^{[6,10]}$	$R_{\rm n}^{[6,10]}$	$R_{\rm a}^{[11,15]}$	$R_{\rm a}^{[16,20]}$	Sv1	Dtv6	Dtv12	Ami12	Ts1	Isff1	Isq1
m	0.62	0.63	0.57	0.65	0.69	−0.51	0.83	−0.45	0.67	0.56	−0.53	−0.37	−0.42	0.42	0.23	0.34	0.27
α	0.55	0.56	0.50	0.55	0.66	−0.67	0.80	−0.59	0.68	0.60	−0.67	−0.35	−0.40	0.31	0.19	0.33	0.25
$\alpha_{\rm FF}$	0.03	0.08	0.05	0.65	0.71	−0.14	0.87	−0.25	0.70	0.63	−0.63	0.03	−0.03	−0.03	0.22	0.31	0.24
$\alpha_{\rm PS}$	−0.02	0.03	0.00	0.69	0.68	−0.12	0.88	−0.27	0.75	0.68	−0.67	0.05	−0.02	−0.05	0.21	0.32	0.24
$\alpha_{\rm C}$	0.12	0.10	0.02	0.42	0.74	−0.23	0.97	−0.14	0.68	0.64	−0.60	−0.05	−0.04	−0.04	0.26	0.26	0.20
α_q	0.28	0.25	0.15	0.55	0.81	−0.16	1.13	0.07	0.65	0.64	−0.35	−0.11	−0.13	0.15	0.31	0.31	0.31
a	0.10	0.14	0.11	0.65	0.73	0.03	1.05	−0.06	0.73	0.61	−0.34	0.00	−0.07	0.08	0.29	0.34	0.30
t_m	2.87	3.13	2.94	3.23	4.00	−2.22	4.91	−2.24	4.66	3.29	−2.47	−1.99	−2.28	1.99	2.11	3.50	2.88
t_α	2.48	2.74	2.55	2.75	3.70	−3.07	4.86	−2.95	4.87	3.48	−3.13	−1.89	−2.14	1.54	1.70	3.28	2.69
$t_{\rm FF}$	0.22	0.66	0.39	3.57	3.95	−0.82	4.92	−1.54	4.75	3.74	−2.89	0.39	−0.40	−0.38	2.06	3.24	2.65
$t_{\rm PS}$	−0.18	0.28	−0.02	3.68	3.65	−0.68	4.87	−1.57	4.85	3.85	−3.07	0.53	−0.29	−0.54	1.94	3.22	2.65
$t_{\rm C}$	0.85	0.82	0.13	2.42	3.69	−1.31	5.28	−0.75	4.83	3.48	−2.63	−0.52	−0.43	−0.46	2.38	2.61	2.19
t_q	1.77	1.78	1.08	2.48	3.90	−0.86	4.88	0.35	3.60	3.14	−1.42	−1.21	−1.65	2.03	2.75	2.64	3.01
t_a	0.70	1.24	0.94	3.35	3.93	0.18	5.22	−0.34	4.07	3.67	−1.43	0.04	−0.87	1.12	2.56	3.05	2.91
$\overline{\lvert\alpha\rvert}$	0.18	0.21	0.19	0.15	0.14	0.26	0.19	0.19	0.17	0.18	0.19	0.15	0.17	0.12	0.05	0.07	0.07
$\overline{\lvert\alpha_{\rm FF}\rvert}$	0.07	0.09	0.09	0.17	0.15	0.15	0.20	0.13	0.18	0.18	0.20	0.04	0.05	0.04	0.08	0.09	0.09
$\overline{\lvert\alpha_{\rm PS}\rvert}$	0.06	0.08	0.07	0.18	0.14	0.15	0.20	0.13	0.18	0.18	0.21	0.04	0.05	0.04	0.08	0.09	0.09
$\overline{\lvert\alpha_{\rm C}\rvert}$	0.07	0.08	0.07	0.12	0.15	0.15	0.23	0.11	0.17	0.17	0.18	0.06	0.06	0.04	0.08	0.08	0.09
$\overline{\lvert\alpha_q\rvert}$	0.09	0.10	0.07	0.15	0.17	0.13	0.24	0.15	0.18	0.17	0.12	0.08	0.09	0.12	0.10	0.10	0.11
$\overline{\lvert\alpha_a\rvert}$	0.06	0.07	0.06	0.17	0.16	0.09	0.22	0.15	0.20	0.16	0.12	0.04	0.05	0.08	0.08	0.10	0.09
p	0.09	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.04	0.08	0.51	0.08	0.06
$p_{\rm FF}$	0.30	0.22	0.25	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.01	0.02	0.00	0.00
$p_{\rm PS}$	0.29	0.32	0.29	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.03	0.04	0.02	0.00	0.00
$p_{\rm C}$	0.16	0.25	0.30	0.16	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.04	0.05	0.03	0.05	0.01	0.00
p_q	0.07	0.04	0.22	0.09	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.01	0.00	0.00
p_a	0.34	0.18	0.33	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.04	0.03	0.01	0.02	0.00	0.00

Table 7 : Significant Anomalies, ABM-EW, January 1967 to December 2014, 576 Months

For each high-minus-low decile, $m, \alpha, \alpha_{\mathrm{FF}}, \alpha_{\mathrm{PS}}, \alpha_{\mathrm{C}}$, α_q, and a are the average return, the Fama-French three-factor alpha, the Pastor-Stambaugh alpha, the Carhart alpha, the q-model alpha, and the five-factor alpha. and $t_m, t_\alpha, t_{\mathrm{FF}}, t_{\mathrm{PS}}, t_{\mathrm{C}}$, t_q, and t_a are their t-statistics adjusted for heteroscedasticity and autocorrelations, respectively. $\overline{|\alpha|}$, $\overline{|\alpha_{\mathrm{FF}}|}$, $\overline{|\alpha_{\mathrm{PS}}|}$, $\overline{|\alpha_{\mathrm{C}}|}$, $\overline{|\alpha_q|}$, and $\overline{|a|}$ are the mean absolute alpha across a given set of deciles, and $p, p_{\mathrm{FF}}, p_{\mathrm{PS}}, p_{\mathrm{C}}, p_q$, and p_a are the p-value of the GRS test on the null that the alphas across the deciles are jointly zero. Table 3 describes the symbols, and Appendix B details variable definition and portfolio construction.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Sue1	Sue6	Abr1	Abr6	Abr12	Re1	Re6	Re12	R^61	R^66	R^612	$R^{11}1$	$R^{11}6$	Im1	Im6	Im12	Rs1	Rs6
m	0.84	0.40	0.96	0.45	0.31	0.76	0.43	0.26	1.06	0.91	0.56	1.22	0.76	0.97	0.69	0.67	0.57	0.28
α	0.88	0.43	1.00	0.46	0.30	0.80	0.47	0.31	1.19	0.96	0.58	1.29	0.78	1.08	0.74	0.69	0.63	0.32
α_{FF}	1.07	0.63	1.05	0.52	0.37	0.91	0.59	0.43	1.33	1.11	0.79	1.54	1.08	1.14	0.78	0.79	0.83	0.54
α_{PS}	1.10	0.66	1.05	0.52	0.38	0.90	0.59	0.42	1.35	1.13	0.82	1.58	1.12	1.13	0.74	0.78	0.88	0.58
α_{C}	0.74	0.36	0.87	0.31	0.21	0.45	0.19	0.15	0.18	0.04	0.01	0.24	0.03	0.39	0.02	0.20	0.67	0.38
α_q	0.37	0.00	0.85	0.31	0.22	0.24	−0.05	−0.08	0.38	0.08	0.01	0.39	0.07	0.54	0.15	0.33	0.27	0.04
a	0.84	0.43	1.01	0.52	0.38	0.82	0.48	0.31	1.13	0.91	0.68	1.34	0.96	0.94	0.64	0.75	0.60	0.33
t_m	6.31	3.59	8.67	5.65	5.13	4.01	2.69	2.04	3.87	3.86	2.87	4.28	2.89	4.15	3.63	3.98	4.56	2.44
t_α	7.25	4.16	9.39	6.05	5.37	4.51	3.11	2.53	4.56	4.35	3.15	4.81	3.14	4.53	3.88	4.07	5.20	2.85
t_{FF}	8.71	6.03	9.12	6.24	6.24	5.19	4.07	3.72	5.30	4.82	4.26	5.73	4.43	4.95	4.16	4.70	7.55	5.58
t_{PS}	8.54	6.15	8.85	6.41	6.59	5.05	3.99	3.65	5.15	4.75	4.35	5.76	4.51	4.71	3.78	4.41	8.11	5.98
t_{C}	6.21	3.60	8.60	3.53	3.39	2.66	1.37	1.31	0.95	0.28	0.06	1.86	0.17	1.97	0.15	1.49	5.67	3.60
t_q	3.50	0.03	5.66	2.19	2.33	1.43	−0.33	−0.65	0.96	0.21	0.03	0.97	0.21	1.66	0.59	1.47	2.56	0.37
t_a	6.73	4.06	8.13	4.82	5.30	4.53	2.90	2.37	3.26	2.80	2.91	3.76	3.25	3.18	2.60	3.68	5.26	3.14
$\overline{\|\alpha\|}$	0.25	0.18	0.24	0.17	0.15	0.19	0.13	0.11	0.25	0.24	0.19	0.30	0.23	0.30	0.22	0.20	0.19	0.16
$\overline{\|\alpha_{\mathrm{FF}}\|}$	0.27	0.14	0.20	0.11	0.09	0.24	0.16	0.12	0.20	0.21	0.16	0.31	0.22	0.26	0.18	0.16	0.18	0.11
$\overline{\|\alpha_{\mathrm{PS}}\|}$	0.28	0.15	0.19	0.11	0.09	0.24	0.17	0.12	0.20	0.21	0.16	0.32	0.23	0.25	0.17	0.16	0.19	0.12
$\overline{\|\alpha_{\mathrm{C}}\|}$	0.20	0.13	0.19	0.15	0.17	0.15	0.13	0.14	0.13	0.11	0.13	0.10	0.12	0.13	0.04	0.06	0.16	0.14
$\overline{\|\alpha_q\|}$	0.10	0.10	0.19	0.17	0.18	0.13	0.15	0.16	0.16	0.14	0.15	0.11	0.13	0.16	0.09	0.11	0.09	0.10
$\overline{\|\alpha_a\|}$	0.22	0.09	0.20	0.11	0.09	0.22	0.14	0.10	0.18	0.16	0.13	0.27	0.18	0.26	0.20	0.20	0.12	0.07
p	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{C}	0.00	0.00	0.00	0.00	0.00	0.01	0.13	0.09	0.00	0.00	0.00	0.01	0.01	0.10	0.22	0.25	0.00	0.00
p_q	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.29	0.18	0.21	0.01	0.04
p_a	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	Tes1	Tes6	dEf1	dEf6	dEf12	Nei1	Nei6	52w6	52w12	ϵ^61	ϵ^66	ϵ^612	$\epsilon^{11}1$	$\epsilon^{11}6$	$\epsilon^{11}12$	Sm1	Sm6	Sm12
m	0.31	0.25	1.20	0.58	0.37	0.46	0.25	0.73	0.60	0.51	0.61	0.40	0.93	0.60	0.33	0.90	0.27	0.26
α	0.23	0.18	1.22	0.58	0.36	0.49	0.28	1.10	0.92	0.57	0.65	0.43	0.95	0.61	0.34	0.95	0.31	0.27
α_{FF}	0.39	0.33	1.38	0.71	0.50	0.61	0.39	1.14	1.00	0.61	0.68	0.50	1.01	0.70	0.45	0.92	0.27	0.26
α_{PS}	0.41	0.36	1.38	0.71	0.50	0.64	0.42	1.14	1.01	0.61	0.68	0.50	1.03	0.70	0.44	0.95	0.26	0.25
α_{C}	0.24	0.22	0.98	0.36	0.24	0.42	0.22	0.14	0.15	0.17	0.28	0.18	0.50	0.28	0.13	0.84	0.02	0.04
α_q	0.02	−0.01	0.95	0.27	0.14	0.04	−0.15	−0.17	−0.16	0.30	0.35	0.20	0.57	0.31	0.14	0.89	0.04	0.03
a	0.29	0.25	1.37	0.72	0.49	0.35	0.13	0.65	0.59	0.54	0.66	0.49	0.94	0.69	0.46	1.00	0.21	0.21
t_m	2.54	2.15	6.23	3.97	3.20	4.32	2.36	2.62	2.41	3.55	4.86	3.87	5.87	4.22	2.83	4.47	2.64	3.59
t_α	1.95	1.50	6.52	4.08	3.21	4.70	2.70	4.83	4.62	4.00	5.16	4.06	5.96	4.29	2.88	4.66	2.92	3.65
t_{FF}	3.30	3.00	7.52	5.36	4.81	5.95	4.01	5.31	5.18	4.22	5.35	4.79	6.10	4.92	3.94	4.43	2.62	3.38
t_{PS}	3.53	3.33	7.48	5.35	4.95	6.16	4.34	5.32	5.34	4.21	5.22	4.67	6.17	4.87	3.78	4.61	2.50	3.37
t_{C}	2.13	2.06	5.81	2.96	2.51	4.20	2.17	0.83	0.92	1.35	2.66	2.06	3.88	2.46	1.35	4.09	0.24	0.60
t_q	0.14	−0.07	4.54	1.82	1.17	0.58	−2.02	−0.49	−0.58	1.72	2.19	1.70	2.85	1.90	1.10	3.44	0.26	0.34
t_a	2.47	2.40	6.57	4.95	4.30	4.01	1.47	2.14	2.38	3.34	4.53	4.39	5.04	4.60	3.93	4.33	1.59	2.15
$\overline{\|\alpha\|}$	0.20	0.20	0.31	0.17	0.13	0.25	0.18	0.30	0.26	0.20	0.21	0.19	0.27	0.22	0.19	0.29	0.19	0.17
$\overline{\|\alpha_{\mathrm{FF}}\|}$	0.14	0.11	0.36	0.19	0.14	0.24	0.15	0.26	0.24	0.13	0.15	0.12	0.23	0.16	0.11	0.24	0.07	0.06
$\overline{\|\alpha_{\mathrm{PS}}\|}$	0.14	0.11	0.36	0.19	0.14	0.23	0.15	0.26	0.24	0.13	0.15	0.12	0.24	0.17	0.11	0.25	0.07	0.06
$\overline{\|\alpha_{\mathrm{C}}\|}$	0.14	0.15	0.23	0.15	0.14	0.21	0.17	0.12	0.13	0.11	0.13	0.14	0.15	0.15	0.14	0.24	0.11	0.09
$\overline{\|\alpha_q\|}$	0.10	0.10	0.23	0.16	0.19	0.11	0.09	0.12	0.13	0.09	0.11	0.11	0.14	0.11	0.11	0.20	0.06	0.03
$\overline{\|\alpha_a\|}$	0.09	0.06	0.33	0.18	0.13	0.19	0.11	0.15	0.14	0.12	0.13	0.11	0.22	0.15	0.10	0.23	0.13	0.14
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
p_{C}	0.05	0.01	0.00	0.00	0.02	0.00	0.00	0.03	0.11	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
p_q	0.66	0.18	0.00	0.01	0.05	0.00	0.00	0.08	0.20	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.63
p_a	0.20	0.17	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08

	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Ilr1	Ilr6	Ilr12	Ile1	Ile6	Cm1	Cm6	Cm12	Sim1	Sim6	Sim12	Cim1	Cim6	Cim12	Bm	Bmj	Bm$^{\mathrm{q}}$12	Am
m	0.89	0.45	0.36	0.78	0.32	0.53	0.19	0.16	1.15	0.30	0.22	1.00	0.39	0.33	0.74	0.53	0.52	0.62
α	0.96	0.50	0.39	0.79	0.35	0.55	0.22	0.18	1.17	0.31	0.23	1.02	0.42	0.34	0.94	0.70	0.68	0.77
α_{FF}	0.97	0.52	0.42	0.96	0.51	0.55	0.20	0.17	1.17	0.32	0.24	1.02	0.42	0.37	0.24	0.02	−0.03	0.02
α_{PS}	1.04	0.51	0.41	0.98	0.55	0.60	0.22	0.18	1.23	0.34	0.24	1.06	0.44	0.37	0.21	−0.04	−0.09	−0.02
α_{C}	0.82	0.20	0.11	0.75	0.29	0.43	0.00	0.02	0.99	−0.03	−0.06	0.80	0.10	0.08	0.17	0.30	0.29	0.01
α_q	0.90	0.29	0.19	0.50	0.09	0.38	−0.02	0.01	0.95	0.08	0.04	0.87	0.19	0.16	0.08	0.19	0.16	−0.18
a	0.98	0.47	0.37	0.78	0.40	0.53	0.12	0.12	1.17	0.29	0.22	1.06	0.39	0.36	0.01	−0.12	−0.17	−0.25
t_m	4.41	4.35	4.52	5.01	2.37	2.78	2.31	2.69	5.24	2.41	2.52	4.12	3.63	4.13	3.24	2.14	2.18	2.49
t_α	4.75	4.97	4.97	4.86	2.55	2.88	2.78	2.96	5.19	2.55	2.53	4.30	3.96	4.36	4.19	2.95	2.90	3.01
t_{FF}	4.54	5.02	5.20	5.90	3.73	2.82	2.38	2.90	4.80	2.33	2.60	4.04	3.55	4.19	2.59	0.11	−0.21	0.16
t_{PS}	4.65	4.68	4.91	5.68	3.85	3.09	2.60	3.15	5.00	2.41	2.58	4.05	3.53	4.08	2.24	−0.32	−0.73	−0.16
t_{C}	4.15	2.18	1.77	4.56	2.13	1.94	0.05	0.26	4.30	−0.22	−0.78	3.50	1.04	1.14	1.46	2.30	2.46	0.05
t_q	3.50	1.79	1.57	2.76	0.58	1.48	−0.16	0.08	2.76	0.34	0.26	2.53	0.99	1.21	0.37	0.88	0.74	−0.76
t_a	4.15	3.44	3.50	4.52	2.56	2.38	0.99	1.62	3.98	1.53	1.85	3.45	2.46	3.10	0.08	−0.86	−1.33	−1.89
$\overline{\lvert\alpha\rvert}$	0.30	0.19	0.17	0.19	0.14	0.14	0.10	0.09	0.34	0.15	0.14	0.32	0.16	0.14	0.25	0.21	0.21	0.22
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.27	0.10	0.09	0.21	0.13	0.14	0.08	0.08	0.29	0.08	0.07	0.29	0.10	0.08	0.05	0.04	0.03	0.05
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.28	0.10	0.09	0.21	0.14	0.15	0.09	0.09	0.31	0.08	0.07	0.31	0.11	0.08	0.04	0.04	0.02	0.05
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.25	0.09	0.08	0.13	0.08	0.12	0.07	0.09	0.28	0.11	0.11	0.26	0.13	0.12	0.13	0.13	0.13	0.13
$\overline{\lvert\alpha_q\rvert}$	0.25	0.07	0.06	0.10	0.05	0.19	0.21	0.22	0.25	0.09	0.08	0.26	0.12	0.11	0.14	0.14	0.15	0.14
$\overline{\lvert\alpha_a\rvert}$	0.27	0.14	0.14	0.20	0.14	0.17	0.07	0.06	0.29	0.09	0.09	0.30	0.09	0.09	0.03	0.05	0.06	0.07
p	0.00	0.00	0.00	0.00	0.10	0.11	0.05	0.05	0.00	0.02	0.02	0.00	0.00	0.00	0.01	0.02	0.02	0.02
p_{FF}	0.00	0.00	0.00	0.00	0.01	0.16	0.16	0.10	0.00	0.07	0.06	0.00	0.00	0.00	0.59	0.75	0.71	0.36
p_{PS}	0.00	0.00	0.00	0.00	0.01	0.09	0.11	0.07	0.00	0.08	0.06	0.00	0.00	0.00	0.68	0.73	0.90	0.17
p_{C}	0.00	0.03	0.04	0.00	0.42	0.42	0.69	0.70	0.00	0.08	0.15	0.00	0.05	0.10	0.10	0.00	0.00	0.10
p_q	0.00	0.02	0.02	0.11	0.95	0.07	0.13	0.13	0.00	0.00	0.00	0.00	0.01	0.01	0.20	0.07	0.00	0.05
p_a	0.00	0.00	0.00	0.00	0.03	0.13	0.28	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.37	0.08	0.26

	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	Rev1	Rev6	Rev12	Ep	Ep$^{\mathrm{q}}$1	Ep$^{\mathrm{q}}$6	Ep$^{\mathrm{q}}$12	Cp	Cp$^{\mathrm{q}}$1	Cp$^{\mathrm{q}}$6	Cp$^{\mathrm{q}}$12	Op	Op$^{\mathrm{q}}$1	Op$^{\mathrm{q}}$6	Op$^{\mathrm{q}}$12	Nop	Nop$^{\mathrm{q}}$6	Nop$^{\mathrm{q}}$12
m	−0.62	−0.53	−0.50	0.61	1.12	0.80	0.53	0.74	0.83	0.53	0.54	0.41	0.38	0.37	0.31	0.66	0.46	0.45
α	−0.69	−0.60	−0.57	0.80	1.22	0.93	0.67	0.92	0.94	0.67	0.69	0.64	0.52	0.55	0.49	0.89	0.76	0.76
α_{FF}	−0.27	−0.23	−0.23	0.31	0.80	0.53	0.28	0.27	0.38	0.10	0.12	0.24	0.36	0.39	0.33	0.59	0.48	0.48
α_{PS}	−0.25	−0.20	−0.21	0.26	0.74	0.48	0.22	0.24	0.29	0.01	0.03	0.23	0.38	0.42	0.36	0.59	0.49	0.49
α_{C}	−0.22	−0.19	−0.19	0.29	1.04	0.69	0.36	0.19	0.77	0.40	0.26	0.20	0.62	0.56	0.41	0.44	0.46	0.41
α_q	−0.30	−0.26	−0.20	0.23	0.62	0.33	0.10	0.09	0.43	0.14	0.07	0.23	0.38	0.33	0.19	0.21	0.01	−0.04
a	−0.21	−0.20	−0.20	0.18	0.64	0.33	0.09	0.02	0.14	−0.11	−0.10	0.17	0.18	0.19	0.14	0.25	0.10	0.09
t_m	−3.44	−3.10	−3.05	3.12	5.41	4.45	3.19	3.30	3.49	2.38	2.62	2.08	2.22	2.47	2.19	3.65	1.98	2.04
t_α	−3.79	−3.54	−3.56	4.21	5.82	5.32	4.19	4.19	3.95	3.06	3.36	3.84	3.09	3.85	3.74	5.52	3.36	3.57
t_{FF}	−1.76	−1.60	−1.71	2.86	5.07	4.13	2.60	2.45	2.13	0.69	0.92	1.83	2.68	3.51	3.32	4.93	3.89	4.01
t_{PS}	−1.61	−1.40	−1.53	2.30	4.58	3.59	2.00	2.13	1.62	0.06	0.23	1.82	2.87	3.83	3.67	5.03	3.99	4.12
t_{C}	−1.35	−1.24	−1.28	2.56	7.48	6.09	3.64	1.39	5.43	2.88	2.02	1.38	4.71	5.13	3.99	3.59	3.21	2.83
t_q	−1.91	−1.55	−1.18	1.29	2.45	1.67	0.58	0.38	1.54	0.56	0.31	1.26	1.87	2.51	1.76	1.53	0.07	−0.22
t_a	−1.38	−1.41	−1.43	1.48	3.90	2.65	0.87	0.16	0.78	−0.71	−0.82	1.25	1.20	1.70	1.40	2.11	0.85	0.76
$\overline{\lvert\alpha\rvert}$	0.26	0.26	0.25	0.26	0.34	0.28	0.23	0.28	0.29	0.25	0.25	0.29	0.23	0.25	0.24	0.27	0.23	0.23
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.10	0.09	0.09	0.08	0.20	0.13	0.08	0.08	0.11	0.06	0.06	0.12	0.15	0.14	0.14	0.14	0.13	0.13
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.09	0.09	0.09	0.08	0.19	0.13	0.08	0.07	0.09	0.05	0.05	0.11	0.15	0.14	0.13	0.13	0.13	0.13
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.14	0.15	0.15	0.15	0.28	0.20	0.16	0.14	0.21	0.15	0.14	0.18	0.23	0.22	0.21	0.19	0.16	0.16
$\overline{\lvert\alpha_q\rvert}$	0.08	0.09	0.09	0.07	0.16	0.09	0.07	0.07	0.14	0.09	0.09	0.10	0.15	0.11	0.09	0.11	0.14	0.15
$\overline{\lvert\alpha_a\rvert}$	0.04	0.04	0.04	0.04	0.15	0.08	0.05	0.05	0.09	0.06	0.04	0.08	0.12	0.10	0.08	0.06	0.06	0.05
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
p_{FF}	0.02	0.02	0.00	0.10	0.00	0.00	0.12	0.18	0.16	0.40	0.80	0.00	0.01	0.01	0.01	0.00	0.02	0.00
p_{PS}	0.11	0.10	0.01	0.12	0.00	0.00	0.16	0.36	0.48	0.60	0.88	0.00	0.01	0.00	0.01	0.00	0.01	0.00
p_{C}	0.04	0.02	0.00	0.07	0.00	0.00	0.00	0.15	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_q	0.15	0.24	0.16	0.50	0.00	0.00	0.03	0.29	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.03	0.01	0.00
p_a	0.45	0.38	0.15	0.56	0.00	0.00	0.15	0.58	0.04	0.05	0.51	0.03	0.01	0.02	0.04	0.02	0.29	0.02

	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	Sg	Em	Em^{q}1	Em^{q}6	Em^{q}12	Sp	Sp^{q}1	Sp^{q}6	Sp^{q}12	Ocp	Ocp^{q}1	Ir	Vhp	Ebp	Ndp	Dur	Aci	I/A
m	−0.41	−0.80	−0.97	−0.54	−0.55	0.77	0.77	0.67	0.64	0.65	0.59	−0.64	0.50	0.61	0.32	−0.65	−0.31	−0.69
α	−0.56	−1.00	−1.15	−0.77	−0.79	0.91	0.85	0.78	0.75	0.84	0.69	−0.70	0.64	0.78	0.35	−0.88	−0.32	−0.83
α_{FF}	−0.27	−0.47	−0.80	−0.41	−0.41	0.18	0.12	0.06	0.05	0.20	0.27	−0.09	0.16	0.05	−0.10	−0.36	−0.30	−0.55
α_{PS}	−0.28	−0.45	−0.77	−0.38	−0.39	0.09	0.03	−0.03	−0.04	0.18	0.24	−0.04	0.09	0.02	−0.13	−0.32	−0.33	−0.57
α_{C}	−0.20	−0.34	−1.03	−0.54	−0.42	0.19	0.58	0.39	0.25	0.07	0.59	−0.15	0.18	0.01	0.00	−0.19	−0.18	−0.46
α_q	−0.02	−0.10	−0.57	−0.10	−0.05	−0.29	−0.02	−0.16	−0.27	−0.01	0.14	−0.21	0.13	−0.17	0.14	0.01	−0.12	−0.29
a	−0.05	−0.10	−0.37	0.04	0.04	−0.36	−0.39	−0.46	−0.48	−0.09	−0.07	−0.02	0.03	−0.25	0.00	−0.06	−0.24	−0.34
t_m	−2.96	−3.70	−3.61	−2.26	−2.48	2.79	2.53	2.37	2.35	2.94	1.98	−3.29	2.71	2.46	2.10	−2.96	−3.64	−4.74
t_α	−4.33	−4.72	−4.31	−3.23	−3.51	3.19	2.78	2.71	2.70	3.85	2.24	−3.54	3.41	3.09	2.21	−4.28	−3.75	−5.86
t_{FF}	−2.56	−3.65	−3.89	−2.31	−2.69	0.99	0.54	0.27	0.24	1.68	1.22	−0.79	1.30	0.41	−0.94	−2.73	−3.48	−4.65
t_{PS}	−2.56	−3.42	−3.79	−2.20	−2.62	0.50	0.11	−0.15	−0.19	1.59	1.13	−0.34	0.73	0.15	−1.28	−2.43	−3.81	−4.76
t_{C}	−1.82	−2.35	−5.62	−3.36	−2.78	1.03	2.86	2.08	1.36	0.46	3.08	−1.18	1.51	0.10	0.02	−1.29	−2.04	−3.79
t_q	−0.16	−0.45	−1.82	−0.38	−0.22	−1.11	−0.05	−0.53	−0.98	−0.07	0.40	−1.34	0.71	−0.73	1.02	0.07	−1.27	−2.46
t_a	−0.58	−0.71	−1.87	0.28	0.33	−2.43	−1.83	−2.69	−3.20	−0.61	−0.31	−0.19	0.23	−2.07	−0.03	−0.50	−2.72	−3.21
$\overline{\lvert\alpha\rvert}$	0.23	0.30	0.38	0.30	0.30	0.26	0.26	0.25	0.24	0.32	0.28	0.27	0.24	0.23	0.16	0.28	0.22	0.28
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.12	0.11	0.23	0.14	0.13	0.06	0.05	0.04	0.04	0.13	0.18	0.08	0.07	0.04	0.06	0.10	0.09	0.15
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.12	0.10	0.22	0.13	0.12	0.05	0.04	0.03	0.03	0.11	0.16	0.07	0.07	0.04	0.08	0.09	0.09	0.15
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.17	0.15	0.30	0.20	0.18	0.13	0.16	0.14	0.14	0.20	0.26	0.16	0.14	0.13	0.06	0.14	0.17	0.19
$\overline{\lvert\alpha_q\rvert}$	0.11	0.09	0.18	0.10	0.11	0.14	0.13	0.15	0.17	0.14	0.18	0.09	0.07	0.13	0.06	0.10	0.10	0.14
$\overline{\lvert\alpha_a\rvert}$	0.07	0.05	0.15	0.07	0.04	0.10	0.10	0.11	0.12	0.05	0.10	0.04	0.04	0.07	0.13	0.04	0.07	0.08
p	0.00	0.00	0.00	0.00	0.00	0.02	0.08	0.08	0.07	0.00	0.02	0.00	0.00	0.02	0.23	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.07	0.14	0.44	0.94	0.92	0.79	0.00	0.09	0.19	0.36	0.80	0.74	0.05	0.00	0.00
p_{PS}	0.00	0.01	0.00	0.13	0.28	0.56	0.89	0.89	0.72	0.00	0.13	0.31	0.39	0.76	0.55	0.10	0.00	0.00
p_{C}	0.00	0.01	0.00	0.00	0.01	0.07	0.02	0.08	0.08	0.00	0.00	0.04	0.17	0.13	0.91	0.04	0.00	0.00
p_q	0.16	0.01	0.00	0.00	0.01	0.08	0.01	0.02	0.03	0.02	0.01	0.70	0.22	0.03	0.39	0.04	0.14	0.01
p_a	0.29	0.11	0.00	0.16	0.47	0.05	0.04	0.01	0.01	0.02	0.05	0.69	0.58	0.24	0.23	0.34	0.09	0.01

	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
	Ia^{q}1	Ia^{q}6	Ia^{q}12	dPia	Noa	dNoa	dLno	Ig	2Ig	3Ig	Nsi	dIi	Cei	Cdi	Ivg	Ivc	Oa	Ta
m	−0.81	−0.84	−0.78	−0.64	−0.58	−0.74	−0.57	−0.41	−0.46	−0.34	−0.82	−0.46	−0.67	−0.25	−0.48	−0.50	−0.28	−0.43
α	−0.94	−0.98	−0.91	−0.75	−0.63	−0.84	−0.63	−0.48	−0.54	−0.44	−0.99	−0.53	−0.92	−0.31	−0.58	−0.58	−0.29	−0.50
α_{FF}	−0.56	−0.65	−0.61	−0.62	−0.78	−0.70	−0.52	−0.32	−0.39	−0.28	−0.82	−0.40	−0.72	−0.28	−0.46	−0.49	−0.28	−0.34
α_{PS}	−0.54	−0.65	−0.61	−0.66	−0.81	−0.71	−0.52	−0.33	−0.40	−0.26	−0.82	−0.40	−0.70	−0.29	−0.46	−0.54	−0.27	−0.32
α_{C}	−0.56	−0.56	−0.50	−0.51	−0.66	−0.58	−0.43	−0.23	−0.25	−0.19	−0.64	−0.26	−0.57	−0.23	−0.34	−0.43	−0.29	−0.36
α_q	−0.54	−0.48	−0.39	−0.35	−0.74	−0.44	−0.31	−0.04	−0.12	−0.03	−0.28	−0.15	−0.31	−0.16	−0.28	−0.43	−0.50	−0.42
a	−0.37	−0.45	−0.41	−0.46	−0.82	−0.55	−0.40	−0.14	−0.25	−0.14	−0.37	−0.27	−0.47	−0.23	−0.37	−0.51	−0.47	−0.36
t_m	−4.52	−5.25	−5.58	−5.10	−3.56	−5.79	−4.99	−4.37	−4.11	−2.96	−5.59	−4.76	−4.09	−3.03	−4.26	−4.36	−2.27	−3.74
t_α	−5.13	−6.16	−6.68	−6.42	−4.00	−7.04	−5.60	−5.19	−5.07	−4.20	−7.32	−5.79	−6.94	−4.12	−5.44	−5.14	−2.34	−4.50
t_{FF}	−3.81	−5.06	−5.34	−5.30	−4.63	−5.85	−4.48	−3.78	−3.77	−2.84	−6.29	−4.77	−7.00	−3.78	−4.17	−4.47	−2.25	−3.22
t_{PS}	−3.73	−5.24	−5.51	−5.53	−4.79	−5.96	−4.39	−3.87	−3.88	−2.61	−6.22	−4.81	−7.03	−3.69	−4.20	−4.95	−2.15	−3.06
t_{C}	−3.77	−4.00	−3.96	−4.37	−4.13	−4.94	−3.95	−2.49	−2.38	−1.87	−4.70	−3.05	−4.98	−3.12	−3.17	−3.84	−2.03	−2.79
t_q	−3.57	−3.31	−3.06	−2.85	−3.45	−3.55	−2.54	−0.45	−1.17	−0.32	−2.14	−1.69	−2.40	−2.04	−2.34	−3.55	−3.82	−3.85
t_a	−2.59	−3.56	−3.61	−4.44	−5.17	−5.04	−3.72	−1.61	−2.60	−1.50	−3.23	−3.28	−4.35	−3.02	−3.51	−5.24	−4.36	−3.61
$\overline{\lvert\alpha\rvert}$	0.30	0.31	0.31	0.25	0.24	0.29	0.21	0.20	0.23	0.23	0.27	0.22	0.28	0.22	0.25	0.21	0.22	0.22
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.16	0.17	0.17	0.16	0.17	0.19	0.12	0.09	0.12	0.11	0.16	0.11	0.16	0.08	0.12	0.11	0.13	0.09
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.14	0.16	0.16	0.16	0.17	0.18	0.12	0.09	0.12	0.10	0.16	0.11	0.15	0.08	0.12	0.11	0.13	0.08
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.19	0.21	0.23	0.21	0.21	0.22	0.17	0.15	0.17	0.16	0.20	0.15	0.20	0.14	0.18	0.17	0.18	0.17
$\overline{\lvert\alpha_q\rvert}$	0.16	0.18	0.20	0.17	0.17	0.17	0.11	0.12	0.11	0.11	0.15	0.11	0.11	0.06	0.10	0.12	0.16	0.12
$\overline{\lvert\alpha_a\rvert}$	0.11	0.12	0.13	0.13	0.15	0.13	0.08	0.04	0.06	0.04	0.11	0.06	0.08	0.08	0.07	0.10	0.12	0.07
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
p_{C}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_q	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.40	0.59	0.79	0.00	0.11	0.00	0.23	0.01	0.00	0.00	0.00
p_a	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.80	0.28	0.90	0.00	0.09	0.00	0.02	0.00	0.00	0.00	0.04

	109 dWc	110 dCoa	111 dCol	112 dNco	113 dNca	114 dFin	115 dLti	116 dFnl	117 dBe	118 Dac	119 Poa	120 Pta	121 Pda	122 Nxf	123 Nef	124 Ndf	125 Roe1	126 Roe6
m	−0.36	−0.55	−0.41	−0.68	−0.66	0.32	−0.27	−0.46	−0.64	−0.32	−0.41	−0.50	−0.31	−0.66	−0.54	−0.41	0.97	0.66
α	−0.43	−0.68	−0.53	−0.75	−0.73	0.31	−0.36	−0.51	−0.77	−0.32	−0.49	−0.60	−0.36	−0.87	−0.79	−0.46	1.09	0.79
α_{FF}	−0.40	−0.47	−0.28	−0.60	−0.56	0.44	−0.28	−0.45	−0.47	−0.37	−0.34	−0.47	−0.37	−0.70	−0.56	−0.40	1.16	0.86
α_{PS}	−0.40	−0.48	−0.31	−0.61	−0.57	0.46	−0.31	−0.47	−0.48	−0.38	−0.33	−0.44	−0.36	−0.70	−0.56	−0.42	1.14	0.86
α_{C}	−0.33	−0.38	−0.21	−0.50	−0.46	0.43	−0.12	−0.39	−0.42	−0.39	−0.23	−0.43	−0.26	−0.53	−0.42	−0.33	0.86	0.55
α_q	−0.39	−0.25	−0.01	−0.30	−0.25	0.47	0.02	−0.17	−0.34	−0.46	−0.15	−0.34	−0.18	−0.22	−0.08	−0.12	0.07	−0.22
a	−0.46	−0.33	−0.07	−0.41	−0.35	0.55	−0.07	−0.28	−0.34	−0.45	−0.24	−0.34	−0.26	−0.33	−0.14	−0.22	0.54	0.23
t_m	−3.30	−4.25	−3.31	−5.59	−5.42	2.80	−2.31	−5.23	−4.39	−3.32	−3.75	−4.85	−4.30	−3.82	−2.84	−4.15	4.53	3.39
t_α	−4.07	−5.68	−4.51	−6.25	−6.05	2.71	−3.25	−5.83	−5.57	−3.26	−4.60	−6.45	−5.03	−5.77	−4.58	−4.78	5.23	4.08
t_{FF}	−3.81	−4.51	−2.99	−5.11	−4.77	3.68	−2.59	−4.90	−4.17	−3.85	−3.83	−5.29	−4.94	−5.39	−4.10	−4.01	5.90	4.68
t_{PS}	−3.74	−4.66	−3.33	−5.14	−4.82	3.92	−2.78	−5.30	−4.27	−3.98	−3.58	−5.03	−4.88	−5.47	−4.15	−4.40	5.69	4.60
t_{C}	−3.19	−3.57	−2.06	−4.40	−4.02	3.60	−1.06	−4.16	−3.49	−3.46	−2.50	−4.62	−3.37	−4.24	−2.86	−3.43	4.30	2.86
t_q	−3.61	−2.39	−0.13	−2.53	−2.13	3.18	0.16	−1.91	−2.90	−4.23	−1.54	−3.71	−2.00	−1.67	−0.54	−1.29	0.52	−1.59
t_a	−5.17	−3.60	−0.86	−3.70	−3.17	4.72	−0.69	−3.21	−3.04	−5.03	−2.80	−3.70	−3.20	−2.60	−1.10	−2.28	4.06	1.74
$\overline{\lvert\alpha\rvert}$	0.22	0.24	0.22	0.24	0.24	0.21	0.18	0.21	0.25	0.19	0.20	0.20	0.16	0.27	0.27	0.20	0.26	0.23
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.12	0.12	0.10	0.15	0.14	0.13	0.09	0.13	0.09	0.11	0.12	0.09	0.11	0.17	0.14	0.10	0.24	0.19
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.12	0.12	0.10	0.15	0.14	0.13	0.10	0.13	0.10	0.11	0.12	0.08	0.11	0.16	0.13	0.10	0.23	0.19
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.19	0.18	0.16	0.20	0.19	0.19	0.15	0.19	0.17	0.17	0.18	0.18	0.16	0.21	0.19	0.19	0.19	0.17
$\overline{\lvert\alpha_q\rvert}$	0.16	0.14	0.12	0.15	0.15	0.15	0.16	0.14	0.12	0.14	0.16	0.14	0.14	0.13	0.10	0.14	0.12	0.14
$\overline{\lvert\alpha_a\rvert}$	0.10	0.08	0.06	0.10	0.10	0.12	0.09	0.13	0.07	0.10	0.13	0.09	0.11	0.09	0.05	0.12	0.11	0.07
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{C}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_q	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
p_a	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00

	127 dRoe1	128 dRoe6	129 dRoe12	130 Roa1	131 Roa6	132 dRoa1	133 dRoa6	134 dRoa12	135 Cto	136 Rna^{q}1	137 Rna^{q}6	138 Rna^{q}12	139 Pm^{q}1	140 Ato^{q}1	141 Ato^{q}6	142 Ato^{q}12	143 Cto^{q}1	144 Cto^{q}6
m	0.87	0.44	0.24	0.89	0.62	0.85	0.42	0.24	0.36	0.87	0.59	0.47	0.63	0.74	0.57	0.46	0.79	0.68
α	0.91	0.46	0.27	1.02	0.76	0.85	0.42	0.25	0.27	1.02	0.74	0.61	0.84	0.67	0.49	0.38	0.79	0.68
α_{FF}	1.00	0.57	0.38	1.07	0.84	0.93	0.53	0.35	0.25	1.12	0.83	0.70	0.81	0.80	0.64	0.55	0.65	0.55
α_{PS}	0.99	0.57	0.39	1.09	0.87	0.94	0.56	0.38	0.21	1.16	0.86	0.73	0.76	0.85	0.68	0.58	0.67	0.58
α_{C}	0.73	0.35	0.19	0.80	0.54	0.63	0.30	0.16	0.24	0.93	0.64	0.48	0.63	0.62	0.48	0.41	0.55	0.41
α_q	0.49	0.10	−0.02	0.11	−0.14	0.38	0.05	−0.05	−0.14	0.24	−0.03	−0.11	0.00	0.31	0.18	0.13	−0.13	−0.24
a	0.92	0.50	0.32	0.50	0.26	0.83	0.46	0.29	−0.16	0.49	0.19	0.11	0.29	0.46	0.31	0.23	−0.01	−0.11
t_m	6.60	4.03	2.62	4.06	3.02	5.65	3.21	2.24	2.01	3.98	2.89	2.43	2.61	4.21	3.24	2.60	3.58	3.30
t_α	7.38	4.52	3.19	4.73	3.74	6.05	3.43	2.43	1.49	4.74	3.60	3.23	3.52	3.77	2.81	2.17	3.34	3.06
t_{FF}	8.49	5.93	4.64	5.28	4.43	6.91	4.56	3.54	1.47	5.64	4.40	4.06	3.89	5.03	4.06	3.44	3.06	2.74
t_{PS}	7.70	5.54	4.52	5.36	4.65	6.71	4.62	3.79	1.21	5.90	4.60	4.31	3.61	5.37	4.27	3.65	3.20	2.88
t_{C}	5.99	3.85	2.54	3.85	2.74	4.57	2.60	1.71	1.39	4.48	3.38	2.64	2.93	3.86	2.94	2.44	2.59	2.02
t_q	3.49	0.92	−0.23	0.78	−1.17	2.43	0.34	−0.41	−0.75	1.45	−0.24	−0.79	0.02	1.93	1.16	0.82	−0.69	−1.41
t_a	7.28	4.83	3.56	3.48	1.85	5.77	3.64	2.59	−1.18	3.67	1.63	0.93	1.82	2.94	2.09	1.64	−0.07	−0.69
$\overline{\lvert\alpha\rvert}$	0.29	0.21	0.18	0.25	0.24	0.30	0.22	0.20	0.17	0.31	0.26	0.23	0.21	0.14	0.14	0.14	0.16	0.16
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.27	0.16	0.11	0.23	0.19	0.27	0.17	0.12	0.09	0.25	0.18	0.14	0.14	0.16	0.13	0.10	0.11	0.09
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.28	0.16	0.12	0.24	0.20	0.28	0.17	0.12	0.10	0.26	0.19	0.15	0.15	0.17	0.13	0.10	0.11	0.09
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.20	0.15	0.16	0.17	0.18	0.20	0.15	0.17	0.15	0.22	0.17	0.16	0.14	0.14	0.15	0.16	0.12	0.15
$\overline{\lvert\alpha_q\rvert}$	0.13	0.11	0.13	0.14	0.17	0.15	0.12	0.14	0.12	0.14	0.15	0.17	0.13	0.12	0.13	0.15	0.10	0.15
$\overline{\lvert\alpha_a\rvert}$	0.24	0.12	0.07	0.13	0.08	0.25	0.14	0.10	0.09	0.10	0.09	0.09	0.11	0.14	0.11	0.10	0.06	0.06
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.03	0.01	0.00
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09	0.06
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09	0.06
p_{C}	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.02
p_q	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.03
p_a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.51	0.43

	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
	Cto^{q}12	Gpa	Gla^{q}1	Gla^{q}6	Gla^{q}12	Ope	Ole^{q}1	Ole^{q}6	Ole^{q}12	Opa	Ola^{q}1	Ola^{q}6	Ola^{q}12	Cop	Cla	Cla^{q}1	Cla^{q}6	Cla^{q}12
m	0.55	0.62	0.81	0.56	0.50	0.47	0.96	0.53	0.42	0.64	1.02	0.67	0.57	0.76	0.63	0.88	0.73	0.68
α	0.55	0.61	0.83	0.57	0.50	0.60	1.08	0.66	0.54	0.75	1.11	0.78	0.68	0.91	0.72	1.00	0.83	0.79
α_{FF}	0.46	0.60	0.85	0.59	0.53	0.46	0.90	0.48	0.37	0.92	1.27	0.93	0.84	1.07	0.96	1.04	0.85	0.82
α_{PS}	0.48	0.56	0.89	0.62	0.55	0.45	0.91	0.50	0.38	0.96	1.30	0.96	0.86	1.11	0.99	1.03	0.86	0.83
α_{C}	0.30	0.50	0.76	0.48	0.41	0.29	0.78	0.32	0.18	0.64	1.05	0.66	0.54	0.84	0.78	0.91	0.69	0.63
α_q	−0.31	−0.08	0.12	−0.12	−0.10	−0.42	0.08	−0.35	−0.44	0.12	0.50	0.12	0.07	0.54	0.61	0.62	0.36	0.35
a	−0.17	−0.01	0.22	−0.03	−0.03	−0.29	0.30	−0.14	−0.23	0.34	0.75	0.39	0.33	0.72	0.74	0.71	0.51	0.52
t_m	2.78	3.52	4.39	3.29	3.02	2.12	4.12	2.48	2.00	3.27	4.78	3.45	3.04	4.92	4.27	6.01	5.65	5.63
t_α	2.59	3.21	4.27	3.14	2.85	2.62	4.56	2.98	2.55	3.80	5.09	3.88	3.61	6.54	5.15	6.87	6.31	6.65
t_{FF}	2.30	3.47	4.58	3.40	3.20	2.20	4.28	2.43	1.92	5.33	6.55	5.19	4.97	8.27	7.62	8.20	7.66	7.78
t_{PS}	2.45	3.21	4.81	3.59	3.38	2.11	4.30	2.50	2.02	5.58	6.61	5.30	5.13	8.43	7.74	7.94	7.53	7.74
t_{C}	1.48	2.98	4.17	2.81	2.47	1.32	3.91	1.57	0.83	3.31	5.36	3.61	3.02	6.57	5.95	7.08	5.70	5.44
t_q	−1.88	−0.54	0.72	−0.78	−0.72	−1.81	0.44	−1.80	−2.17	0.47	3.21	0.74	0.37	3.12	3.20	5.49	2.60	2.31
t_a	−1.12	−0.09	1.61	−0.20	−0.27	−2.25	2.08	−1.02	−1.68	1.74	4.35	2.33	1.88	4.93	4.91	6.35	4.35	4.12
$\overline{\lvert\alpha\rvert}$	0.15	0.15	0.19	0.17	0.16	0.20	0.28	0.23	0.20	0.21	0.28	0.23	0.20	0.27	0.24	0.31	0.25	0.24
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.08	0.14	0.19	0.16	0.13	0.11	0.20	0.14	0.11	0.19	0.29	0.22	0.17	0.23	0.21	0.30	0.23	0.21
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.08	0.14	0.20	0.17	0.15	0.11	0.20	0.14	0.10	0.19	0.29	0.22	0.17	0.24	0.21	0.29	0.23	0.21
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.17	0.16	0.18	0.16	0.15	0.15	0.21	0.18	0.17	0.19	0.25	0.19	0.17	0.24	0.22	0.28	0.21	0.20
$\overline{\lvert\alpha_q\rvert}$	0.17	0.15	0.14	0.17	0.17	0.14	0.13	0.16	0.18	0.14	0.14	0.13	0.14	0.15	0.15	0.20	0.15	0.15
$\overline{\lvert\alpha_a\rvert}$	0.08	0.09	0.13	0.12	0.11	0.08	0.10	0.08	0.08	0.11	0.20	0.13	0.12	0.17	0.16	0.21	0.15	0.15
p	0.00	0.00	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.01	0.01	0.51	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.01	0.59	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{C}	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_q	0.00	0.00	0.01	0.00	0.00	0.10	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_a	0.04	0.02	0.01	0.02	0.03	0.16	0.07	0.14	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
	F	F^{q}1	F^{q}6	F^{q}12	Fp6	O	O^{q}1	G	Sg^{q}12	Oca	Ioca	Adm	gAd	Rdm	Rdm^{q}1	Rdm^{q}6	Rdm^{q}12	Ol
m	0.56	0.93	0.70	0.54	−0.57	−0.30	−0.35	0.55	−0.29	0.46	0.37	0.67	−0.41	1.00	1.32	1.14	1.27	0.42
α	0.80	1.20	0.95	0.78	−0.94	−0.40	−0.47	0.73	−0.41	0.51	0.45	0.85	−0.50	0.87	1.15	1.04	1.20	0.48
α_{FF}	0.71	1.04	0.79	0.62	−1.08	−0.56	−0.64	0.82	−0.08	0.62	0.47	0.28	−0.32	0.75	0.99	0.86	1.00	0.41
α_{PS}	0.69	1.00	0.77	0.59	−1.11	−0.53	−0.66	0.82	−0.06	0.63	0.44	0.25	−0.31	0.74	0.93	0.80	0.97	0.39
α_{C}	0.48	0.89	0.62	0.42	−0.29	−0.45	−0.58	0.69	−0.18	0.69	0.40	0.28	−0.22	0.75	1.60	1.35	1.31	0.41
α_q	0.23	0.41	0.16	0.01	0.13	−0.26	−0.17	0.40	−0.15	0.48	0.40	−0.15	0.07	0.90	1.60	1.35	1.28	−0.02
a	0.47	0.70	0.47	0.32	−0.50	−0.35	−0.31	0.50	0.10	0.46	0.46	−0.20	0.00	0.80	0.93	0.79	0.86	0.02
t_m	2.57	3.82	3.29	2.75	−2.08	−2.25	−2.06	2.87	−2.04	2.30	3.91	2.33	−2.41	3.99	3.73	3.31	3.99	2.25
t_α	4.45	5.15	4.59	4.14	−4.10	−3.11	−2.84	4.17	−2.98	2.54	5.06	2.93	−2.93	3.48	3.38	3.03	3.63	2.52
t_{FF}	4.38	5.48	4.85	4.46	−5.09	−4.51	−4.31	5.09	−0.75	3.15	5.05	1.28	−1.87	3.26	3.02	2.73	3.52	2.17
t_{PS}	4.27	5.24	4.66	4.38	−5.44	−4.24	−4.41	5.12	−0.57	3.12	4.73	1.19	−1.85	3.29	2.94	2.66	3.54	2.02
t_{C}	2.76	4.83	3.74	2.80	−1.52	−3.46	−3.54	3.98	−1.49	3.40	3.92	1.19	−1.02	3.18	4.83	4.65	4.67	2.25
t_q	1.27	1.98	0.92	0.04	0.38	−1.72	−1.22	2.05	−1.27	1.89	3.16	−0.51	0.25	3.23	4.00	3.92	4.74	−0.13
t_a	2.75	3.69	2.99	2.33	−1.64	−2.54	−2.40	2.84	0.98	2.17	4.59	−0.93	−0.01	3.28	2.61	2.43	3.17	0.11
$\overline{\lvert\alpha\rvert}$	0.25	0.33	0.26	0.22	0.26	0.19	0.22	0.22	0.21	0.15	0.13	0.24	0.28	0.19	0.22	0.21	0.25	0.13
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.19	0.29	0.22	0.18	0.21	0.12	0.12	0.23	0.10	0.17	0.14	0.08	0.14	0.17	0.23	0.21	0.26	0.06
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.19	0.28	0.21	0.18	0.21	0.11	0.12	0.23	0.10	0.16	0.13	0.07	0.13	0.17	0.24	0.22	0.26	0.07
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.17	0.26	0.20	0.17	0.15	0.17	0.16	0.20	0.16	0.21	0.15	0.24	0.29	0.29	0.37	0.36	0.43	0.16
$\overline{\lvert\alpha_q\rvert}$	0.10	0.14	0.10	0.12	0.15	0.13	0.13	0.18	0.13	0.18	0.17	0.23	0.21	0.38	0.57	0.56	0.61	0.13
$\overline{\lvert\alpha_a\rvert}$	0.13	0.19	0.12	0.10	0.09	0.08	0.08	0.11	0.06	0.14	0.10	0.12	0.08	0.24	0.39	0.36	0.39	0.07
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.00	0.01	0.10	0.06	0.00	0.13
p_{FF}	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.50	0.03	0.02	0.20	0.12	0.00	0.12
p_{PS}	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.02	0.00	0.56	0.02	0.02	0.32	0.12	0.00	0.06
p_{C}	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.03
p_q	0.13	0.03	0.54	0.67	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.04	0.19	0.00	0.00	0.00	0.00	0.05
p_a	0.01	0.00	0.09	0.27	0.01	0.04	0.01	0.03	0.12	0.05	0.00	0.21	0.56	0.01	0.01	0.04	0.01	0.10

	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
	$\mathrm{Ol}^{\mathrm{q}}1$	$\mathrm{Ol}^{\mathrm{q}}6$	$\mathrm{Ol}^{\mathrm{q}}12$	Hn	Parc	dSi	Rer	Eprd	Ala	$\mathrm{Alm}^{\mathrm{q}}1$	$\mathrm{Alm}^{\mathrm{q}}6$	$\mathrm{Alm}^{\mathrm{q}}12$	R_{a}^{1}	R_{n}^{1}	$R_{\mathrm{a}}^{[2,5]}$	$R_{\mathrm{n}}^{[2,5]}$	$R_{\mathrm{a}}^{[6,10]}$	$R_{\mathrm{n}}^{[6,10]}$
m	0.55	0.53	0.49	−0.49	0.29	0.17	0.37	−0.62	−0.46	0.62	0.64	0.58	0.60	0.70	0.54	−0.83	0.65	−0.42
α	0.57	0.56	0.53	−0.63	0.32	0.19	0.37	−0.78	−0.71	0.76	0.77	0.70	0.52	0.76	0.50	−1.02	0.63	−0.52
α_{FF}	0.53	0.50	0.48	−0.37	0.30	0.18	0.37	−1.06	−0.34	0.17	0.21	0.17	0.63	1.05	0.57	−0.55	0.65	−0.32
α_{PS}	0.56	0.51	0.49	−0.39	0.28	0.18	0.38	−1.07	−0.35	0.12	0.17	0.13	0.67	1.10	0.55	−0.52	0.65	−0.33
α_{C}	0.57	0.52	0.48	−0.28	0.29	0.16	0.35	−0.86	−0.26	0.19	0.12	0.05	0.45	−0.25	0.68	−0.53	0.81	−0.22
α_q	0.16	0.13	0.11	−0.05	0.25	0.19	0.32	−0.58	0.00	0.00	−0.08	−0.16	0.51	0.08	0.73	−0.46	0.82	0.02
a	0.19	0.16	0.15	−0.11	0.24	0.23	0.37	−0.85	−0.06	−0.14	−0.12	−0.15	0.64	1.01	0.64	−0.35	0.74	−0.14
t_m	2.62	2.60	2.50	−3.60	2.31	2.05	3.73	−3.53	−2.29	2.51	2.88	2.76	3.40	2.32	4.04	−3.98	5.77	−2.68
t_α	2.66	2.73	2.67	−4.73	2.50	2.29	3.70	−4.84	−4.01	2.87	3.17	3.11	2.90	2.71	3.75	−5.28	5.75	−3.40
t_{FF}	2.50	2.42	2.40	−3.64	2.22	2.10	3.70	−7.80	−3.04	1.10	1.56	1.29	3.83	3.64	4.32	−3.81	5.67	−2.41
t_{PS}	2.59	2.46	2.44	−3.86	2.03	2.06	3.70	−7.50	−3.09	0.77	1.29	1.04	4.03	3.75	4.16	−3.60	5.72	−2.42
t_{C}	2.79	2.57	2.45	−2.72	2.07	1.81	3.38	−5.92	−2.34	1.14	0.83	0.33	2.61	−1.56	4.74	−3.57	6.08	−1.57
t_q	0.75	0.63	0.54	−0.46	1.63	2.03	2.86	−3.81	0.02	0.01	−0.46	−0.86	2.59	0.18	4.76	−2.77	5.05	0.12
t_a	0.96	0.84	0.83	−1.23	1.56	2.65	3.50	−5.98	−0.58	−0.97	−0.92	−1.12	3.75	2.61	4.55	−2.27	5.53	−1.03
$\overline{\lvert\alpha\rvert}$	0.16	0.16	0.14	0.22	0.13	0.21	0.10	0.27	0.25	0.24	0.25	0.23	0.19	0.18	0.23	0.31	0.26	0.26
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.10	0.09	0.08	0.10	0.14	0.09	0.07	0.23	0.09	0.05	0.06	0.06	0.15	0.21	0.14	0.14	0.17	0.11
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.10	0.10	0.08	0.10	0.14	0.09	0.07	0.23	0.08	0.04	0.05	0.05	0.16	0.22	0.14	0.13	0.16	0.12
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.13	0.15	0.17	0.16	0.35	0.16	0.18	0.21	0.17	0.10	0.13	0.15	0.14	0.12	0.19	0.16	0.23	0.13
$\overline{\lvert\alpha_q\rvert}$	0.11	0.12	0.13	0.12	0.34	0.08	0.21	0.15	0.12	0.15	0.18	0.18	0.13	0.18	0.17	0.10	0.20	0.06
$\overline{\lvert\alpha_a\rvert}$	0.06	0.06	0.05	0.08	0.16	0.08	0.10	0.20	0.07	0.08	0.07	0.07	0.13	0.23	0.16	0.06	0.18	0.09
p	0.01	0.01	0.04	0.00	0.06	0.00	0.02	0.00	0.00	0.04	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
p_{FF}	0.04	0.01	0.05	0.00	0.08	0.00	0.04	0.00	0.00	0.87	0.50	0.04	0.00	0.00	0.00	0.00	0.00	0.17
p_{PS}	0.03	0.01	0.03	0.00	0.14	0.00	0.03	0.00	0.00	0.95	0.50	0.05	0.00	0.00	0.00	0.00	0.00	0.14
p_{C}	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.14	0.01	0.01	0.00	0.00	0.00	0.00	0.15
p_q	0.01	0.02	0.05	0.00	0.00	0.02	0.00	0.00	0.00	0.08	0.10	0.02	0.02	0.00	0.00	0.01	0.00	0.40
p_a	0.07	0.08	0.19	0.01	0.01	0.02	0.01	0.00	0.00	0.41	0.56	0.08	0.01	0.00	0.00	0.05	0.00	0.29

	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
	$R_{\mathrm{a}}^{[11,15]}$	$R_{\mathrm{a}}^{[16,20]}$	Ivc1	Ivq1	Sv1	Srev	Dtv1	Dtv6	Dtv12	Ami6	Ami12	$\mathrm{Lm}^{6}1$	$\mathrm{Lm}^{6}6$	$\mathrm{Lm}^{6}12$	$\mathrm{Lm}^{12}1$	$\mathrm{Lm}^{12}6$	$\mathrm{Lm}^{12}12$	Mdr1
m	0.44	0.49	−0.69	−0.63	−0.45	−0.52	−0.36	−0.45	−0.45	0.37	0.38	0.53	0.52	0.51	0.50	0.52	0.46	−0.67
α	0.46	0.51	−1.21	−1.12	−0.56	−0.36	−0.49	−0.58	−0.58	0.32	0.32	0.91	0.90	0.88	0.87	0.88	0.81	−1.12
α_{FF}	0.46	0.52	−0.97	−0.88	−0.52	−0.31	−0.11	−0.20	−0.21	0.05	0.06	0.60	0.60	0.59	0.60	0.62	0.57	−0.88
α_{PS}	0.47	0.55	−0.93	−0.86	−0.57	−0.26	−0.11	−0.20	−0.21	0.05	0.06	0.56	0.56	0.57	0.56	0.60	0.55	−0.86
α_{C}	0.46	0.57	−0.75	−0.67	−0.48	−0.60	−0.15	−0.16	−0.12	0.04	0.05	0.54	0.46	0.39	0.46	0.42	0.34	−0.75
α_q	0.37	0.59	−0.14	−0.08	−0.14	−0.57	0.04	−0.01	0.02	0.15	0.14	0.12	0.06	−0.02	0.11	0.07	−0.01	−0.18
a	0.43	0.53	−0.34	−0.27	−0.16	−0.39	0.07	−0.03	−0.04	0.11	0.11	0.14	0.15	0.16	0.20	0.22	0.20	−0.31
t_m	4.09	4.50	−2.10	−1.97	−2.20	−2.40	−2.52	−3.19	−3.31	2.57	2.72	2.36	2.33	2.35	2.33	2.46	2.26	−2.22
t_α	4.35	4.67	−4.70	−4.47	−2.69	−1.72	−3.40	−4.04	−4.11	2.28	2.42	4.79	4.92	4.93	4.94	5.06	4.85	−4.66
t_{FF}	3.92	4.74	−5.21	−4.98	−2.58	−1.29	−1.07	−2.14	−2.25	0.68	0.84	3.57	3.81	3.88	3.88	4.10	3.81	−4.91
t_{PS}	4.00	4.88	−4.96	−4.78	−2.87	−1.07	−1.01	−2.05	−2.24	0.63	0.79	3.27	3.51	3.66	3.58	3.90	3.66	−4.68
t_{C}	3.76	5.06	−3.70	−3.47	−2.25	−2.67	−1.32	−1.55	−1.17	0.51	0.61	3.03	2.70	2.22	2.79	2.54	2.02	−3.78
t_q	2.74	4.60	−0.69	−0.42	−0.65	−1.62	0.31	−0.08	0.16	2.11	1.96	0.61	0.32	−0.09	0.57	0.36	−0.05	−0.86
t_a	3.39	4.66	−2.28	−1.97	−0.81	−1.33	0.66	−0.29	−0.46	1.50	1.70	0.93	1.03	1.02	1.36	1.46	1.29	−2.32
$\overline{\lvert\alpha\rvert}$	0.25	0.25	0.32	0.30	0.20	0.18	0.14	0.15	0.15	0.10	0.10	0.22	0.22	0.22	0.22	0.22	0.22	0.30
$\overline{\lvert\alpha_{\mathrm{FF}}\rvert}$	0.13	0.14	0.22	0.21	0.16	0.13	0.06	0.07	0.07	0.04	0.04	0.12	0.13	0.13	0.12	0.12	0.12	0.20
$\overline{\lvert\alpha_{\mathrm{PS}}\rvert}$	0.13	0.15	0.22	0.20	0.16	0.12	0.06	0.07	0.08	0.04	0.04	0.11	0.12	0.12	0.12	0.12	0.12	0.19
$\overline{\lvert\alpha_{\mathrm{C}}\rvert}$	0.16	0.17	0.22	0.20	0.18	0.19	0.08	0.10	0.13	0.10	0.13	0.15	0.15	0.16	0.14	0.14	0.15	0.19
$\overline{\lvert\alpha_q\rvert}$	0.10	0.15	0.16	0.15	0.16	0.18	0.13	0.15	0.17	0.15	0.17	0.13	0.15	0.17	0.12	0.15	0.16	0.13
$\overline{\lvert\alpha_a\rvert}$	0.12	0.15	0.14	0.13	0.09	0.14	0.06	0.06	0.05	0.06	0.05	0.08	0.07	0.06	0.07	0.07	0.06	0.10
p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p_{FF}	0.00	0.00	0.00	0.00	0.01	0.02	0.14	0.02	0.05	0.39	0.39	0.02	0.00	0.00	0.04	0.00	0.01	0.00
p_{PS}	0.00	0.00	0.00	0.00	0.01	0.06	0.19	0.04	0.12	0.57	0.48	0.05	0.01	0.00	0.05	0.00	0.01	0.00
p_{C}	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.08	0.03	0.01	0.00	0.00	0.07	0.00	0.00	0.00
p_q	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.06	0.05	0.01	0.06	0.00	0.00	0.02
p_a	0.00	0.00	0.00	0.00	0.06	0.03	0.17	0.05	0.18	0.27	0.34	0.50	0.24	0.05	0.34	0.03	0.07	0.03

Table 8 : Betas for the q-factor Model and the Five-factor Model, Significant Anomalies, NYSE-VW, January 1967 to December 2014, 576 Months

For each high-minus-low decile, $\beta_{\mathrm{MKT}}, \beta_{\mathrm{ME}}, \beta_{\mathrm{I/A}}$, and β_{ROE} are the loadings on the market, size, investment, and ROE factors in the q-factor model, respectively, and $t_{\beta_{\mathrm{MKT}}}, t_{\beta_{\mathrm{ME}}}, t_{\beta_{\mathrm{I/A}}}$, and $t_{\beta_{\mathrm{ROE}}}$ are their t-statistics. b, s, h, r, and c are the loadings on MKT, SMB, HML, RMW, and CMA in the five-factor model, and t_b, t_s, t_h, t_r, and t_c are their t-statistics. All t-statistics are adjusted for heteroscedasticity and autocorrelations. Table 3 describes the symbols.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Sue1	Abr1	Abr6	Abr12	Re1	Re6	$R^6 1$	$R^6 6$	$R^6 12$	$R^{11} 1$	$R^{11} 6$	Im1	Im6	Im12	Rs1	dEf1	dEf6	dEf12
β_{MKT}	−0.04	−0.06	−0.03	−0.02	−0.06	−0.06	−0.21	−0.08	−0.02	−0.13	−0.05	−0.20	−0.07	−0.04	−0.05	0.02	0.06	0.03
β_{ME}	−0.04	0.07	0.09	0.07	−0.19	−0.17	0.21	0.22	0.07	0.32	0.16	0.15	0.24	0.15	−0.12	−0.10	−0.03	−0.08
$\beta_{\mathrm{I/A}}$	−0.09	−0.13	−0.17	−0.26	0.07	−0.09	0.06	−0.01	−0.20	0.10	−0.11	0.05	0.10	−0.16	−0.41	−0.18	−0.31	−0.34
β_{ROE}	0.86	0.26	0.17	0.16	1.28	1.07	1.17	0.99	0.83	1.43	1.27	0.79	0.83	0.66	0.60	0.80	0.79	0.68
$t_{\beta_{\mathrm{MKT}}}$	−0.93	−1.39	−1.32	−0.75	−0.93	−1.13	−2.39	−1.13	−0.34	−1.38	−0.63	−2.50	−1.17	−0.81	−0.98	0.45	1.26	0.76
$t_{\beta_{\mathrm{ME}}}$	−0.64	0.75	1.89	1.86	−2.20	−1.86	1.01	1.27	0.51	1.50	0.89	0.75	1.51	1.12	−2.39	−1.03	−0.36	−1.28
$t_{\beta_{\mathrm{I/A}}}$	−0.95	−1.28	−2.40	−4.27	0.45	−0.61	0.18	−0.04	−1.11	0.33	−0.47	0.19	0.45	−0.86	−4.77	−1.25	−2.47	−3.57
$t_{\beta_{\mathrm{ROE}}}$	11.24	3.12	2.87	3.71	9.71	8.96	4.09	5.33	5.88	5.67	6.52	3.91	5.01	4.44	7.96	7.13	7.86	8.95
b	−0.08	−0.08	−0.06	−0.06	−0.16	−0.15	−0.28	−0.17	−0.11	−0.23	−0.16	−0.24	−0.13	−0.11	−0.09	−0.07	−0.04	−0.06
s	−0.19	−0.04	0.01	0.02	−0.42	−0.38	−0.11	−0.08	−0.17	−0.05	−0.19	−0.05	−0.01	−0.07	−0.25	−0.30	−0.24	−0.24
h	−0.39	−0.19	−0.12	−0.14	−0.18	−0.26	−0.54	−0.53	−0.49	−0.71	−0.69	−0.50	−0.37	−0.39	−0.48	−0.27	−0.22	−0.28
r	0.47	−0.11	−0.13	−0.11	0.53	0.38	0.21	0.09	0.05	0.32	0.19	0.19	0.11	−0.03	0.26	0.09	0.05	0.11
c	0.18	0.12	−0.07	−0.18	0.00	−0.01	0.53	0.37	0.11	0.66	0.35	0.57	0.39	0.13	−0.01	−0.06	−0.24	−0.19
t_b	−1.82	−1.97	−2.56	−2.50	−1.98	−2.29	−2.66	−1.89	−1.54	−2.02	−1.68	−2.89	−1.72	−1.67	−1.88	−1.15	−0.73	−1.38
t_s	−2.70	−0.57	0.22	0.42	−3.86	−4.10	−0.63	−0.54	−1.45	−0.28	−1.25	−0.28	−0.04	−0.57	−4.08	−3.12	−2.90	−3.76
t_h	−3.86	−1.82	−1.86	−2.85	−1.08	−1.76	−1.79	−2.46	−3.06	−2.55	−3.11	−2.31	−1.83	−2.43	−5.73	−1.83	−1.75	−3.00
t_r	3.90	−1.22	−1.80	−2.23	3.41	2.65	0.64	0.37	0.27	1.08	0.83	0.67	0.48	−0.16	3.13	0.63	0.43	1.33
t_c	1.04	0.83	−0.62	−2.01	0.01	−0.03	1.22	1.20	0.42	1.65	1.08	1.68	1.27	0.51	−0.09	−0.27	−1.13	−1.30

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	Nei1	Nei6	52w6	$\epsilon^6 6$	$\epsilon^6 12$	$\epsilon^{11} 1$	$\epsilon^{11} 6$	$\epsilon^{11} 12$	Sm1	Ilr1	Ilr6	Ilr12	Ile1	Cm1	Cm12	Sim1	Cim1	Cim6
β_{MKT}	0.01	−0.01	−0.44	−0.03	−0.02	0.01	0.01	0.01	−0.03	−0.19	−0.11	−0.05	−0.05	0.07	0.02	0.04	0.01	−0.04
β_{ME}	−0.08	−0.09	−0.36	0.11	0.05	0.12	0.10	0.02	−0.19	−0.10	0.08	0.08	0.00	−0.17	0.09	0.02	−0.18	0.11
$\beta_{\mathrm{I/A}}$	−0.32	−0.42	0.52	0.08	0.00	0.19	0.10	0.01	0.14	0.08	0.01	−0.03	−0.18	0.21	0.00	0.16	0.19	0.19
β_{ROE}	0.65	0.60	1.24	0.25	0.29	0.40	0.39	0.34	−0.01	0.08	0.35	0.33	0.62	−0.04	0.13	0.23	0.19	0.28
$t_{\beta_{\mathrm{MKT}}}$	0.46	−0.33	−6.35	−0.73	−0.40	0.12	0.17	0.23	−0.44	−2.67	−3.27	−2.12	−0.89	0.90	0.54	0.50	0.12	−1.22
$t_{\beta_{\mathrm{ME}}}$	−2.03	−2.61	−2.20	1.48	0.73	1.75	1.19	0.30	−1.85	−0.99	0.97	1.29	0.04	−1.95	1.47	0.18	−1.81	1.47
$t_{\beta_{\mathrm{I/A}}}$	−4.46	−6.32	2.46	0.75	−0.05	1.48	0.84	0.14	0.74	0.47	0.10	−0.36	−1.40	1.18	0.05	0.70	0.89	1.22
$t_{\beta_{\mathrm{ROE}}}$	11.51	11.64	6.53	2.63	4.22	3.30	3.87	4.00	−0.07	0.59	4.17	5.11	6.11	−0.27	2.28	1.46	1.13	2.89
b	−0.04	−0.05	−0.50	−0.05	−0.05	−0.02	−0.04	−0.04	−0.08	−0.21	−0.13	−0.08	−0.08	0.03	0.01	0.00	−0.01	−0.05
s	−0.16	−0.16	−0.65	−0.01	−0.06	−0.02	−0.06	−0.11	−0.20	−0.10	0.00	0.00	−0.15	−0.19	0.04	−0.08	−0.18	0.02
h	−0.34	−0.35	−0.38	−0.14	−0.21	−0.24	−0.22	−0.28	0.17	−0.11	−0.16	−0.16	−0.57	−0.05	−0.14	0.09	0.00	−0.13
r	0.44	0.42	0.57	−0.10	−0.06	0.00	−0.10	−0.09	−0.18	−0.03	0.11	0.07	0.25	−0.14	0.01	−0.12	0.07	0.05
c	−0.09	−0.15	0.70	0.21	0.15	0.40	0.21	0.19	−0.22	0.12	0.17	0.11	0.35	0.12	0.18	−0.06	0.15	0.29
t_b	−1.42	−2.07	−5.52	−1.08	−1.14	−0.29	−0.66	−0.80	−1.07	−3.04	−3.56	−2.52	−1.57	0.45	0.26	−0.02	−0.12	−1.61
t_s	−3.43	−3.55	−4.67	−0.09	−1.03	−0.26	−0.82	−1.80	−1.93	−1.03	0.01	−0.04	−1.99	−1.86	0.82	−0.70	−1.77	0.34
t_h	−5.34	−5.72	−1.65	−1.47	−2.51	−1.87	−2.00	−3.06	1.23	−0.90	−1.76	−2.00	−4.80	−0.37	−2.89	0.55	−0.04	−1.52
t_r	6.39	6.92	2.24	−1.05	−0.80	0.03	−0.89	−1.01	−1.19	−0.21	0.88	0.83	2.11	−0.86	0.17	−0.48	0.32	0.36
t_c	−0.86	−1.46	2.22	1.38	1.08	2.12	1.22	1.36	−0.89	0.57	1.24	0.96	2.10	0.51	2.28	−0.22	0.60	1.78

	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Cim12	Bm	Bmj	$\mathrm{Bm}^q 12$	Rev1	Rev6	Rev12	Ep	$\mathrm{Ep}^q 1$	$\mathrm{Ep}^q 6$	$\mathrm{Ep}^q 12$	Efp1	Cp	$\mathrm{Cp}^q 1$	$\mathrm{Cp}^q 6$	$\mathrm{Cp}^q 12$	Nop	Em
β_{MKT}	−0.01	0.00	−0.05	0.02	0.05	0.08	0.09	−0.09	0.00	−0.03	−0.06	−0.19	0.00	0.08	0.00	−0.03	−0.17	0.12
β_{ME}	0.10	0.41	0.31	0.32	−0.63	−0.60	−0.60	0.28	0.29	0.25	0.27	−0.09	0.23	0.18	0.17	0.22	−0.34	−0.17
$\beta_{\mathrm{I/A}}$	0.07	1.33	1.32	1.22	−1.18	−1.04	−0.95	1.01	0.82	0.84	0.82	0.79	1.26	0.99	0.97	1.01	1.05	−0.95
β_{ROE}	0.27	−0.55	−0.82	−0.94	0.72	0.66	0.50	−0.07	0.13	0.17	0.13	−0.07	−0.39	−0.61	−0.56	−0.45	0.04	0.14
$t_{\beta_{\mathrm{MKT}}}$	−0.67	0.10	−1.21	0.47	1.05	1.52	1.68	−1.60	−0.01	−0.55	−1.13	−2.78	−0.02	1.24	−0.01	−0.65	−3.46	2.37
$t_{\beta_{\mathrm{ME}}}$	1.70	5.04	3.29	3.06	−7.76	−7.72	−8.37	2.41	2.16	2.01	2.34	−0.65	1.89	1.31	1.37	1.99	−4.34	−2.08
$t_{\beta_{\mathrm{I/A}}}$	0.63	13.09	11.07	9.42	−10.63	−9.77	−8.48	6.55	4.77	6.10	6.37	4.76	9.36	6.12	6.74	7.57	10.23	−7.24
$t_{\beta_{\mathrm{ROE}}}$	4.10	−6.64	−9.67	−8.85	7.44	6.89	4.75	−0.55	0.90	1.36	1.23	−0.44	−3.33	−4.30	−4.70	−4.16	0.37	1.20

b	−0.04	0.08	0.03	0.11	−0.02	0.02	0.03	−0.03	0.05	0.02	−0.01	−0.10	0.08	0.16	0.08	0.05	−0.09	0.05
s	0.01	0.45	0.40	0.46	−0.65	−0.59	−0.55	0.32	0.28	0.26	0.29	0.02	0.30	0.32	0.30	0.32	−0.27	−0.24
h	−0.12	1.15	1.16	1.23	−0.48	−0.36	−0.29	1.30	1.05	0.96	0.94	1.16	1.28	1.16	1.16	1.15	0.47	−0.90
r	0.00	−0.31	−0.41	−0.42	0.39	0.46	0.42	0.22	0.31	0.39	0.38	0.22	0.00	−0.03	−0.03	0.02	0.54	−0.25
c	0.14	0.25	0.23	0.04	−0.77	−0.78	−0.76	−0.29	−0.22	−0.12	−0.10	−0.35	0.02	−0.14	−0.15	−0.09	0.55	−0.13
t_b	−1.62	2.47	0.66	2.35	−0.34	0.36	0.63	−0.79	1.09	0.43	−0.19	−1.67	2.29	2.63	1.65	1.20	−2.52	1.25
t_s	0.16	9.84	5.99	7.16	−6.55	−6.40	−6.80	5.77	4.15	4.15	5.00	0.28	5.97	3.71	4.92	6.78	−4.42	−4.09
t_h	−1.87	15.74	11.28	11.85	−3.81	−2.97	−2.59	13.28	10.20	10.25	11.69	10.09	15.78	9.58	12.02	15.09	5.76	−9.02
t_r	0.00	−4.47	−3.92	−4.21	4.51	4.54	3.89	2.80	3.38	4.82	5.51	2.22	0.02	−0.22	−0.25	0.29	7.50	−2.52
t_c	1.15	2.36	1.31	0.24	−4.61	−4.82	−4.83	−2.28	−1.32	−0.94	−0.97	−2.08	0.15	−0.81	−1.07	−0.82	4.52	−1.00

	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	Em^q1	Em^q6	Em^q12	Sp	Sp^q1	Sp^q6	Sp^q12	Ocp	Ocp^q1	Ir	Vhp	Vfp	Ebp	Dur	Aci	I/A	Ia^q6	Ia^q12
β_{MKT}	0.07	0.09	0.11	0.09	0.13	0.09	0.07	−0.02	0.11	−0.03	−0.04	−0.05	0.05	0.07	0.01	0.03	0.07	0.04
β_{ME}	0.02	−0.02	−0.07	0.62	0.59	0.61	0.64	0.16	0.13	−0.57	0.24	0.15	0.51	−0.27	−0.29	−0.13	−0.18	−0.21
$\beta_{\mathrm{I/A}}$	−0.67	−0.67	−0.71	1.14	1.07	1.11	1.08	1.37	1.19	−1.16	0.91	0.50	1.19	−0.97	0.13	−1.37	−1.35	−1.36
β_{ROE}	0.03	0.03	−0.01	−0.30	−0.56	−0.51	−0.39	−0.50	−0.58	0.65	−0.10	0.18	−0.59	0.18	−0.20	0.16	0.34	0.21
$t_{\beta_{\mathrm{MKT}}}$	1.26	1.77	2.33	1.77	1.88	1.47	1.31	−0.33	1.23	−0.64	−0.62	−0.84	1.01	1.14	0.18	1.06	2.23	1.41
$t_{\beta_{\mathrm{ME}}}$	0.19	−0.18	−0.76	4.50	3.43	3.98	4.54	1.40	0.64	−7.94	2.01	1.46	6.51	−1.97	−4.98	−2.31	−3.30	−4.28
$t_{\beta_{\mathrm{I/A}}}$	−4.56	−5.53	−5.95	9.49	5.92	7.02	7.99	9.73	5.54	−10.70	5.82	3.04	12.49	−6.69	1.04	−16.72	−12.31	−13.62
$t_{\beta_{\mathrm{ROE}}}$	0.25	0.23	−0.09	−2.87	−3.13	−3.37	−3.20	−4.31	−2.96	7.39	−0.78	1.51	−7.49	1.42	−2.26	2.54	4.37	3.11
b	0.01	0.02	0.05	0.17	0.24	0.20	0.17	0.09	0.22	−0.10	0.02	0.02	0.11	0.01	0.03	−0.01	0.00	−0.01
s	−0.11	−0.17	−0.21	0.71	0.76	0.78	0.77	0.27	0.42	−0.59	0.31	0.23	0.55	−0.32	−0.26	−0.09	−0.15	−0.15
h	−0.72	−0.68	−0.71	1.05	1.16	1.10	1.04	1.19	1.18	−0.95	1.22	0.84	1.04	−1.22	0.16	−0.17	−0.29	−0.22
r	−0.37	−0.42	−0.43	0.20	0.22	0.24	0.23	−0.02	0.13	0.42	0.25	0.27	−0.33	−0.09	−0.03	0.02	0.10	0.06
c	0.05	0.02	0.01	0.17	0.05	0.13	0.17	0.21	−0.06	−0.33	−0.31	−0.22	0.20	0.21	−0.02	−1.14	−1.11	−1.14
t_b	0.12	0.49	1.13	4.97	4.01	3.81	3.93	2.30	2.79	−3.01	0.44	0.36	3.30	0.20	0.66	−0.31	−0.01	−0.53
t_s	−1.41	−2.32	−2.88	13.86	9.76	11.54	13.51	5.39	3.72	−9.26	4.93	2.22	11.65	−5.39	−4.00	−1.44	−2.77	−3.46
t_h	−6.53	−6.22	−6.77	11.13	7.84	8.77	9.84	15.80	6.82	−11.83	13.43	6.43	17.22	−12.13	1.54	−2.53	−4.54	−4.48
t_r	−3.61	−4.18	−4.40	2.49	1.79	2.40	2.83	−0.26	0.90	4.58	3.06	2.14	−6.02	−1.04	−0.35	0.28	1.26	0.90
t_c	0.28	0.15	0.07	1.45	0.26	0.85	1.37	1.62	−0.23	−2.83	−2.60	−1.13	2.17	1.79	−0.10	−11.07	−8.57	−11.00

	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	dPia	Noa	dNoa	dLno	Ig	2Ig	Nsi	dIi	Cei	Ivg	Ivc	Oa	dWc	dCoa	dNco	dNca	dFin	dFnl
β_{MKT}	0.04	−0.01	0.00	−0.08	−0.02	0.07	0.04	0.03	0.22	−0.02	0.05	0.06	0.03	0.05	−0.02	−0.05	−0.03	0.03
β_{ME}	−0.09	0.11	0.03	−0.16	−0.15	−0.30	0.15	−0.17	0.28	0.07	0.00	0.31	0.35	−0.04	−0.08	−0.10	−0.11	−0.06
$\beta_{\mathrm{I/A}}$	−0.82	−0.07	−1.05	−0.81	−0.75	−0.73	−0.67	−0.64	−1.04	−0.94	−0.67	−0.02	−0.33	−1.15	−0.78	−0.87	−0.30	−0.42
β_{ROE}	0.14	0.00	0.02	0.02	−0.06	−0.07	−0.28	−0.21	−0.12	0.04	0.20	0.26	0.14	0.13	0.00	0.03	0.03	−0.14
$t_{\beta_{\mathrm{MKT}}}$	1.14	−0.14	−0.11	−1.60	−0.70	1.88	1.07	1.01	6.28	−0.66	1.44	1.83	0.62	1.97	−0.59	−1.42	−1.08	1.00
$t_{\beta_{\mathrm{ME}}}$	−1.86	1.04	0.55	−2.34	−2.64	−4.76	2.15	−3.68	4.25	1.70	−0.08	5.06	4.32	−0.85	−1.61	−1.94	−2.19	−1.50
$t_{\beta_{\mathrm{I/A}}}$	−8.63	−0.44	−9.49	−6.86	−10.47	−9.36	−7.67	−7.58	−13.74	−12.85	−6.21	−0.23	−3.20	−16.21	−10.85	−11.77	−2.54	−5.58
$t_{\beta_{\mathrm{ROE}}}$	1.83	0.04	0.25	0.15	−0.90	−1.01	−4.39	−2.99	−1.57	0.59	2.26	4.13	2.18	2.10	0.00	0.41	0.45	−2.05
b	0.03	0.00	−0.01	−0.09	−0.03	0.05	0.00	0.02	0.17	−0.02	0.05	0.08	0.04	0.02	−0.02	−0.05	−0.06	0.02
s	−0.03	0.16	0.07	−0.10	−0.13	−0.23	0.09	−0.13	0.25	0.11	0.07	0.33	0.36	0.00	−0.03	−0.06	−0.13	−0.03
h	0.02	0.46	−0.17	0.04	−0.10	0.03	−0.07	−0.27	−0.39	−0.09	0.01	0.00	−0.11	−0.23	0.03	0.04	−0.25	0.16
r	0.22	0.08	−0.03	0.02	−0.11	−0.04	−0.68	−0.24	−0.41	0.07	0.36	0.41	0.17	0.04	0.02	0.00	−0.09	−0.19
c	−0.79	−0.53	−0.73	−0.82	−0.57	−0.75	−0.62	−0.29	−0.62	−0.73	−0.62	0.04	−0.09	−0.88	−0.73	−0.78	−0.09	−0.54
t_b	0.95	−0.05	−0.29	−1.99	−0.91	1.53	−0.17	0.74	5.90	−0.66	1.43	2.32	0.89	0.56	−0.64	−1.51	−1.85	0.74
t_s	−0.65	2.31	1.24	−1.44	−2.52	−5.05	1.74	−2.82	5.12	2.12	1.31	6.39	4.95	0.05	−0.58	−1.05	−2.87	−0.70
t_h	0.21	5.21	−2.22	0.50	−1.53	0.41	−1.15	−4.05	−6.00	−1.10	0.08	−0.01	−1.23	−3.68	0.53	0.59	−4.09	2.54
t_r	3.51	0.62	−0.30	0.18	−1.36	−0.42	−10.64	−2.82	−5.89	0.74	4.00	6.49	1.63	0.44	0.26	0.05	−1.03	−2.22
t_c	−7.37	−3.68	−5.54	−5.53	−5.28	−6.05	−7.09	−2.72	−6.40	−7.32	−4.62	0.38	−0.62	−8.33	−7.40	−7.43	−0.78	−4.86

	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
	Dac	Poa	Pta	Pda	Ndf	Roe1	dRoe1	dRoe6	dRoe12	Roa1	dRoa1	dRoa6	Rna^{q}1	Ato^{q}1	Ato^{q}6	Ato^{q}12	Cto^{q}1	Cto^{q}6
β_{MKT}	0.01	−0.01	0.06	0.05	0.06	−0.08	0.03	0.04	0.01	−0.13	0.11	0.09	−0.14	0.11	0.09	0.08	0.12	0.12
β_{ME}	0.19	0.14	0.17	0.05	−0.12	−0.37	−0.06	−0.02	−0.01	−0.37	0.09	0.11	−0.44	0.43	0.38	0.33	0.33	0.32
$\beta_{\mathrm{I/A}}$	0.23	−0.94	−0.87	−0.18	−0.44	0.12	0.23	0.21	0.14	−0.08	0.25	0.19	−0.14	−0.49	−0.61	−0.69	−0.14	−0.21
β_{ROE}	0.19	0.07	0.05	−0.09	−0.26	1.49	0.58	0.56	0.52	1.34	0.59	0.59	1.29	0.55	0.53	0.47	0.83	0.77
$t_{\beta_{\mathrm{MKT}}}$	0.32	−0.35	1.69	1.32	1.76	−2.22	0.64	0.97	0.26	−4.17	2.44	1.96	−3.48	1.87	1.69	1.52	2.08	2.29
$t_{\beta_{\mathrm{ME}}}$	3.27	3.36	2.66	0.63	−2.34	−6.34	−0.88	−0.42	−0.16	−6.34	1.30	1.59	−8.60	5.44	5.41	5.64	3.03	3.34
$t_{\beta_{\mathrm{I/A}}}$	2.38	−11.07	−8.94	−1.34	−5.80	1.24	2.75	2.60	2.53	−0.95	2.15	2.13	−1.40	−4.70	−5.95	−6.82	−1.31	−2.04
$t_{\beta_{\mathrm{ROE}}}$	3.05	1.39	0.65	−0.97	−3.79	19.40	6.76	6.02	8.01	17.49	5.18	5.51	19.43	5.73	7.03	6.73	10.37	10.61
b	0.02	−0.04	0.03	0.04	0.04	−0.11	−0.02	−0.02	−0.04	−0.15	0.06	0.04	−0.15	0.11	0.08	0.07	0.15	0.15
s	0.20	0.18	0.14	0.08	−0.10	−0.46	−0.25	−0.18	−0.13	−0.47	−0.13	−0.08	−0.42	0.47	0.42	0.39	0.43	0.43
h	0.11	−0.18	−0.24	0.17	0.06	−0.26	−0.27	−0.26	−0.18	−0.25	−0.37	−0.32	−0.29	−0.68	−0.69	−0.67	−0.35	−0.36
r	0.28	−0.01	−0.21	−0.13	−0.38	1.42	0.02	0.06	0.15	1.25	−0.01	0.05	1.33	0.72	0.67	0.63	1.24	1.19
c	0.15	−0.72	−0.56	−0.33	−0.50	0.22	0.38	0.33	0.19	0.04	0.56	0.42	0.02	0.31	0.19	0.09	0.29	0.23
t_b	0.73	−1.41	0.84	1.20	1.08	−2.43	−0.46	−0.39	−1.00	−3.69	1.14	0.82	−3.33	2.18	1.82	1.53	3.12	3.35
t_s	3.64	4.53	2.15	1.21	−1.59	−5.86	−2.92	−2.52	−2.14	−5.95	−1.56	−1.05	−6.43	5.66	6.39	6.62	6.66	7.24
t_h	1.61	−3.24	−2.49	1.89	0.67	−2.51	−2.24	−2.32	−1.98	−3.05	−2.89	−2.58	−2.82	−5.47	−7.76	−8.68	−4.17	−4.84
t_r	3.83	−0.26	−2.54	−1.12	−4.34	12.27	0.19	0.61	1.92	10.73	−0.12	0.49	12.33	7.81	7.73	8.04	15.29	15.81
t_c	1.33	−8.28	−4.62	−2.32	−3.88	1.37	2.39	2.39	1.66	0.25	3.30	2.54	0.10	2.06	1.54	0.76	2.75	2.25

	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
	Cto^{q}12	Gpa	Gla^{q}1	Gla^{q}6	Gla^{q}12	Ole^{q}1	Ole^{q}6	Ola^{q}1	Ola^{q}6	Ola^{q}12	Cop	Cla	Cla^{q}1	Cla^{q}6	Cla^{q}12	F^{q}1	F^{q}6	F^{q}12
β_{MKT}	0.11	0.04	0.00	0.02	0.01	−0.05	−0.06	−0.11	−0.10	−0.13	−0.23	−0.21	−0.08	−0.04	−0.07	−0.07	−0.03	−0.05
β_{ME}	0.30	0.03	0.11	0.06	0.05	−0.24	−0.29	−0.33	−0.37	−0.37	−0.60	−0.62	−0.32	−0.32	−0.31	−0.33	−0.40	−0.41
$\beta_{\mathrm{I/A}}$	−0.27	−0.31	−0.28	−0.37	−0.45	0.38	0.33	−0.24	−0.31	−0.42	−0.06	−0.31	−0.13	−0.13	−0.19	0.44	0.33	0.32
β_{ROE}	0.72	0.55	0.66	0.60	0.53	1.15	1.05	1.08	0.98	0.89	0.49	0.40	0.48	0.45	0.40	0.73	0.67	0.65
$t_{\beta_{\mathrm{MKT}}}$	2.06	0.95	−0.10	0.82	0.23	−1.08	−1.43	−2.44	−3.08	−4.28	−5.84	−5.46	−1.87	−1.46	−2.79	−1.03	−0.70	−0.99
$t_{\beta_{\mathrm{ME}}}$	3.48	0.69	2.20	1.23	1.11	−2.25	−3.31	−3.82	−5.62	−5.68	−7.78	−8.65	−4.77	−5.77	−6.01	−3.16	−4.55	−4.82
$t_{\beta_{\mathrm{I/A}}}$	−2.68	−3.21	−3.03	−4.56	−5.22	2.63	2.64	−2.09	−3.25	−4.60	−0.66	−3.35	−1.07	−1.24	−2.14	3.07	2.80	3.18
$t_{\beta_{\mathrm{ROE}}}$	10.25	7.66	12.26	10.83	8.96	10.91	9.99	13.43	14.45	12.18	7.88	6.00	5.25	7.12	7.34	6.97	6.90	7.11
b	0.13	0.04	−0.01	0.02	0.00	−0.02	−0.02	−0.12	−0.11	−0.14	−0.22	−0.21	−0.09	−0.06	−0.09	−0.12	−0.09	−0.10
s	0.41	0.11	0.15	0.09	0.11	−0.24	−0.26	−0.36	−0.38	−0.35	−0.63	−0.64	−0.35	−0.36	−0.35	−0.37	−0.43	−0.41
h	−0.38	−0.47	−0.51	−0.46	−0.40	0.06	0.06	−0.51	−0.45	−0.40	−0.46	−0.45	−0.35	−0.29	−0.30	0.06	0.04	0.16
r	1.11	0.89	0.84	0.76	0.72	1.45	1.40	1.04	0.98	0.93	0.57	0.42	0.41	0.36	0.31	0.62	0.53	0.56
c	0.18	0.20	0.18	0.06	−0.08	0.24	0.19	0.24	0.13	−0.03	0.44	0.14	0.21	0.14	0.08	0.19	0.10	−0.05
t_b	2.94	1.06	−0.21	0.55	0.05	−0.48	−0.76	−2.41	−2.83	−3.94	−6.34	−6.36	−2.31	−1.86	−3.36	−1.77	−1.66	−2.03
t_s	7.01	2.23	2.69	1.80	2.05	−3.55	−4.84	−4.88	−5.56	−4.99	−11.27	−12.49	−5.77	−6.70	−7.98	−3.27	−4.40	−4.84
t_h	−5.07	−4.63	−5.80	−5.61	−5.15	0.63	0.89	−4.74	−5.18	−4.56	−5.42	−5.71	−4.62	−4.97	−5.37	0.49	0.42	1.86
t_r	15.30	9.85	11.54	10.10	9.88	13.95	14.81	6.79	7.66	7.31	5.39	4.65	2.88	3.32	3.38	3.97	3.83	5.88
t_c	1.72	1.59	1.42	0.50	−0.68	1.62	1.63	1.41	0.96	−0.25	4.23	1.33	1.36	1.20	0.80	1.07	0.57	−0.31

	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
	Fp6	Tbi^{q}12	Oca	Ioca	Adm	Rdm	Rdm^{q}1	Rdm^{q}6	Rdm^{q}12	Ol	Ol^{q}1	Ol^{q}6	Ol^{q}12	Hs	Etr	Rer	Eprd	Etl
β_{MKT}	0.41	−0.07	−0.16	−0.06	0.07	0.16	0.01	−0.08	−0.08	−0.04	−0.10	−0.13	−0.13	−0.17	0.01	0.05	0.10	0.01
β_{ME}	0.40	−0.17	0.22	0.25	0.48	0.62	0.14	0.52	0.62	0.30	0.27	0.32	0.32	−0.08	0.12	−0.13	0.35	0.29
$\beta_{\mathrm{I/A}}$	0.10	−0.14	0.27	0.36	1.36	0.17	0.61	0.69	0.82	0.11	0.04	0.05	0.04	0.28	0.04	−0.15	0.41	−0.13
β_{ROE}	−1.54	0.05	0.55	0.51	−0.30	−0.62	−1.02	−0.90	−0.70	0.55	0.67	0.62	0.59	−0.03	0.18	0.01	−0.62	0.05
$t_{\beta_{\mathrm{MKT}}}$	5.87	−2.10	−2.41	−1.88	0.76	2.45	0.05	−0.96	−1.04	−0.80	−1.84	−2.66	−2.85	−3.35	0.36	0.93	1.63	0.25
$t_{\beta_{\mathrm{ME}}}$	2.19	−3.37	2.89	5.60	2.75	6.37	0.71	3.56	4.72	3.18	3.34	3.64	4.03	−0.96	2.19	−1.28	4.21	3.18
$t_{\beta_{\mathrm{I/A}}}$	0.39	−2.07	2.05	3.73	5.94	0.95	1.99	3.17	4.35	0.95	0.33	0.38	0.34	1.69	0.40	−1.17	3.59	−0.87
$t_{\beta_{\mathrm{ROE}}}$	−8.64	0.65	4.38	7.32	−1.49	−4.26	−3.50	−4.82	−4.62	5.07	6.80	5.82	5.75	−0.21	2.29	0.10	−6.46	0.54
b	0.45	−0.07	−0.15	−0.07	0.14	0.22	0.24	0.11	0.09	−0.02	−0.07	−0.10	−0.11	−0.12	0.01	0.05	0.16	−0.01
s	0.61	−0.08	0.21	0.21	0.62	0.57	0.35	0.54	0.58	0.37	0.29	0.35	0.33	−0.02	0.04	−0.06	0.44	0.25
h	0.62	0.05	−0.35	−0.09	1.02	0.00	0.27	0.37	0.24	0.03	−0.11	−0.07	−0.06	0.38	−0.04	−0.09	0.61	−0.26
r	−1.04	0.25	0.82	0.52	0.44	−0.56	−0.26	−0.54	−0.44	0.89	0.94	0.91	0.84	0.25	0.05	0.13	−0.37	−0.12
c	−0.50	−0.21	0.59	0.36	0.12	0.45	0.58	0.69	0.93	0.08	0.16	0.15	0.12	−0.04	0.06	−0.04	−0.02	0.13
t_b	4.87	−2.32	−2.48	−1.84	2.36	3.49	1.82	1.22	1.13	−0.59	−1.49	−2.22	−2.48	−2.75	0.20	0.95	2.90	−0.28
t_s	3.85	−1.67	2.92	4.13	6.41	6.32	1.61	3.42	4.38	5.67	4.29	4.88	5.22	−0.34	0.80	−0.65	6.54	3.79
t_h	2.67	0.67	−2.82	−1.00	6.94	0.02	1.05	1.96	1.72	0.25	−1.22	−0.77	−0.71	3.71	−0.50	−0.87	6.05	−2.54
t_r	−3.77	3.74	5.83	4.81	3.76	−3.04	−1.02	−2.19	−2.14	10.68	9.71	10.05	9.64	1.47	0.54	1.28	−3.64	−1.00
t_c	−1.42	−1.93	3.45	2.57	0.55	2.12	1.21	2.09	3.72	0.61	1.20	1.13	0.90	−0.19	0.52	−0.24	−0.15	0.94

	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161
	Alm^{q}1	Alm^{q}6	Alm^{q}12	R_{a}^{1}	$R_{\mathrm{a}}^{[2,5]}$	$R_{\mathrm{n}}^{[2,5]}$	$R_{\mathrm{a}}^{[6,10]}$	$R_{\mathrm{n}}^{[6,10]}$	$R_{\mathrm{a}}^{[11,15]}$	$R_{\mathrm{a}}^{[16,20]}$	Sv1	Dtv6	Dtv12	Ami12	Ts1	Isff1	Isq1
β_{MKT}	0.07	0.06	0.07	0.23	0.06	0.19	−0.03	0.16	−0.01	−0.07	0.04	0.14	0.13	−0.03	0.03	−0.01	−0.02
β_{ME}	0.67	0.71	0.72	−0.14	−0.18	−0.27	0.03	−0.31	−0.07	−0.07	0.35	−1.08	−1.14	1.30	0.06	0.17	0.19
$\beta_{\mathrm{I/A}}$	0.83	0.77	0.70	−0.15	−0.28	−1.32	−0.37	−0.81	−0.03	−0.04	−0.14	−0.38	−0.36	0.15	−0.08	0.01	−0.06
β_{ROE}	−0.44	−0.33	−0.24	0.18	0.05	0.38	−0.23	−0.28	0.10	0.00	−0.44	0.33	0.29	−0.36	−0.15	−0.04	−0.13
$t_{\beta_{\mathrm{MKT}}}$	1.83	2.04	2.23	4.14	1.06	3.03	−0.64	3.06	−0.25	−1.37	0.65	4.54	5.12	−1.14	1.13	−0.27	−0.66
$t_{\beta_{\mathrm{ME}}}$	7.56	10.54	11.47	−1.28	−1.75	−2.08	0.31	−3.40	−0.83	−1.21	2.58	−17.69	−31.71	42.18	1.41	4.25	2.54
$t_{\beta_{\mathrm{I/A}}}$	8.07	9.20	8.45	−0.97	−2.46	−9.56	−2.22	−5.88	−0.23	−0.34	−0.80	−5.64	−7.11	2.95	−0.83	0.13	−0.74
$t_{\beta_{\mathrm{ROE}}}$	−5.96	−5.55	−3.73	1.25	0.47	2.77	−1.97	−2.30	1.09	−0.01	−3.45	6.94	7.17	−8.56	−3.04	−0.77	−2.40
b	0.14	0.12	0.12	0.19	0.07	0.11	−0.05	0.13	−0.02	−0.07	0.04	0.11	0.11	−0.02	0.02	−0.02	−0.03
s	0.74	0.74	0.73	−0.13	−0.12	−0.34	0.03	−0.29	−0.10	−0.04	0.29	−1.13	−1.16	1.33	0.07	0.17	0.18
h	0.73	0.64	0.57	−0.08	0.12	−0.78	−0.04	−0.54	0.04	−0.05	0.03	−0.34	−0.25	0.16	−0.09	−0.06	−0.10
r	−0.19	−0.21	−0.20	0.10	0.18	−0.13	−0.31	−0.38	−0.01	0.07	−0.56	0.10	0.16	−0.29	−0.17	−0.09	−0.18
c	0.18	0.21	0.21	−0.18	−0.39	−0.57	−0.32	−0.26	−0.11	0.01	−0.15	−0.12	−0.19	0.08	−0.02	0.04	0.06
t_b	3.62	3.97	3.72	3.43	1.20	1.89	−0.89	2.68	−0.49	−1.39	0.61	4.23	4.85	−0.78	0.66	−0.72	−0.86
t_s	12.88	14.70	14.33	−1.23	−1.49	−3.22	0.49	−3.61	−1.35	−0.64	2.70	−26.70	−35.27	39.34	1.55	4.02	3.33
t_h	7.69	7.99	6.53	−0.54	1.05	−5.37	−0.34	−5.11	0.36	−0.61	0.20	−5.39	−5.30	3.44	−1.59	−1.22	−1.43
t_r	−2.87	−4.13	−3.68	0.51	1.53	−1.34	−2.26	−3.43	−0.07	0.72	−3.95	2.00	3.36	−6.63	−2.17	−1.13	−2.14
t_c	1.54	2.20	2.15	−0.83	−2.70	−3.08	−1.73	−1.49	−0.80	0.08	−0.73	−1.69	−2.92	1.28	−0.21	0.35	0.61

Table 9 : Betas for the q-factor Model and the Five-factor Model, Significant Anomalies, ABM-EW, January 1967 to December 2014, 576 Months

For each high-minus-low decile, $\beta_{\mathrm{MKT}}, \beta_{\mathrm{ME}}, \beta_{\mathrm{I/A}}$, and β_{ROE} are the loadings on the market, size, investment, and ROE factors in the q-factor model, respectively, and $t_{\beta_{\mathrm{MKT}}}, t_{\beta_{\mathrm{ME}}}, t_{\beta_{\mathrm{I/A}}}$, and $t_{\beta_{\mathrm{ROE}}}$ are their t-statistics. b, s, h, r, and c are the loadings on MKT, SMB, HML, RMW, and CMA in the five-factor model, and t_b, t_s, t_h, t_r, and t_c are their t-statistics. All t-statistics are adjusted for heteroscedasticity and autocorrelations. Table 3 describes the symbols.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Sue1	Sue6	Abr1	Abr6	Abr12	Re1	Re6	Re12	$R^6 1$	$R^6 6$	$R^6 12$	$R^{11} 1$	$R^{11} 6$	Im1	Im6	Im12	Rs1	Rs6
β_{MKT}	0.01	0.02	−0.07	−0.01	0.00	0.01	0.02	−0.02	−0.23	−0.05	−0.02	−0.10	−0.03	−0.15	−0.06	−0.03	−0.03	−0.03
β_{ME}	−0.05	−0.09	0.11	0.13	0.09	0.05	0.00	−0.03	0.52	0.46	0.31	0.52	0.41	0.21	0.33	0.24	−0.10	−0.07
$\beta_{\mathrm{I/A}}$	−0.05	−0.11	0.00	−0.05	−0.12	−0.14	−0.10	−0.15	−0.01	0.10	−0.19	−0.07	−0.29	0.18	0.17	−0.09	−0.18	−0.27
β_{ROE}	0.89	0.82	0.21	0.25	0.21	0.93	0.86	0.69	1.13	1.19	0.97	1.33	1.25	0.64	0.70	0.56	0.76	0.71
$t_{\beta_{\mathrm{MKT}}}$	0.21	1.18	−2.05	−0.47	−0.20	0.20	0.56	−0.53	−2.26	−0.58	−0.27	−1.05	−0.36	−1.84	−0.95	−0.65	−1.09	−1.11
$t_{\beta_{\mathrm{ME}}}$	−1.31	−2.80	1.46	2.22	2.36	0.85	−0.07	−0.77	1.84	2.32	2.01	2.17	2.05	1.04	1.89	1.79	−2.49	−2.41
$t_{\beta_{\mathrm{I/A}}}$	−0.80	−2.18	0.01	−0.52	−1.88	−1.32	−1.06	−1.82	−0.02	0.33	−1.00	−0.22	−1.15	0.61	0.77	−0.52	−2.78	−3.68
$t_{\beta_{\mathrm{ROE}}}$	14.01	18.81	2.79	3.18	4.41	8.70	10.76	12.57	3.99	4.98	6.18	5.07	5.75	3.19	4.04	4.06	14.03	12.74
b	−0.04	−0.03	−0.09	−0.04	−0.03	−0.07	−0.05	−0.07	−0.29	−0.13	−0.10	−0.21	−0.14	−0.17	−0.10	−0.08	−0.06	−0.06
s	−0.20	−0.21	0.02	0.04	0.03	−0.11	−0.15	−0.13	0.19	0.12	0.03	0.14	0.05	0.03	0.10	0.05	−0.20	−0.16
h	−0.39	−0.36	−0.20	−0.14	−0.11	−0.09	−0.12	−0.15	−0.66	−0.58	−0.60	−0.85	−0.83	−0.44	−0.34	−0.36	−0.36	−0.41
r	0.48	0.48	−0.07	−0.02	0.01	0.30	0.31	0.32	0.19	0.23	0.14	0.17	0.11	0.14	0.10	−0.02	0.54	0.51
c	0.23	0.12	0.24	0.03	−0.07	−0.23	−0.14	−0.13	0.62	0.53	0.29	0.63	0.38	0.67	0.48	0.23	0.10	0.10
t_b	−1.12	−0.84	−2.61	−1.56	−1.63	−1.12	−0.95	−1.94	−2.58	−1.34	−1.33	−1.88	−1.45	−2.09	−1.33	−1.34	−1.87	−1.82
t_s	−3.55	−4.14	0.29	0.76	0.85	−1.30	−2.24	−2.43	0.91	0.77	0.28	0.80	0.31	0.17	0.71	0.44	−4.10	−3.91
t_h	−4.06	−4.55	−2.36	−1.97	−2.24	−0.58	−1.08	−2.06	−1.94	−2.19	−3.04	−2.84	−3.22	−2.06	−1.58	−2.20	−4.91	−7.16
t_r	6.96	7.90	−0.80	−0.22	0.19	2.94	3.57	4.74	0.43	0.69	0.59	0.46	0.37	0.42	0.35	−0.12	6.73	6.66
t_c	1.85	1.12	1.97	0.22	−0.83	−1.07	−0.77	−0.97	1.26	1.31	0.95	1.43	0.96	2.03	1.57	0.97	1.05	1.00

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	Tes1	Tes6	dEf1	dEf6	dEf12	Nei1	Nei6	52w6	52w12	$\epsilon^6 1$	$\epsilon^6 6$	$\epsilon^6 12$	$\epsilon^{11} 1$	$\epsilon^{11} 6$	$\epsilon^{11} 12$	Sm1	Sm6	Sm12
β_{MKT}	0.13	0.11	−0.01	0.04	0.03	0.03	0.02	−0.44	−0.37	−0.08	−0.04	−0.02	0.02	0.01	0.01	−0.03	−0.04	0.01
β_{ME}	0.09	0.11	0.07	0.03	0.00	−0.02	−0.03	−0.07	−0.14	0.10	0.11	0.05	0.12	0.07	0.01	−0.13	0.19	0.14
$\beta_{\mathrm{I/A}}$	−0.28	−0.34	−0.29	−0.24	−0.25	−0.08	−0.09	0.74	0.54	0.07	0.05	−0.04	0.08	−0.03	−0.11	0.15	0.12	0.07
β_{ROE}	0.50	0.49	0.58	0.62	0.51	0.80	0.78	1.47	1.36	0.35	0.39	0.38	0.50	0.49	0.41	0.01	0.26	0.26
$t_{\beta_{\mathrm{MKT}}}$	4.45	4.02	−0.20	1.15	1.08	1.67	1.01	−5.49	−5.68	−1.35	−0.91	−0.57	0.32	0.19	0.20	−0.53	−1.23	0.37
$t_{\beta_{\mathrm{ME}}}$	1.89	2.51	0.61	0.47	0.01	−0.92	−1.23	−0.37	−1.02	1.21	1.53	0.80	1.71	1.02	0.23	−1.52	3.08	3.59
$t_{\beta_{\mathrm{I/A}}}$	−2.52	−3.80	−2.05	−2.49	−3.59	−2.03	−1.62	2.50	2.45	0.60	0.56	−0.43	0.62	−0.22	−0.99	0.89	1.02	0.84
$t_{\beta_{\mathrm{ROE}}}$	6.08	8.35	5.75	7.69	9.15	27.16	18.19	6.21	7.08	3.17	3.90	4.84	4.51	4.96	4.56	0.09	3.14	4.89
b	0.09	0.07	−0.08	−0.03	−0.03	0.00	−0.01	−0.48	−0.43	−0.09	−0.07	−0.06	−0.02	−0.04	−0.04	−0.06	−0.05	−0.01
s	0.01	0.04	−0.09	−0.13	−0.13	−0.11	−0.11	−0.36	−0.40	−0.03	−0.03	−0.07	−0.03	−0.08	−0.11	−0.13	0.12	0.08
h	−0.32	−0.27	−0.37	−0.21	−0.21	−0.25	−0.26	−0.24	−0.22	−0.25	−0.17	−0.17	−0.24	−0.20	−0.22	0.18	−0.02	−0.04
r	0.21	0.24	0.00	0.05	0.08	0.65	0.66	0.84	0.77	−0.01	−0.03	0.00	0.03	−0.01	−0.03	−0.13	0.07	0.07
c	−0.01	−0.15	0.05	−0.13	−0.13	0.10	0.11	0.82	0.57	0.35	0.18	0.07	0.26	0.07	0.01	−0.13	0.15	0.08
t_b	2.66	2.13	−1.61	−0.67	−0.89	−0.11	−0.28	−4.70	−4.78	−1.46	−1.37	−1.30	−0.34	−0.75	−0.93	−0.99	−1.43	−0.38
t_s	0.14	0.73	−1.10	−1.97	−2.44	−2.56	−2.59	−2.42	−3.11	−0.39	−0.44	−1.28	−0.35	−1.10	−1.86	−1.48	2.32	2.14
t_h	−4.71	−4.10	−2.78	−1.98	−3.24	−3.97	−4.16	−0.94	−0.97	−1.86	−1.47	−1.85	−1.82	−1.78	−2.24	1.71	−0.32	−0.69
t_r	2.27	2.99	0.03	0.57	1.22	11.04	10.34	2.57	2.94	−0.11	−0.26	0.00	0.22	−0.09	−0.31	−1.00	0.73	1.09
t_c	−0.10	−1.21	0.24	−0.82	−1.20	1.02	0.99	2.05	1.58	1.71	1.06	0.44	1.27	0.39	0.06	−0.67	1.08	0.87

	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Ilr1	Ilr6	Ilr12	Ile1	Ile6	Cm1	Cm6	Cm12	Sim1	Sim6	Sim12	Cim1	Cim6	Cim12	Bm	Bmj	$\mathrm{Bm^q}12$	Am
β_{MKT}	−0.13	−0.10	−0.04	0.01	−0.03	0.01	−0.02	0.00	0.00	−0.03	−0.01	−0.02	−0.04	−0.01	−0.14	−0.12	−0.09	0.00
β_{ME}	−0.01	0.14	0.11	0.08	0.06	0.03	0.14	0.12	0.07	0.22	0.17	0.05	0.15	0.10	0.09	−0.07	−0.09	0.05
$\beta_{\mathrm{I/A}}$	0.09	0.03	0.00	−0.10	−0.16	0.14	0.12	0.02	0.17	0.04	−0.01	0.09	0.10	0.03	1.78	1.69	1.66	1.94
β_{ROE}	0.03	0.27	0.29	0.52	0.55	0.13	0.24	0.21	0.19	0.27	0.26	0.15	0.24	0.23	−0.13	−0.55	−0.52	−0.09
$t_{\beta_{\mathrm{MKT}}}$	−1.92	−2.57	−1.53	0.18	−0.78	0.19	−0.81	−0.23	0.00	−0.61	−0.35	−0.33	−1.04	−0.55	−2.64	−2.12	−1.32	−0.06
$t_{\beta_{\mathrm{ME}}}$	−0.05	1.44	1.63	0.94	0.91	0.26	2.78	3.13	0.52	1.89	2.59	0.30	1.51	1.38	0.83	−0.51	−0.53	0.37
$t_{\beta_{\mathrm{I/A}}}$	0.53	0.21	0.02	−0.95	−1.99	0.75	1.08	0.40	0.72	0.19	−0.09	0.38	0.63	0.33	8.62	9.46	9.33	8.58
$t_{\beta_{\mathrm{ROE}}}$	0.23	2.88	4.15	6.60	7.92	0.85	3.36	4.49	1.12	2.11	3.03	0.94	2.41	3.43	−0.76	−3.91	−3.78	−0.49

b	−0.14	−0.11	−0.06	−0.02	−0.06	−0.02	−0.03	−0.02	−0.02	−0.04	−0.03	−0.04	−0.05	−0.04	−0.05	−0.02	0.03	0.09
s	−0.05	0.05	0.03	−0.05	−0.07	−0.02	0.10	0.08	−0.04	0.12	0.10	−0.04	0.04	0.01	0.12	0.05	0.07	0.11
h	−0.12	−0.16	−0.14	−0.51	−0.37	−0.05	−0.01	−0.04	−0.07	−0.14	−0.10	−0.07	−0.14	−0.12	1.28	1.32	1.42	1.45
r	−0.16	0.01	0.05	0.26	0.22	−0.01	0.14	0.10	−0.12	0.00	0.03	−0.20	−0.05	−0.05	0.35	0.14	0.26	0.49
c	0.20	0.20	0.14	0.38	0.14	0.11	0.09	0.05	0.18	0.18	0.08	0.15	0.23	0.12	0.48	0.38	0.24	0.42
t_b	−2.25	−2.90	−1.89	−0.36	−1.62	−0.29	−1.24	−0.83	−0.33	−0.90	−0.84	−0.72	−1.45	−1.38	−1.93	−0.28	0.54	2.87
t_s	−0.52	0.74	0.52	−0.71	−1.16	−0.17	1.98	2.31	−0.32	1.39	1.77	−0.38	0.64	0.10	3.10	0.67	0.96	2.33
t_h	−0.91	−1.59	−1.76	−5.70	−4.71	−0.41	−0.09	−0.73	−0.41	−0.97	−1.04	−0.41	−1.26	−1.49	23.74	11.22	11.88	21.75
t_r	−0.92	0.10	0.43	2.36	2.46	−0.08	1.59	1.57	−0.47	−0.02	0.23	−0.79	−0.31	−0.47	3.68	1.10	2.39	5.16
t_c	1.07	1.44	1.27	2.71	1.16	0.55	0.69	0.52	0.68	0.88	0.53	0.67	1.46	1.03	4.37	1.90	1.40	3.58

	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	Rev1	Rev6	Rev12	Ep	Ep^{q}1	Ep^{q}6	Ep^{q}12	Cp	Cp^{q}1	Cp^{q}6	Cp^{q}12	Op	Op^{q}1	Op^{q}6	Op^{q}12	Nop	Nop^{q}6	Nop^{q}12
β_{MKT}	0.06	0.07	0.07	−0.19	−0.02	−0.08	−0.12	−0.12	−0.02	−0.08	−0.09	−0.28	−0.10	−0.14	−0.14	−0.20	−0.14	−0.13
β_{ME}	−0.36	−0.29	−0.26	−0.02	0.00	−0.03	−0.01	0.04	−0.08	−0.07	−0.01	−0.21	−0.25	−0.19	−0.14	−0.25	−0.32	−0.32
$\beta_{\text{I/A}}$	−1.12	−0.98	−0.91	1.14	0.92	0.94	0.92	1.60	1.22	1.22	1.25	1.07	0.53	0.60	0.64	1.09	1.11	1.12
β_{ROE}	0.44	0.36	0.25	−0.01	0.20	0.20	0.17	0.01	−0.17	−0.13	−0.04	−0.15	−0.12	−0.07	0.02	0.27	0.39	0.45
$t_{\beta_{\text{MKT}}}$	1.46	1.68	1.62	−3.38	−0.27	−1.30	−2.23	−1.74	−0.21	−1.03	−1.28	−6.09	−1.82	−3.51	−3.88	−6.48	−2.71	−2.71
$t_{\beta_{\text{ME}}}$	−5.61	−4.07	−3.26	−0.17	0.01	−0.25	−0.05	0.32	−0.42	−0.37	−0.04	−2.96	−2.65	−3.19	−2.66	−5.38	−4.78	−5.37
$t_{\beta_{\text{I/A}}}$	−9.11	−6.98	−6.11	8.10	5.15	6.41	6.89	8.38	5.73	5.96	6.71	7.28	3.96	6.36	7.01	9.69	6.91	7.49
$t_{\beta_{\text{ROE}}}$	4.05	2.90	1.91	−0.10	1.43	1.51	1.46	0.08	−0.87	−0.72	−0.23	−1.16	−0.95	−0.81	0.26	2.74	2.82	3.46
b	0.02	0.03	0.04	−0.12	0.03	−0.03	−0.07	−0.03	0.08	0.01	0.00	−0.23	−0.03	−0.09	−0.10	−0.15	−0.12	−0.12
s	−0.36	−0.28	−0.23	0.02	0.05	0.03	0.05	0.10	0.11	0.12	0.14	−0.20	−0.12	−0.11	−0.08	−0.25	−0.26	−0.28
h	−0.45	−0.45	−0.44	1.09	1.04	0.96	0.92	1.34	1.29	1.32	1.28	0.79	0.33	0.28	0.29	0.41	0.56	0.51
r	0.21	0.23	0.16	0.37	0.56	0.60	0.56	0.57	0.71	0.68	0.66	0.07	0.30	0.26	0.25	0.57	0.60	0.61
c	−0.65	−0.51	−0.43	0.00	−0.18	−0.09	−0.05	0.21	−0.10	−0.15	−0.06	0.16	0.17	0.31	0.28	0.59	0.39	0.43
t_b	0.34	0.81	0.99	−3.99	0.68	−0.83	−2.29	−1.06	1.46	0.22	−0.13	−7.12	−0.70	−2.47	−3.46	−5.23	−3.36	−3.62
t_s	−4.37	−3.67	−3.15	0.33	0.70	0.47	1.01	2.04	1.41	1.89	2.59	−3.68	−1.94	−2.14	−1.79	−4.87	−4.29	−4.97
t_h	−3.95	−4.30	−4.30	16.32	11.01	12.73	15.34	20.18	11.17	12.94	17.06	10.88	3.49	3.60	4.61	6.23	7.56	7.31
t_r	1.69	1.58	1.09	4.97	4.67	7.47	9.03	6.46	5.37	6.85	8.56	0.94	3.70	4.85	4.99	6.57	7.17	7.95
t_c	−3.74	−2.69	−2.22	0.03	−1.46	−0.93	−0.55	1.80	−0.66	−1.11	−0.59	1.47	1.21	3.53	3.25	5.44	3.17	3.39

	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	Sg	Em	Em^{q}1	Em^{q}6	Em^{q}12	Sp	Sp^{q}1	Sp^{q}6	Sp^{q}12	Ocp	Ocp^{q}1	Ir	Vhp	Ebp	Ndp	Dur	Aci	I/A
β_{MKT}	0.07	0.16	0.04	0.10	0.12	0.02	0.09	0.05	0.04	−0.12	0.10	0.00	−0.12	−0.05	0.03	0.22	0.01	0.07
β_{ME}	0.14	−0.05	0.32	0.25	0.16	0.21	0.06	0.11	0.16	0.01	−0.25	−0.24	0.06	0.08	0.08	−0.09	−0.15	0.03
$\beta_{\text{I/A}}$	−1.22	−1.40	−0.99	−1.06	−1.08	1.84	1.63	1.68	1.68	1.57	1.26	−1.36	0.97	1.87	0.94	−1.23	−0.15	−1.25
β_{ROE}	0.09	−0.29	−0.29	−0.35	−0.41	0.34	0.03	0.10	0.20	0.08	−0.01	0.42	−0.02	−0.05	−0.48	−0.39	−0.14	0.15
$t_{\beta_{\text{MKT}}}$	3.05	2.43	0.55	1.36	1.88	0.24	0.94	0.57	0.48	−1.95	1.07	0.05	−1.83	−0.72	0.92	3.16	0.33	3.36
$t_{\beta_{\text{ME}}}$	3.24	−0.44	1.68	1.45	1.11	1.00	0.24	0.45	0.75	0.05	−1.08	−2.39	0.46	0.53	1.02	−0.72	−3.87	0.64
$t_{\beta_{\text{I/A}}}$	−16.46	−7.19	−4.50	−5.38	−5.85	8.12	5.94	6.99	7.58	7.55	5.74	−10.74	7.03	8.96	8.18	−7.50	−2.21	−15.21
$t_{\beta_{\text{ROE}}}$	1.28	−1.77	−1.74	−2.26	−2.90	1.70	0.13	0.44	0.99	0.46	−0.03	3.80	−0.13	−0.32	−5.84	−2.14	−2.19	2.16
b	0.03	0.08	−0.04	0.03	0.05	0.13	0.24	0.19	0.17	−0.02	0.19	−0.07	−0.05	0.05	0.08	0.15	0.02	0.04
s	0.17	−0.11	0.12	0.06	0.00	0.35	0.31	0.33	0.35	0.07	0.07	−0.31	0.15	0.15	0.12	−0.10	−0.10	0.09
h	−0.30	−1.04	−0.91	−0.91	−0.89	1.36	1.47	1.42	1.36	1.11	1.07	−1.07	1.09	1.38	0.92	−1.11	0.10	−0.20
r	−0.07	−0.86	−1.01	−1.04	−1.01	1.27	1.28	1.26	1.26	0.58	0.74	−0.03	0.47	0.55	−0.23	−0.78	−0.02	0.03
c	−0.86	−0.31	0.08	0.07	0.00	0.44	0.24	0.31	0.35	0.36	0.02	−0.29	−0.16	0.44	−0.05	−0.10	−0.24	−0.97
t_b	1.52	2.41	−0.78	0.69	1.61	3.76	3.92	3.81	4.05	−0.66	3.10	−2.10	−1.71	1.62	2.59	3.93	0.68	1.49
t_s	4.00	−2.24	1.58	0.91	−0.04	6.74	3.25	4.46	6.03	1.19	0.75	−5.68	2.81	3.32	2.81	−1.68	−2.82	1.99
t_h	−5.65	−15.17	−8.59	−9.41	−11.56	18.12	9.05	10.90	13.66	14.91	7.63	−13.18	15.56	22.78	14.48	−12.05	1.70	−3.06
t_r	−1.05	−9.02	−8.69	−11.01	−13.20	16.17	7.35	9.81	14.00	5.56	5.10	−0.43	6.36	7.27	−4.37	−7.09	−0.34	0.29
t_c	−8.96	−2.41	0.53	0.58	0.00	3.96	1.11	1.95	3.02	2.51	0.09	−2.49	−1.54	4.55	−0.49	−0.66	−2.64	−9.07

	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
	Ia^{q}1	Ia^{q}6	Ia^{q}12	dPia	Noa	dNoa	dLno	Ig	2Ig	3Ig	Nsi	dIi	Cei	Cdi	Ivg	Ivc	Oa	Ta
β_{MKT}	0.10	0.10	0.07	0.10	0.13	0.07	0.04	0.00	0.04	0.08	0.12	0.04	0.24	0.08	0.07	0.06	0.01	0.06
β_{ME}	−0.02	0.02	0.03	−0.01	−0.03	0.02	−0.09	0.01	−0.05	0.00	0.05	−0.01	0.29	0.02	0.08	0.10	0.21	0.07
$\beta_{\mathrm{I/A}}$	−1.27	−1.30	−1.24	−0.80	0.01	−0.83	−0.63	−0.76	−0.68	−0.68	−0.86	−0.51	−0.93	−0.23	−0.69	−0.55	−0.19	−0.67
β_{ROE}	0.41	0.26	0.18	0.02	0.18	0.04	0.04	−0.08	−0.10	−0.09	−0.46	−0.19	−0.31	−0.05	0.06	0.18	0.42	0.40
$t_{\beta_{\mathrm{MKT}}}$	2.56	3.29	3.15	3.30	2.15	2.89	1.52	0.23	1.51	2.51	4.43	1.46	7.24	3.58	3.16	2.80	0.24	1.76
$t_{\beta_{\mathrm{ME}}}$	−0.24	0.23	0.46	−0.12	−0.23	0.42	−1.80	0.30	−1.13	−0.06	0.87	−0.20	6.48	0.37	2.01	2.38	3.97	1.48
$t_{\beta_{\mathrm{I/A}}}$	−7.17	−8.99	−13.04	−8.52	0.07	−10.06	−7.95	−11.69	−8.02	−7.55	−8.45	−7.50	−10.49	−3.93	−7.84	−6.25	−1.75	−8.11
$t_{\beta_{\mathrm{ROE}}}$	3.63	2.79	2.67	0.26	1.53	0.64	0.62	−1.30	−1.19	−1.04	−5.72	−2.64	−3.62	−1.60	0.95	3.12	4.88	4.78
b	0.03	0.05	0.03	0.09	0.14	0.06	0.03	−0.01	0.04	0.07	0.08	0.04	0.22	0.08	0.07	0.07	0.02	0.05
s	0.00	0.09	0.11	0.07	0.10	0.12	−0.02	0.05	0.00	0.02	0.03	0.02	0.33	0.06	0.12	0.17	0.25	0.08
h	−0.33	−0.23	−0.20	0.07	0.62	0.03	0.08	−0.09	−0.12	−0.18	−0.13	−0.20	−0.39	0.01	−0.04	−0.01	−0.02	−0.10
r	0.13	0.14	0.11	0.07	0.52	0.10	0.10	−0.13	−0.08	−0.13	−0.81	−0.21	−0.44	−0.01	0.11	0.33	0.62	0.39
c	−0.98	−1.06	−0.99	−0.82	−0.65	−0.82	−0.68	−0.63	−0.49	−0.41	−0.70	−0.23	−0.42	−0.22	−0.58	−0.46	−0.11	−0.52
t_b	0.59	1.57	1.43	3.00	3.84	2.45	1.28	−0.66	1.16	2.18	3.00	1.25	7.86	3.49	2.82	2.64	0.79	1.24
t_s	−0.02	1.60	2.50	1.65	1.66	2.90	−0.44	1.41	0.00	0.52	0.53	0.54	5.74	1.59	3.10	5.36	5.90	1.52
t_h	−3.06	−3.42	−3.73	1.04	6.16	0.54	1.29	−1.90	−1.53	−2.54	−2.20	−3.10	−5.38	0.33	−0.62	−0.08	−0.25	−1.22
t_r	0.73	1.17	1.41	1.05	4.60	1.40	1.60	−1.94	−0.93	−1.32	−9.90	−2.89	−5.71	−0.16	1.65	5.67	8.59	4.94
t_c	−5.43	−7.54	−9.30	−8.82	−5.37	−8.90	−8.61	−6.77	−3.57	−3.30	−7.65	−2.10	−4.49	−3.17	−6.54	−5.70	−0.93	−3.66

	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
	dWc	dCoa	dCol	dNco	dNca	dFin	dLti	dFnl	dBe	Dac	Poa	Pta	Pda	Nxf	Nef	Ndf	Roe1	Roe6
β_{MKT}	0.08	0.08	0.06	0.02	0.02	−0.03	0.10	0.01	0.10	0.01	0.00	0.09	0.05	0.20	0.23	0.03	−0.02	−0.03
β_{ME}	0.15	0.15	0.07	−0.05	−0.11	0.02	−0.01	−0.01	0.03	0.06	0.19	0.09	0.00	0.23	0.33	−0.04	−0.12	−0.11
$\beta_{\mathrm{I/A}}$	−0.33	−1.01	−1.05	−0.80	−0.87	−0.21	−0.44	−0.46	−1.15	−0.02	−0.75	−0.57	−0.17	−0.89	−0.99	−0.38	0.24	0.25
β_{ROE}	0.16	0.09	0.01	−0.04	−0.03	−0.09	−0.25	−0.16	0.26	0.22	0.00	0.03	−0.16	−0.39	−0.45	−0.23	1.50	1.48
$t_{\beta_{\mathrm{MKT}}}$	3.46	3.94	2.27	0.68	0.68	−0.92	3.08	0.32	4.83	0.36	0.00	3.67	2.22	7.41	7.11	1.15	−0.45	−0.74
$t_{\beta_{\mathrm{ME}}}$	2.79	5.42	2.02	−1.21	−2.93	0.23	−0.23	−0.34	0.81	1.26	5.53	2.30	0.06	5.09	6.22	−1.04	−1.19	−1.26
$t_{\beta_{\mathrm{I/A}}}$	−4.10	−15.43	−15.05	−10.70	−12.13	−1.78	−4.93	−8.17	−14.35	−0.19	−11.76	−8.94	−2.70	−8.03	−7.77	−6.01	2.40	1.79
$t_{\beta_{\mathrm{ROE}}}$	3.37	1.80	0.24	−0.69	−0.50	−1.25	−3.18	−4.24	3.72	2.50	−0.07	0.49	−3.50	−4.37	−3.89	−4.65	21.32	14.04
b	0.09	0.06	0.03	0.00	0.00	−0.06	0.08	0.00	0.06	0.02	−0.01	0.08	0.05	0.16	0.17	0.02	−0.02	−0.03
s	0.22	0.22	0.10	0.03	−0.04	−0.08	0.02	0.04	0.08	0.09	0.23	0.07	0.04	0.27	0.32	0.02	−0.16	−0.14
h	0.04	−0.21	−0.26	0.04	0.03	−0.36	0.01	0.04	−0.30	0.18	−0.23	−0.16	0.11	−0.13	−0.31	0.04	−0.03	−0.05
r	0.34	0.08	−0.12	−0.04	−0.07	−0.39	−0.29	−0.18	0.13	0.35	0.00	−0.13	−0.11	−0.60	−0.83	−0.24	1.58	1.58
c	−0.31	−0.71	−0.71	−0.80	−0.84	0.15	−0.46	−0.45	−0.80	−0.18	−0.43	−0.37	−0.30	−0.68	−0.58	−0.40	0.21	0.23
t_b	4.21	2.66	1.10	−0.05	−0.08	−1.99	2.32	0.00	2.75	0.79	−0.36	2.79	2.07	5.82	6.21	0.59	−0.50	−0.76
t_s	5.82	6.13	3.12	0.65	−1.06	−1.83	0.48	1.23	1.74	2.34	6.75	1.89	1.35	5.29	5.95	0.34	−2.03	−2.08
t_h	0.87	−3.97	−5.05	0.69	0.46	−5.12	0.06	0.62	−5.52	2.54	−4.99	−2.70	2.69	−2.02	−4.76	0.66	−0.26	−0.49
t_r	7.55	1.41	−2.14	−0.58	−1.00	−5.23	−3.15	−3.59	1.48	4.92	0.06	−2.35	−2.25	−6.25	−8.99	−3.60	16.48	15.15
t_c	−4.39	−8.84	−9.07	−8.54	−9.40	1.68	−3.47	−5.94	−6.61	−1.48	−5.81	−3.81	−5.15	−6.21	−5.09	−4.07	1.38	1.28

	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
	dRoe1	dRoe6	dRoe12	Roa1	Roa6	dRoa1	dRoa6	dRoa12	Cto	Rna^{q}1	Rna^{q}6	Rna^{q}12	Pm^{q}1	Ato^{q}1	Ato^{q}6	Ato^{q}12	Cto^{q}1	Cto^{q}6
β_{MKT}	0.04	0.04	0.00	−0.04	−0.07	0.08	0.07	0.03	0.15	−0.05	−0.05	−0.07	−0.15	0.10	0.09	0.07	0.13	0.12
β_{ME}	−0.05	−0.06	−0.03	−0.12	−0.12	0.01	−0.02	0.01	0.44	−0.19	−0.17	−0.11	−0.36	0.45	0.45	0.44	0.28	0.34
$\beta_{\mathrm{I/A}}$	0.18	0.13	0.04	0.15	0.12	0.23	0.11	0.02	−0.18	−0.02	0.01	−0.07	0.38	−0.25	−0.32	−0.41	0.47	0.43
β_{ROE}	0.54	0.49	0.46	1.40	1.41	0.57	0.52	0.46	0.65	1.28	1.23	1.18	1.17	0.64	0.63	0.61	1.02	1.01
$t_{\beta_{\mathrm{MKT}}}$	1.17	1.55	−0.01	−1.12	−2.06	2.32	2.07	1.19	3.04	−0.99	−1.26	−2.08	−2.72	2.11	2.02	1.78	2.18	2.42
$t_{\beta_{\mathrm{ME}}}$	−1.03	−1.38	−0.86	−1.29	−1.64	0.24	−0.31	0.23	4.30	−1.61	−1.69	−1.45	−3.23	8.70	9.68	9.65	1.81	2.70
$t_{\beta_{\mathrm{I/A}}}$	1.49	1.37	0.58	1.30	0.94	1.85	1.12	0.34	−1.49	−0.16	0.05	−0.47	2.29	−2.46	−3.29	−4.40	2.99	2.82
$t_{\beta_{\mathrm{ROE}}}$	4.79	6.00	9.13	18.72	15.12	4.87	5.53	8.45	6.91	13.12	12.11	10.37	10.15	8.97	9.38	9.75	8.95	9.15

b	−0.01	−0.01	−0.05	−0.03	−0.06	0.03	0.01	−0.02	0.18	−0.04	−0.04	−0.06	−0.13	0.10	0.09	0.07	0.20	0.18
s	−0.22	−0.21	−0.15	−0.16	−0.17	−0.19	−0.19	−0.12	0.58	−0.09	−0.07	−0.02	−0.36	0.44	0.46	0.47	0.37	0.42
h	−0.26	−0.26	−0.21	−0.07	−0.15	−0.25	−0.27	−0.19	−0.10	−0.04	−0.06	−0.06	0.31	−0.57	−0.56	−0.56	0.04	−0.03
r	0.01	0.02	0.07	1.49	1.49	0.00	0.00	0.10	1.17	1.44	1.45	1.38	1.39	0.72	0.75	0.75	1.58	1.56
c	0.31	0.24	0.11	0.16	0.21	0.37	0.27	0.09	0.03	−0.11	−0.05	−0.10	0.03	0.41	0.33	0.24	0.46	0.48
t_b	−0.31	−0.44	−1.63	−0.67	−1.42	0.71	0.31	−0.47	5.67	−1.09	−1.21	−1.92	−2.45	2.27	2.21	1.93	4.60	5.41
t_s	−3.27	−3.84	−3.26	−2.24	−2.42	−2.59	−3.14	−2.25	13.31	−1.46	−1.34	−0.47	−4.55	8.38	9.28	9.56	5.12	7.60
t_h	−2.28	−2.97	−2.79	−0.70	−1.55	−2.19	−2.83	−2.36	−1.61	−0.49	−1.03	−0.94	2.84	−7.56	−7.98	−7.81	0.39	−0.42
t_r	0.08	0.24	1.09	14.66	13.59	0.00	−0.01	1.54	15.96	14.81	17.28	15.26	12.77	8.32	9.70	9.27	13.61	17.26
t_c	2.49	2.28	1.09	1.04	1.14	2.63	2.12	0.79	0.24	−0.67	−0.32	−0.61	0.17	3.43	2.80	2.01	3.66	3.74

	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
	Cto^{q}12	Gpa	Gla^{q}1	Gla^{q}6	Gla^{q}12	Ope	Ole^{q}1	Ole^{q}6	Ole^{q}12	Opa	Ola^{q}1	Ola^{q}6	Ola^{q}12	Cop	Cla	Cla^{q}1	Cla^{q}6	Cla^{q}12
β_{MKT}	0.11	0.11	0.11	0.10	0.08	0.00	0.00	0.01	−0.01	−0.11	−0.04	−0.06	−0.09	−0.18	−0.14	−0.08	−0.06	−0.08
β_{ME}	0.36	0.25	0.03	0.09	0.15	−0.11	−0.15	−0.15	−0.10	0.04	0.00	0.05	0.06	−0.19	−0.17	−0.09	−0.01	−0.01
$\beta_{\mathrm{I/A}}$	0.35	0.23	0.13	0.12	0.01	0.65	0.66	0.68	0.64	−0.01	−0.20	−0.16	−0.22	0.09	−0.32	0.18	0.24	0.18
β_{ROE}	0.99	0.84	0.98	0.93	0.86	1.15	1.13	1.13	1.11	1.01	1.08	1.10	1.07	0.61	0.52	0.49	0.55	0.54
$t_{\beta_{\mathrm{MKT}}}$	2.30	2.81	1.82	2.21	1.93	−0.04	0.06	0.21	−0.18	−2.54	−1.17	−1.99	−2.62	−4.64	−3.19	−2.80	−2.38	−2.92
$t_{\beta_{\mathrm{ME}}}$	3.36	3.06	0.20	0.75	1.61	−0.83	−0.82	−0.96	−0.69	0.38	0.05	0.67	0.82	−2.07	−1.66	−1.83	−0.28	−0.24
$t_{\beta_{\mathrm{I/A}}}$	2.47	1.72	1.00	0.99	0.06	2.77	3.67	3.44	3.00	−0.02	−1.64	−0.98	−1.12	0.63	−2.04	1.65	1.60	1.25
$t_{\beta_{\mathrm{ROE}}}$	9.73	7.81	8.95	9.10	9.07	6.44	8.10	7.15	6.52	5.61	14.38	10.03	8.19	5.98	4.46	6.90	5.31	5.46
b	0.16	0.14	0.12	0.12	0.10	0.05	0.05	0.06	0.04	−0.09	−0.04	−0.06	−0.09	−0.17	−0.14	−0.07	−0.05	−0.07
s	0.43	0.36	0.20	0.24	0.29	0.00	−0.08	−0.09	−0.04	−0.01	−0.02	0.02	0.03	−0.26	−0.23	−0.11	−0.05	−0.07
h	−0.09	−0.20	−0.08	−0.13	−0.15	0.32	0.40	0.36	0.36	−0.56	−0.39	−0.38	−0.38	−0.46	−0.54	−0.19	−0.17	−0.19
r	1.49	1.43	1.41	1.35	1.26	1.88	1.61	1.62	1.59	1.20	1.05	1.08	1.05	0.61	0.44	0.54	0.55	0.49
c	0.45	0.46	0.04	0.11	0.06	0.32	0.13	0.19	0.15	0.66	0.24	0.24	0.19	0.58	0.28	0.41	0.42	0.39
t_b	5.00	5.12	3.28	4.27	3.74	1.65	1.29	1.78	1.18	−1.84	−0.78	−1.39	−1.91	−4.62	−3.52	−1.98	−1.72	−2.34
t_s	8.35	7.79	3.00	4.42	6.10	0.09	−1.32	−1.78	−0.91	−0.09	−0.32	0.23	0.39	−3.88	−3.26	−2.15	−1.00	−1.46
t_h	−1.25	−2.93	−0.76	−1.64	−2.31	5.51	4.44	5.16	5.66	−4.59	−3.90	−4.00	−3.45	−4.66	−5.40	−2.89	−3.16	−2.98
t_r	17.06	18.38	13.13	16.41	17.07	21.06	14.63	16.59	16.47	5.66	7.43	7.15	6.19	4.22	2.87	5.10	4.70	4.20
t_c	3.18	3.88	0.28	0.86	0.53	2.33	1.06	1.35	0.94	2.91	1.42	1.17	0.82	4.13	1.85	3.45	2.80	2.64

	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
	F	F^{q}1	F^{q}6	F^{q}12	Fp6	O	O^{q}1	G	Sg^{q}12	Oca	Ioca	Adm	gAd	Rdm	Rdm^{q}1	Rdm^{q}6	Rdm^{q}12	Ol
β_{MKT}	−0.29	−0.08	−0.07	−0.07	0.40	0.15	0.06	−0.17	0.10	−0.14	−0.15	−0.08	−0.04	0.11	0.10	0.00	0.02	−0.07
β_{ME}	−0.24	−0.41	−0.30	−0.24	−0.10	0.14	0.37	−0.39	0.12	0.12	0.01	0.13	0.12	0.61	−0.07	0.09	0.21	0.27
$\beta_{\mathrm{I/A}}$	0.38	0.60	0.56	0.55	−0.12	0.30	0.26	0.12	−1.01	−0.10	0.05	1.61	−1.06	0.25	0.64	0.73	0.87	0.29
β_{ROE}	0.69	0.81	0.81	0.80	−1.50	−0.53	−0.78	0.54	0.38	0.09	0.04	0.22	−0.09	−0.43	−1.05	−0.93	−0.70	0.49
$t_{\beta_{\mathrm{MKT}}}$	−5.67	−1.38	−1.42	−1.44	5.27	4.30	1.65	−3.89	3.23	−2.54	−6.07	−1.15	−0.91	1.64	0.94	0.05	0.29	−1.49
$t_{\beta_{\mathrm{ME}}}$	−3.18	−3.20	−3.45	−3.40	−0.54	2.67	4.23	−5.40	2.01	1.33	0.14	0.97	1.37	4.42	−0.34	0.68	1.74	4.02
$t_{\beta_{\mathrm{I/A}}}$	2.49	4.87	4.99	4.27	−0.39	2.54	2.51	0.67	−9.65	−0.46	0.47	8.81	−5.08	0.97	2.47	3.13	3.79	2.28
$t_{\beta_{\mathrm{ROE}}}$	5.72	7.69	7.58	5.87	−6.61	−5.74	−9.17	3.66	4.30	0.59	0.50	1.16	−0.67	−2.41	−3.90	−4.00	−3.32	4.76
b	−0.29	−0.13	−0.13	−0.13	0.43	0.14	0.07	−0.16	0.02	−0.14	−0.16	0.02	−0.06	0.15	0.36	0.24	0.22	−0.03
s	−0.28	−0.39	−0.30	−0.24	0.13	0.16	0.33	−0.39	0.03	0.13	−0.02	0.22	0.12	0.47	0.11	0.21	0.25	0.31
h	0.27	0.37	0.33	0.38	0.53	0.28	0.13	−0.06	−0.45	−0.45	−0.08	0.94	−0.09	−0.30	0.17	0.19	0.13	−0.09
r	0.68	0.75	0.72	0.69	−0.97	−0.55	−0.80	0.63	−0.12	0.25	−0.02	0.92	−0.29	−0.46	−0.22	−0.26	−0.20	0.86
c	0.00	0.00	0.00	−0.06	−0.70	−0.06	0.15	0.12	−0.61	0.37	0.08	0.54	−0.83	0.77	0.69	0.79	0.96	0.42
t_b	−5.08	−2.48	−2.57	−2.56	4.36	4.06	1.84	−3.71	0.63	−2.71	−6.15	0.39	−1.42	2.64	2.82	2.17	2.11	−0.95
t_s	−3.02	−4.61	−4.26	−3.31	0.84	3.33	5.06	−5.22	0.64	1.60	−0.55	2.74	1.58	4.84	0.52	1.19	1.66	5.58
t_h	2.24	3.40	4.07	4.28	2.16	3.47	1.53	−0.57	−4.92	−3.94	−1.27	9.63	−1.04	−2.32	0.64	0.82	0.65	−1.13
t_r	5.30	5.25	6.91	6.72	−3.29	−4.88	−7.91	3.95	−1.54	1.86	−0.19	8.68	−2.57	−2.03	−0.84	−1.01	−0.80	8.92
t_c	0.01	−0.02	0.02	−0.29	−1.71	−0.53	1.28	0.69	−3.99	1.96	0.73	3.80	−4.40	2.83	1.36	1.83	2.46	3.06

	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
	$\mathrm{Ol}^{\mathrm{q}}1$	$\mathrm{Ol}^{\mathrm{q}}6$	$\mathrm{Ol}^{\mathrm{q}}12$	Hn	Parc	dSi	Rer	Eprd	Ala	$\mathrm{Alm}^{\mathrm{q}}1$	$\mathrm{Alm}^{\mathrm{q}}6$	$\mathrm{Alm}^{\mathrm{q}}12$	R_{a}^{1}	R_{n}^{1}	$R_{\mathrm{a}}^{[2,5]}$	$R_{\mathrm{n}}^{[2,5]}$	$R_{\mathrm{a}}^{[6,10]}$	$R_{\mathrm{n}}^{[6,10]}$
β_{MKT}	−0.02	−0.04	−0.05	0.07	−0.02	−0.05	0.03	0.25	0.21	−0.04	0.00	0.00	0.17	−0.16	0.05	0.20	0.01	0.07
β_{ME}	0.26	0.30	0.29	0.09	0.08	0.02	−0.08	0.25	0.29	0.22	0.25	0.28	−0.09	0.61	−0.19	−0.01	−0.05	−0.03
$\beta_{\mathrm{I/A}}$	0.11	0.15	0.13	−1.14	0.10	−0.10	0.10	0.37	−1.40	1.45	1.48	1.42	−0.12	−0.26	−0.27	−1.31	−0.14	−0.67
β_{ROE}	0.48	0.47	0.47	−0.02	0.01	0.08	0.02	−0.74	−0.10	0.03	0.13	0.18	0.14	1.10	−0.07	0.18	−0.18	−0.31
$t_{\beta_{\mathrm{MKT}}}$	−0.35	−0.86	−1.09	2.45	−0.78	−1.66	0.98	5.06	4.97	−0.68	−0.09	−0.08	3.92	−1.44	1.25	3.39	0.16	1.62
$t_{\beta_{\mathrm{ME}}}$	3.90	4.20	4.08	2.35	1.52	0.43	−2.01	2.98	3.56	1.45	2.16	2.77	−0.98	1.97	−2.45	−0.06	−1.12	−0.38
$t_{\beta_{\mathrm{I/A}}}$	0.91	1.25	1.07	−15.63	1.27	−1.63	1.45	3.48	−13.31	8.64	9.08	10.48	−0.71	−0.69	−2.93	−9.04	−1.24	−5.66
$t_{\beta_{\mathrm{ROE}}}$	4.59	4.74	4.69	−0.27	0.21	1.43	0.39	−8.22	−0.95	0.21	1.19	1.81	0.99	3.75	−0.95	1.31	−1.98	−3.11
b	0.02	0.00	−0.02	0.03	−0.02	−0.07	0.02	0.28	0.16	0.07	0.09	0.08	0.14	−0.29	0.05	0.13	0.00	0.07
s	0.30	0.34	0.32	0.12	0.06	0.04	−0.10	0.33	0.29	0.34	0.32	0.32	−0.10	0.20	−0.13	−0.08	−0.01	−0.03
h	−0.13	−0.09	−0.12	−0.25	−0.07	0.16	0.03	0.47	−0.68	0.96	0.84	0.78	−0.17	−0.99	0.07	−0.82	0.04	−0.46
r	0.82	0.81	0.78	−0.20	0.06	0.07	0.00	−0.54	−0.40	0.49	0.46	0.43	−0.01	−0.24	0.04	−0.30	−0.14	−0.43
c	0.28	0.28	0.28	−0.82	0.18	−0.33	0.00	−0.06	−0.60	0.49	0.61	0.61	−0.04	0.58	−0.36	−0.44	−0.19	−0.06
t_b	0.39	−0.09	−0.47	1.10	−0.60	−2.66	0.70	5.67	5.44	1.46	2.12	2.30	2.85	−2.48	1.23	2.96	0.05	1.90
t_s	4.67	5.76	5.62	2.81	1.27	0.99	−2.54	5.05	5.97	4.57	5.08	5.80	−1.07	1.01	−1.80	−0.98	−0.31	−0.41
t_h	−1.47	−1.13	−1.47	−4.79	−0.92	3.04	0.66	4.62	−10.57	9.03	9.40	10.45	−1.38	−3.00	0.81	−7.42	0.58	−5.86
t_r	9.43	9.72	8.85	−2.74	0.76	1.29	−0.08	−4.50	−4.76	4.86	5.00	5.89	−0.06	−0.59	0.40	−2.33	−1.97	−4.84
t_c	2.18	2.13	2.07	−7.92	1.42	−3.70	−0.03	−0.39	−4.85	3.11	3.63	4.27	−0.22	1.27	−2.89	−2.47	−1.65	−0.46

	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
	$R_{\mathrm{a}}^{[11,15]}$	$R_{\mathrm{a}}^{[16,20]}$	Ivc1	Ivq1	Sv1	Srev	Dtv1	Dtv6	Dtv12	Ami6	Ami12	$\mathrm{Lm}^{6}1$	$\mathrm{Lm}^{6}6$	$\mathrm{Lm}^{6}12$	$\mathrm{Lm}^{12}1$	$\mathrm{Lm}^{12}6$	$\mathrm{Lm}^{12}12$	Mdr1
β_{MKT}	−0.02	−0.05	0.56	0.54	0.00	−0.29	0.26	0.27	0.26	−0.07	−0.06	−0.47	−0.49	−0.47	−0.48	−0.46	−0.45	0.49
β_{ME}	0.00	0.01	0.80	0.79	0.20	0.04	−0.65	−0.70	−0.73	0.95	0.92	−0.22	−0.15	−0.11	−0.15	−0.12	−0.10	0.66
$\beta_{\mathrm{I/A}}$	0.07	−0.08	−1.36	−1.34	−0.21	0.17	−0.74	−0.74	−0.73	0.20	0.21	1.17	1.14	1.15	1.07	1.07	1.04	−1.20
β_{ROE}	0.09	−0.06	−0.89	−0.85	−0.54	0.19	0.00	−0.06	−0.09	−0.25	−0.22	0.39	0.46	0.54	0.40	0.47	0.51	−0.78
$t_{\beta_{\mathrm{MKT}}}$	−0.68	−1.49	9.48	9.66	0.02	−2.95	6.82	7.40	7.12	−3.06	−2.27	−8.00	−9.14	−8.82	−9.34	−8.95	−8.65	7.84
$t_{\beta_{\mathrm{ME}}}$	−0.07	0.11	6.48	6.79	1.21	0.18	−7.00	−9.31	−10.94	24.75	19.83	−1.87	−1.67	−1.39	−1.82	−1.46	−1.32	4.73
$t_{\beta_{\mathrm{I/A}}}$	0.89	−1.10	−7.46	−7.62	−1.16	0.62	−8.60	−9.05	−9.79	4.22	3.42	8.72	8.80	7.90	9.11	8.70	8.13	−6.40
$t_{\beta_{\mathrm{ROE}}}$	1.55	−0.88	−5.34	−5.38	−4.23	0.97	0.07	−0.71	−1.10	−6.11	−4.53	2.97	3.55	3.84	3.31	3.74	3.92	−4.60
b	−0.03	−0.05	0.49	0.48	0.00	−0.30	0.22	0.23	0.23	−0.06	−0.05	−0.41	−0.43	−0.42	−0.44	−0.42	−0.42	0.43
s	−0.02	0.03	0.79	0.78	0.15	−0.06	−0.70	−0.72	−0.72	0.97	0.94	−0.16	−0.14	−0.14	−0.14	−0.13	−0.14	0.64
h	0.00	0.03	−0.64	−0.60	0.10	−0.32	−0.43	−0.42	−0.40	0.15	0.16	0.55	0.49	0.46	0.43	0.40	0.39	−0.63
r	0.03	0.03	−1.30	−1.26	−0.66	−0.12	−0.33	−0.31	−0.28	−0.17	−0.15	0.89	0.83	0.81	0.73	0.72	0.68	−1.22
c	0.05	−0.10	−0.66	−0.67	−0.27	0.52	−0.33	−0.34	−0.34	0.09	0.08	0.60	0.63	0.63	0.59	0.62	0.56	−0.54
t_b	−0.82	−1.34	9.72	9.66	0.02	−3.55	8.08	8.82	8.32	−2.90	−2.21	−8.74	−9.39	−8.79	−9.71	−8.99	−8.72	7.88
t_s	−0.42	0.61	14.17	14.09	1.25	−0.37	−12.79	−15.39	−16.79	21.49	20.90	−2.26	−2.18	−2.28	−2.21	−2.07	−2.27	10.64
t_h	−0.03	0.36	−5.43	−5.40	0.70	−1.39	−6.18	−7.02	−7.01	2.58	2.83	5.46	5.26	4.98	4.77	4.37	4.21	−4.83
t_r	0.38	0.47	−13.48	−13.34	−3.98	−0.41	−5.25	−6.17	−5.64	−3.92	−3.15	10.27	11.11	9.29	9.98	9.61	8.02	−12.39
t_c	0.59	−1.05	−4.30	−4.71	−1.43	1.93	−3.70	−3.87	−3.68	1.22	1.00	4.43	4.60	4.04	4.30	4.21	3.41	−3.59

Table 10 : Factor Mimicking Portfolios for the Financial Intermediary Leverage and the Fourth-quarter Consumption Growth

The coefficients, b, are normalized to sum up to unity. The sample in Panel A is from the first quarter of 1968 to the fourth quarter of 2014 (188 quarters), and the estimated coefficients are used to construct the monthly leverage factor from January 1967 to December 2014. The six size and book-to-market portfolios are rebalanced quarterly. Their data, as well as the data for UMD and the 17 industry portfolio returns are from Kenneth French's Web site. The sample in Panel B is annual, from 1967 to 2014 (48 years).

Panel A: The financial intermediary leverage											
Six size and book-to-market portfolios and UMD as basis assets											
	SL	SM	SH	BL	BM	BH	UMD	R^2			
b	−0.58	0.98	−0.16	−0.24	−0.18	0.70	0.48	11.86%			
	(−1.90)	(1.67)	(−0.34)	(−0.64)	(−0.39)	(1.82)	(2.53)				
17 Fama-French (1997) industry portfolios as basis assets											
	Food	Mines	Oil	Clths	Durbl	Chems	Cnsum	Cnstr	Steel	FabPr	Machn
b	0.57	0.32	0.49	0.7	0.97	−0.29	−0.1	0.54	−0.36	−1.41	−1.2
	(0.56)	(0.72)	(0.82)	(1.06)	(1.46)	(−0.39)	(−0.12)	(0.72)	(−0.69)	(−1.76)	(−1.92)
	Cars	Trans	Utils	Rtail	Finan	Other	R^2				
	0.66	−0.16	0.03	−0.75	0.73	0.25	13.18%				
	(1.27)	(−0.21)	(0.05)	(−0.85)	(0.96)	(0.22)					
Panel B: The fourth-quarter consumption growth											
Six size and book-to-market portfolios and UMD as basis assets											
	SL	SM	SH	BL	BM	BH	UMD	R^2			
b	−0.66	0.54	0.23	0.34	−0.22	0.38	0.39	29.28%			
	−1.82	0.64	0.33	0.90	−0.49	0.84	2.36				
17 Fama-French (1997) industry portfolios as basis assets											
	Food	Mines	Oil	Clths	Durbl	Chems	Cnsum	Cnstr	Steel	FabPr	Machn
b	2.46	−0.89	2.74	−0.38	0.26	−1.49	−1.63	−0.30	0.5	−1.54	0.78
	1.6	−1.39	2.71	−0.43	0.22	−1.28	−1.41	−0.29	0.65	−1.27	0.85
	Cars	Trans	Utils	Rtail	Finan	Other	R^2				
	1.1	−1.8	−0.32	0.08	1.75	−0.33	48.26%				
	1.49	−1.78	−0.29	0.06	2.01	−0.28					

Table 11 : Factor Spanning Tests for Macro Factors, January 1967 to December 2014

r_{ME}, $r_{\mathrm{I/A}}$, and r_{ROE} are the size, investment, ROE factors in the q-factor model, respectively. We calculate MKT as the value-weighted market return minus the one-month Treasury bill rate from CRSP. SMB, HML, RMW, and CMA are the size, value, profitability, and investment factors from the Fama-French five-factor model, respectively. The data for SMB and HML in the three-factor model, SMB, HML, RMW, and CMA in the five-factor model, as well as UMD are from Kenneth French's Web site. LIQ is the Pastor-Stambaugh liquidity factor from Robert Stambaugh's Web site. LevC the Adrian-Etula-Muir leaverage factor with characteristics-based basis assets, LevI the leverage factor with industry basis assets, g4C the Jagannathan-Wang fourth-quarter consumption growth factor with characteristics-based basis assets, and g4I the consumption growth factor with industry basis assets. m is the average return, α is the Carhart alpha, α_q the q-model alpha, and a is the five-factor alpha. $\beta_{\mathrm{MKT}}, \beta_{\mathrm{SMB}}, \beta_{\mathrm{HML}}$, and β_{UMD} are the Carhart factor loadings, $\beta_{\mathrm{MKT}}, \beta_{\mathrm{ME}}, \beta_{\mathrm{I/A}}$, and β_{ROE} are the q-factor loadings, and b, s, h, r, and c are the five-factor loadings. The numbers in parentheses are heteroscedasticity-and-autocorrelation-adjusted t-statistics, which test that a given point estimate is zero.

	m	α	β_{MKT}	β_{SMB}	β_{HML}	β_{UMD}	R^2
LevC	0.91	0.16	0.49	0.07	0.83	0.28	0.82
	(6.70)	(2.54)	(26.03)	(1.67)	(21.04)	(9.25)	
LevI	0.61	−0.38	0.96	−0.15	1.48	0.00	0.34
	(1.53)	(−1.21)	(10.59)	(−1.27)	(8.41)	(0.01)	
g4C	0.95	0.20	0.56	−0.07	0.63	0.39	0.91
	(7.78)	(4.98)	(44.37)	(−2.65)	(27.48)	(22.56)	
g4I	0.74	0.25	0.92	−0.96	0.51	0.10	0.09
	(1.25)	(0.43)	(5.60)	(−3.56)	(1.32)	(0.51)	
		α_q	β_{MKT}	β_{ME}	$\beta_{\mathrm{I/A}}$	β_{ROE}	R^2
LevC		0.15	0.43	0.17	0.86	0.20	0.48
		(1.27)	(11.45)	(2.84)	(11.20)	(2.68)	
LevI		−1.04	0.99	0.14	2.03	0.41	0.28
		(−2.81)	(9.50)	(0.80)	(7.32)	(1.72)	
g4C		0.17	0.51	0.06	0.68	0.37	0.59
		(1.59)	(17.66)	(1.53)	(7.72)	(5.00)	
g4I		0.75	0.83	−1.08	0.69	−0.68	0.09
		(1.11)	(5.44)	(−3.96)	(1.47)	(−1.89)	
	a	b	s	h	r	c	R^2
LevC	0.31	0.45	0.21	0.68	0.18	0.12	0.69
	(4.01)	(14.92)	(3.10)	(12.38)	(3.16)	(1.75)	
LevI	−0.86	1.06	0.13	1.25	1.01	0.51	0.39
	(−2.66)	(11.37)	(0.96)	(7.11)	(5.62)	(1.91)	
g4C	0.38	0.52	0.00	0.41	0.32	0.21	0.64
	(4.03)	(17.63)	(−0.01)	(5.94)	(4.09)	(2.09)	
g4I	0.81	0.84	−1.35	0.69	−1.26	−0.16	0.12
	(1.35)	(5.23)	(−5.67)	(2.01)	(−2.90)	(−0.30)	

Table 12 : Overall Performance of Macro Factor Models, January 1967–December 2014

"Mom," "V−G," "Inv," "Prof," "Intan," and "Fric" denote momentum, value-versus-growth, investment, profitability, intangibles, and frictions categories of anomalies, respectively, and "All" is all the significant anomalies combined. The number in the parenthesis beside a given category is the number of significant anomalies in the category. $\overline{|\alpha_{\mathrm{H-L}}|}$ is the average magnitude of the high-minus-low alphas, $\#^{\star}_{\mathrm{H-L}}$ is the number of significant high-minus-low alphas, $\overline{|\alpha|}$ is the mean absolute alpha across the significant anomalies in each category, and $\#^{\star}_{\mathrm{GRS}}$ is the number of the sets of anomaly deciles across which a given factor model is rejected by the GRS test. All the significance is at the 5% level. LevC is the Adrian-Etula-Muir leaverage factor with characteristics-based basis assets, LevI the leverage factor with industry basis assets, g4C the Jagannathan-Wang fourth-quarter consumption growth factor with characteristics-based basis assets, and g4I the consumption growth factor with industry basis assets.

Panel A: NYSE breakpoints with value-weighted returns

	All (161)		Mom (37)		V−G (31)		Inv (27)		Prof (33)		Intan (26)		Fric (7)	
	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$
LevC	0.40	96	0.51	31	0.17	4	0.30	16	0.54	25	0.49	17	0.25	3
LevI	0.50	151	0.58	37	0.46	25	0.39	26	0.49	32	0.56	26	0.35	5
g4C	0.38	77	0.34	15	0.37	11	0.34	18	0.39	17	0.51	13	0.33	3
g4I	0.51	156	0.55	37	0.55	29	0.40	26	0.50	32	0.59	26	0.38	6
	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$
LevC	0.159	69	0.140	20	0.107	6	0.089	9	0.271	21	0.194	10	0.094	3
LevI	0.508	147	0.484	37	0.550	28	0.470	27	0.487	31	0.557	21	0.523	3
g4C	0.256	59	0.289	15	0.261	11	0.306	11	0.137	11	0.302	9	0.247	2
g4I	0.568	154	0.547	37	0.631	31	0.529	27	0.536	32	0.606	23	0.577	4

Panel B: All-but-micro breakpoints with equal-weighted returns

	All (216)		Mom (50)		V−G (38)		Inv (36)		Prof (47)		Intan (29)		Fric (16)	
	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$	$\overline{\lvert\alpha_{\mathrm{H-L}}\rvert}$	$\#^{\star}_{\mathrm{H-L}}$
LevC	0.43	124	0.53	40	0.19	3	0.42	31	0.53	33	0.48	17	0.37	0
LevI	0.55	196	0.59	50	0.50	27	0.50	36	0.60	43	0.58	26	0.45	14
g4C	0.41	112	0.36	21	0.35	10	0.44	32	0.43	24	0.50	18	0.48	7
g4I	0.59	216	0.58	50	0.61	38	0.51	36	0.64	47	0.61	29	0.52	16
	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$	$\overline{\lvert\alpha\rvert}$	$\#^{\star}_{\mathrm{GRS}}$
LevC	0.140	130	0.141	33	0.112	8	0.100	30	0.150	37	0.210	17	0.098	5
LevI	0.648	215	0.635	50	0.658	37	0.613	36	0.662	47	0.691	29	0.594	16
g4C	0.187	97	0.183	19	0.184	11	0.176	30	0.164	20	0.230	12	0.202	5
g4I	0.724	216	0.715	50	0.743	38	0.701	36	0.728	47	0.750	29	0.665	16

A Delisting Adjustment

Following Beaver, McNichols, and Price (2007), we adjust monthly stock returns for delisting returns by compounding returns in the month before delisting with delisting returns from CRSP.

As discussed in Beaver, McNichols, and Price (2007), the monthly CRSP delisting returns (file `msedelist`) might not adjust for delisting properly. We follow their procedure to directly construct the delisting-adjusted monthly stock returns. For delisting that occurs before the last trading day in month t, we calculate the delisting-adjusted monthly return, DR_t, as:

$$\mathrm{DR}_t = (1 + \mathrm{pmr}_{dt})(1 + \mathrm{der}_{dt}) - 1, \tag{A1}$$

in which pmr_{dt} is the partial month return from the beginning of the month to the delisting day d, and der_{dt} is the delisting event return from the daily CRSP delisting file (`dsedelist`).

We calculate the partial month return, pmr_{dt}, as follows:

- When the delisting date (item DLSTDT) is the same as the delisting payment date (item DLPDT), the monthly CRSP delisting return, mdr_t, includes only the partial month return:

$$\mathrm{pmr}_{dt} = \mathrm{mdr}_t. \tag{A2}$$

- When the delisting date proceeds the delisting payment date, pmr_{dt} can be computed from the monthly CRSP delisting return and the delisting event return:

$$\mathrm{pmr}_{dt} = \frac{1 + \mathrm{mdr}_t}{1 + \mathrm{der}_{dt}} - 1. \tag{A3}$$

- If pmr_{dt} cannot be computed via the above methods, we construct it by accumulating daily returns from the beginning of month t to the delisting day d:

$$\mathrm{pmr}_{dt} = \prod_{i=1}^{d}(1 + \mathrm{ret}_{it}) - 1, \tag{A4}$$

  in which ret_{it} is the regular stock return on day i.

For delisting that occurs on the last trading day of month t, we include only the regular monthly return for month t, and account for the delisting return at the beginning of the following month: $\mathrm{DR}_t = \mathrm{ret}_t$ and $\mathrm{DR}_{t+1} = \mathrm{der}_{dt}$, in which ret_t is the regular full month return. Differing from Beaver, McNichols, and Price (2007), we do not account for these last-day delistings in the same month, because delisting generally occurs after the market closes. Also, delisting events are often surprises, and their payoffs cannot be determined immediately (Shumway 1997). As such, it might be problematic to incorporate delisting returns immediately on the last trading date in month t.

When delisting event returns are missing, the delisting-adjusted monthly returns cannot be computed. Among nonfinancial firms traded on NYSE, Amex, and Nasdaq, there are 16,326 delistings from 1925 to 2014, with 85.8% of the delisting event returns available. One option is to exclude missing delisting returns. However, previous studies show that omitting these stocks can introduce significant biases in asset pricing tests (Shumway 1997, Shumway and Warther 1999). As such, we replace missing delisting event returns using the average available delisting returns with the same stock exchange and delisting type (one-digit delisting code) during the past 60 months. We condition on stock exchange and delisting type because average delisting returns vary significantly across exchanges and delisting types. We also allow replacement values to vary over time because average delisting returns can vary greatly over time. Our procedure is inspired by prior studies. Shumway (1997) proposes a constant replacement value of −30% for all performance-related delistings on NYSE/Amex. Beaver, McNichols, and Price (2007) construct replacement values conditional on stock exchange and delisting type, but do not allow the replacement values to vary over time.

B Variable Definition and Portfolio Construction

We construct two sets of testing deciles for each anomaly variable: (i) NYSE-breakpoints and value-weighted returns; and (ii) all-but-micro breakpoints and equal-weighted returns.

B.1 Momentum

B.1.1 Sue1, Sue6, and Sue12, Standardized Unexpected Earnings

Per Foster, Olsen, and Shevlin (1984), Sue denotes Standardized Unexpected Earnings, and is calculated as the change in split-adjusted quarterly earnings per share (Compustat quarterly item EPSPXQ divided by item AJEXQ) from its value four quarters ago divided by the standard deviation of this change in quarterly earnings over the prior eight quarters (six quarters minimum). At the beginning of each month t, we split all NYSE, Amex, and NASDAQ stocks into deciles based on their most recent past Sue. Before 1972, we use the most recent Sue computed with quarterly earnings from fiscal quarters ending at least four months prior to the portfolio formation. Starting from 1972, we use Sue computed with quarterly earnings from the most recent quarterly earnings announcement dates (Compustat quarterly item RDQ). For a firm to enter our portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Sue to be within six months prior to the portfolio formation. We do so to exclude stale information on earnings. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly portfolio returns are calculated, separately, for the current month t (Sue1), from month t to $t+5$ (Sue6), and from month t to $t+11$ (Sue12). The holding period that is longer than one month as in, for instance, Sue6, means that for a given decile in each month there exist six sub-deciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the sub-decile returns as the monthly return of the Sue6 decile.

B.1.2 Abr1, Abr6, and Abr12, Cumulative Abnormal Returns Around Earnings Announcement Dates

We calculate cumulative abnormal stock return (Abr) around the latest quarterly earnings announcement date (Compustat quarterly item RDQ) (Chan, Jegadeesh, and Lakonishok 1996)):

$$\text{Abr}_i = \sum_{d=-2}^{+1} r_{id} - r_{md}, \tag{B1}$$

in which r_{id} is stock i's return on day d (with the earnings announced on day 0) and r_{md} is the market index return. We cumulate returns until one (trading) day after the announcement date to account for the one-day-delayed reaction to earnings news. r_{md} is the value-weighted market return for the Abr deciles with NYSE breakpoints and value-weighted returns, but is the equal-weighted market return with all-but-micro breakpoints and equal-weighted returns.

At the beginning of each month t, we split all stocks into deciles based on their most recent past Abr. For a firm to enter our portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Abr to be within six months prior to the portfolio formation. We do so to exclude stale information on earnings. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for the current month t (Abr1), and, separately, from month t to $t+5$ (Abr6) and from month t to $t+11$ (Abr12). The deciles are rebalanced monthly. The six-month holding period for Abr6 means that for a given decile in each month there exist six sub-deciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the sub-decile returns as the monthly return of the Abr6 decile. Because quarterly earnings announcement dates are largely unavailable before 1972, the Abr portfolios start in January 1972.

B.1.3 Re1, Re6, and Re12, Revisions in Analyst Earnings Forecasts

Following Chan, Jegadeesh, and Lakonishok (1996), we measure earnings surprise as the revisions in analysts' forecasts of earnings obtained from the Institutional Brokers' Estimate System (IBES). Because analysts' forecasts are not necessarily revised each month, we construct a six-month moving average of past changes in analysts' forecasts:

$$\mathrm{RE}_{it} = \sum_{\tau=1}^{6} \frac{f_{it-\tau} - f_{it-\tau-1}}{p_{it-\tau-1}}, \tag{B2}$$

in which $f_{it-\tau}$ is the consensus mean forecast (IBES unadjusted file, item MEANEST) issued in month $t-\tau$ for firm i's current fiscal year earnings (fiscal period indicator = 1), and $p_{it-\tau-1}$ is the prior month's share price (unadjusted file, item PRICE). We require both earnings forecasts and share prices to be denominated in US dollars (currency code = USD). We also adjust for any stock splits and require a minimum of four monthly forecast changes when constructing Re. At the beginning of each month t, we split all stocks into deciles based on their Re. Monthly decile returns are calculated for the current month t (Re1), and, separately, from month t to $t+5$ (Re6) and from month t to $t+11$ (Re12). The deciles are rebalanced monthly. The six-month holding period for Re6 means that for a given decile in each month there exist six sub-deciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the sub-decile returns as the monthly return of the Re6 decile. Because analyst forecast data start in January 1976, the Re portfolios start in July 1976.

B.1.4 $R^6 1$, $R^6 6$, and $R^6 12$, Prior Six-month Returns

At the beginning of each month t, we split all stocks into deciles based on their prior six-month returns from month $t-7$ to $t-2$. Skipping month $t-1$, we calculate monthly decile returns, separately, for month t ($R^6 1$), from month t to $t+5$ ($R^6 6$), and from month t to $t+11$ ($R^6 12$). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, $R^6 6$, means that for a given decile in each month there exist six sub-deciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the sub-deciles returns as the monthly return of the $R^6 6$ decile. When equal-weighting the returns of price momentum portfolios with all-but-micro breakpoints and equal-weighted returns, we do not impose a separate screen to exclude stocks with prices per share below $5 as in Jegadeesh and Titman (1993). These stocks are mostly microcaps that are absent in the all-but-micro sample. Also, value-weighting returns assigns only small weights to these stocks, which do not need to be excluded with NYSE breakpoints and value-weighted returns.

B.1.5 $R^{11}1$, $R^{11}6$, and $R^{11}12$, Prior 11-month Returns

We split all stocks into deciles at the beginning of each month t based on their prior 11-month returns from month $t-12$ to $t-2$. Skipping month $t-1$, we calculate monthly decile returns for month t ($R^{11}1$), from month t to $t+5$ ($R^{11}6$), and from month t to $t+11$ ($R^{11}12$). All the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, $R^{11}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the $R^{11}6$ decile. Because we exclude financial firms, these decile returns are different from those posted on Kenneth French's Web site.

B.1.6 Im1, Im6, and Im12, Industry Momentum

We start with the FF 49-industry classifications. Excluding financial firms from the sample leaves 45 industries. At the beginning of each month t, we sort industries based on their prior six-month value-weighted returns from $t-6$ to $t-1$. Following Moskowitz and Grinblatt (1999), we do not skip month $t-1$. We form nine portfolios ($9 \times 5 = 45$), each of which contains five different industries. We define the return of a given portfolio as the simple average of the five industry returns within the portfolio. We calculate portfolio returns for the nine portfolios for the current month t (Im1), from month t to $t+5$ (Im6), and from month t to $t+11$ (Im12). The portfolios are rebalanced at the beginning of $t+1$. The holding period that is longer than one month as in, for instance, Im6, means that for a given portfolio in each month there exist six subportfolios, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subportfolio returns as the monthly return of the Im6 portfolio.

B.1.7 Rs1, Rs6, and Rs12, Revenue Surprises

Following Jegadeesh and Livnat (2006), we measure revenue surprises (Rs) as changes in revenue per share (Compustat quarterly item SALEQ/(item CSHPRQ times item AJEXQ)) from its value four quarters ago divided by the standard deviation of this change in quarterly revenue per share over the prior eight quarters (six quarters minimum). At the beginning of each month t, we split stocks into deciles based on their most recent past Rs. Before 1972, we use the most recent Rs computed with quarterly revenue from fiscal quarters ending at least four months prior to the portfolio formation. Starting from 1972, we use Rs computed with quarterly revenue from the most recent quarterly earnings announcement dates (Compustat quarterly item RDQ). Jegadeesh and Livnat find that quarterly revenue data are generally available when earnings are announced. For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Rs to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale revenue information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly deciles returns are calculated for the current month t (Rs1), from month t to $t+5$ (Rs6), and from month t to $t+11$ (Rs12). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Rs6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Rs6 decile.

B.1.8 Tes1, Tes6, and Tes12, Tax Expense Surprises

Following Thomas and Zhang (2011), we measure tax expense surprises (Tes) as changes in tax expense, which is tax expense per share (Compustat quarterly item TXTQ/(item CSHPRQ times item AJEXQ)) in quarter q minus tax expense per share in quarter $q-4$, scaled by assets per share (item ATQ/(item CSHPRQ times item AJEXQ)) in quarter $q-4$. At the beginning of each month t, we sort stocks into deciles based on their Tes calculated with Compustat quarterly data items from at least four months ago. We exclude firms with zero Tes (most of these firms pay no taxes). We calculate decile returns the current month t (Tes1), from month t to $t+5$ (Tes6), and from month t to $t+11$ (Tes12). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Tes6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Tes6 decile. For sufficient data coverage, we start the sample in January 1976.

B.1.9 dEf1, dEf6, and dEf12, Changes in Analyst Earnings Forecasts

Following Hawkins, Chamberlin, and Daniel (1984), we define dEf $\equiv (f_{it-1} - f_{it-2})/(0.5\,|f_{it-1}| + 0.5\,|f_{it-2}|)$, in which f_{it-1} is the consensus mean forecast (IBES unadjusted file, item MEANEST) issued in month $t-1$ for firm i's current fiscal year earnings (fiscal period indicator = 1). We require earnings forecasts to be denominated in US dollars (currency code = USD). We also adjust for any stock splits between months $t-2$ and $t-1$ when constructing dEf. At the beginning of each month t, we sort stocks into deciles on the prior month dEf, and calculate returns for the current month t (dEf1), from month t to $t+5$ (dEf6), and from month t to $t+11$ (dEf12). The deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, dEf6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the dEf6 decile. Because analyst forecast data start in January 1976, the dEf portfolios start in March 1976.

B.1.10 Nei1, Nei6, and Nei12, The Number of Quarters with Consecutive Earnings Increase

We follow Barth, Elliott, and Finn (1999) and Green, Hand, and Zhang (2013) in measuring Nei as the number of consecutive quarters (up to eight quarters) with an increase in earnings (Compustat quarterly item IBQ) over the same quarter in the prior year. At the beginning of each month t, we sort stocks into nine portfolios (with Nei $= 0, 1, 2, \ldots, 7$, and 8, respectively) based on their most recent past Nei. Before 1972, we use Nei computed with quarterly earnings from fiscal quarters ending at least four months prior to the portfolio formation. Starting from 1972, we use Nei computed with earnings from the most recent quarterly earnings announcement dates (Compustat quarterly item RDQ). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Nei to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. We calculate monthly portfolio returns for the current month t (Nei1), from month t to $t+5$

(Nei6), and from month t to $t + 11$ (Nei12). The deciles are rebalanced at the beginning of month $t + 1$. The holding period that is longer than one month as in, for instance, Nei6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Nei6 decile. For sufficient data coverage, the Nei portfolios start in January 1969.

B.1.11 52w1, 52w6, and 52w12, 52-week High

At the beginning of each month t, we split stocks into deciles based on 52w, which is the ratio of its split-adjusted price per share at the end of month $t - 1$ to its highest (daily) split-adjusted price per share during the 12-month period ending on the last day of month $t - 1$. Monthly decile returns are calculated for the current month t (52w1), from month t to $t + 5$ (52w6), and from month t to $t + 11$ (52w12), and the deciles are rebalanced at the beginning of month $t + 1$. The holding period longer than one month as in 52w6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the 52w6 decile. Because a disproportionately large number of stocks can reach the 52-week high at the same time and have 52w equal to one, we use only 52w smaller than one to form the portfolio breakpoints. Doing so helps avoid missing portfolio observations.

B.1.12 $\epsilon^6$1, $\epsilon^6$6, and $\epsilon^6$12, Six-month Residual Momentum

We split all stocks into deciles at the beginning of each month t based on their prior six-month average residual returns from month $t-7$ to $t-2$ scaled by their standard deviation over the same period. Skipping month $t-1$, we calculate monthly decile returns for month t ($\epsilon^6$1), from month t to $t+5$ ($\epsilon^6$6), and from month t to $t+11$ ($\epsilon^6$12). Residual returns are estimated each month for all stocks over the prior 36 months from month $t-36$ to month $t-1$ from regressing stock excess returns on the Fama-French three factors. To reduce the noisiness of the estimation, we require returns to be available for all prior 36 months. All the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than 1 month as in $\epsilon^6$6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the $\epsilon^6$6 decile.

B.1.13 ϵ^{11}1, ϵ^{11}6, and ϵ^{11}12, 11-month Residual Momentum

We split all stocks into deciles at the beginning of each month t based on their prior 11-month residual returns from month $t-12$ to $t-2$ scaled by their standard deviation over the same period. Skipping month $t-1$, we calculate monthly decile returns for month t (ϵ^{11}1), from month t to $t+5$ (ϵ^{11}6), and from month t to $t+11$ (ϵ^{11}12). Residual returns are estimated each month for all stocks over the prior 36 months from month $t-36$ to month $t-1$ from regressing stock excess returns on the Fama-French three factors. To reduce the noisiness of the estimation, we require returns to be available for all prior 36 months. All the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than 1 month as in ϵ^{11}6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the ϵ^{11}6 decile.

B.1.14 Sm1, Sm6, and Sm12, Segment Momentum

Following Cohen and Lou (2012), we extract firms' segment accounting and financial information from Compustat segment files. Industries are based on two-digit SIC codes. Standalone firms are those that operate in only one industry with segment sales, reported in Compustat segment files, accounting for more than 80% of total sales reported in Compustat annual files. Conglomerate firms are those that operating in more than one industry with aggregate sales from all reported segments accounting for more than 80% of total sales.

At the end of June of each year, we form a pseudo-conglomerate for each conglomerate firm. The pseudo-conglomerate is a portfolio of the conglomerate's industry segments constructed with solely the standalone firms in each industry. The segment portfolios (value-weighted across standalone firms) are then weighted by the percentage of sales contributed by each industry segment within the conglomerate. At the beginning of each month t (starting in July), using segment information form the previous fiscal year, we sort all conglomerate firms into deciles based on the returns of their pseudo-conglomerate portfolios in month $t-1$. Monthly deciles are calculated for month t (Sm1), from month t to $t+5$ (Sm6), and from month t to $t+11$ (Sm12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in Sm6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Sm6 decile. Because the segment data start in 1976, the Sm portfolios start in July 1977.

B.1.15 Ilr1, Ilr6, Ilr12, Ile1, Ile6, Ile12, Industry Lead-lag Effect in Prior Returns (Earnings Surprises)

We start with the FF 49-industry classifications. Excluding financial firms from the sample leaves 45 industries. At the beginning of each month t, we sort industries based on the month $t-1$ value-weighted return of the portfolio consisting of the 30% biggest (market equity) firms within a given industry. We form nine portfolios ($9 \times 5 = 45$), each of which contains five different industries. We define the return of a given portfolio as the simple average of the five value-weighted industry returns within the portfolio. The nine portfolio returns are calculated for the current month t (Ilr1), from month t to $t+5$ (Ilr6), and from month t to $t+11$ (Ilr12), and the portfolios are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Ilr6, means that for a given portfolio in each month there exist six subportfolios, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subportfolio returns as the monthly return of the Ilr6 portfolio.

We calculate Standardized Unexpected Earnings, Sue, as the change in split-adjusted quarterly earnings per share (Compustat quarterly item EPSPXQ divided by item AJEXQ) from its value four quarters ago divided by the standard deviation of this change in quarterly earnings over the prior eight quarters (six quarters minimum). At the beginning of each month t, we sort industries based on their most recent Sue averaged across the 30% biggest firms within a given industry.[7] To mitigate the impact of outliers, we winsorize Sue at the 1st and 99th percentiles of its distribution each month. We form nine portfolios ($9 \times 5 = 45$), each of which contains five different industries.

[7]Before 1972, we use the most recent Sue with earnings from fiscal quarters ending at least four months prior to the portfolio month. Starting from 1972, we use Sue with earnings from the most recent quarterly earnings announcement dates (Compustat quarterly item RDQ). For a firm to enter our portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Sue to be within six months prior to the portfolio month. We also require the earnings announcement date to be after the corresponding fiscal quarter end.

We define the return of a given portfolio as the simple average of the five value-weighted industry returns within the portfolio. The nine portfolio returns are calculated for the current month t (Ile1), from month t to $t+5$ (Ile6), and from month t to $t+11$ (Ile12), and the portfolios are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Ile6, means that for a given portfolio in each month there exist six subportfolios, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subportfolio returns as the monthly return of the Ile6 portfolio.

B.1.16 Cm1, Cm6, and Cm12, Customer Momentum

Following Cohen and Frazzini (2008), we extract firms' principal customers from Compustat segment files. For each firm we determine whether the customer is another company listed on the CRSP/Compustat tape, and we assign it the corresponding CRSP permno number. At the end of June of each year t, we form a customer portfolio for each firm with identifiable firm-customer relations for the fiscal year ending in calendar year $t-1$. For firms with multiple customer firms, we form equal-weighted customer portfolios. The customer portfolio returns are calculated from July of year t to June of $t+1$, and the portfolios are rebalanced in June.

At the beginning of each month t, we sort all stocks into quintiles based on their customer portfolio returns, Cm, in month $t-1$. We do not form deciles because a disproportional number of firms can have the same Cm, which leads to fewer than ten portfolios in some months. Monthly quintile returns are calculated for month t (Cm1), from month t to $t+5$ (Cm6), and from month t to $t+11$ (Cm12), and the quintiles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in Cm6 means that for a given quintile in each month there exist six subquintiles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subquintile returns as the monthly return of the Cm6 quintile. For sufficient data coverage, we start the Cm portfolios in July 1979.

B.1.17 Sim1, Sim6, Sim12, Cim1, Cim6, and Cim12, Supplier (Customer) industries Momentum

Following Menzly and Ozbas (2010), we use Benchmark Input-Output Accounts at the Bureau of Economic Analysis (BEA) to identify supplier and customer industries for a given industry. BEA Surveys are conducted roughly once every five years in 1958, 1963, 1967, 1972, 1977, 1982, 1987, 1992, 1997, 2002, and 2007. We delay the use of any data from a given survey until the end of the year in which the survey is publicly released during 1964, 1969, 1974, 1979, 1984, 1991, 1994, 1997, 2002, 2007, and 2013, respectively. The BEA industry classifications are based on SIC codes in the surveys from 1958 to 1992 and based on NAICS codes afterwards. In the surveys from 1997 to 2007, we merge three separate industry accounts, 2301, 2302, and 2303 into a single account. We also merge "Housing" (HS) and "Other Real Estate" (ORE) in the 2007 Survey. In the surveys from 1958 to 1992, we merge industry account pairs 1–2, 5–6, 9–10, 11–12, 20–21, and 33–34. We also merge industry account pairs 22–23 and 44–45 in the 1987 and 1992 surveys. We drop miscellaneous industry accounts related to government, import, and inventory adjustments.

At the end of June of each year t, we assign each stock to an BEA industry based on its reported SIC or NAICS code in Compustat (fiscal year ending in t-1) or CRSP (June of t). Monthly value-weighted industry returns are calculated from July of year t to June of $t+1$, and the industry portfolios are rebalanced in June of $t+1$. For each industry, we further form two separate portfolios, the suppliers portfolio and the customers portfolios. The share of an industry's total purchases from other industries is used to calculate the supplier industries portfolio returns, and the share of the industry's total sales to other industries is used to calculate the customer industries portfolio returns.

At the beginning of each month t, we split industries into deciles based on the supplier portfolio returns, Sim, and separately, on the customer portfolio returns, Cim, in month $t-1$. We then assign the decile rankings of each industry to its member stocks. Monthly decile returns are calculated for month t (Sim1 and Cim1), from month t to $t+5$ (Sim6 and Cim6), and from month t to $t+11$ (Sim12 and Cim12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in Sim6 means that for a given decile in each month there exist six subdeciles, each initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Sim6 decile.

B.2 Value-versus-growth

B.2.1 Bm, Book-to-market Equity

At the end of June of each year t, we split stocks into deciles based on Bm, which is the book equity for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Bm. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Following Davis, Fama, and French (2000), we measure book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (Compustat annual item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock.

B.2.2 Bmj, Book-to-June-end Market Equity

Following Asness and Frazzini (2013), at the end of June of each year t, we sort stocks into deciles based on Bmj, which is book equity per share for the fiscal year ending in calendar year $t-1$ divided by share price (from CRSP) at the end of June of t. We adjust for any stock splits between the fiscal year end and the end of June. Book equity per share is book equity divided by the number of shares outstanding (Compustat annual item CSHO). Following Davis, Fama, and French (2000), we measure book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.3 Bm^{q}1, Bm^{q}6, and Bm^{q}12, Quarterly Book-to-market Equity

At the beginning of each month t, we split stocks into deciles based on Bm^q, which is the book equity for the latest fiscal quarter ending at least four months ago divided by the market equity (from

CRSP) at the end of month $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Bm^{q}. We calculate decile returns for the current month t ($\text{Bm}^{\text{q}}1$), from month t to $t+5$ ($\text{Bm}^{\text{q}}6$), and from month t to $t+11$ ($\text{Bm}^{\text{q}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\text{Bm}^{\text{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\text{Bm}^{\text{q}}6$ decile. Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (Compustat quarterly item TXDITCQ) if available, minus the book value of preferred stock (item PSTKQ). Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the book value of preferred stock, or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity.

Before 1972, the sample coverage is limited for quarterly book equity in Compustat quarterly files. We expand the coverage by using book equity from Compustat annual files as well as by imputing quarterly book equity with clean surplus accounting. Specifically, whenever available we first use quarterly book equity from Compustat quarterly files. We then supplement the coverage for fiscal quarter four with annual book equity from Compustat annual files. Following Davis, Fama, and French (2000), we measure annual book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (Compustat annual item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if available. If not, stockholders' equity is the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock.

If both approaches are unavailable, we apply the clean surplus relation to impute the book equity. Specifically, we impute the book equity for quarter t forward based on book equity from prior quarters. Let BEQ_{t-j}, $1 \leq j \leq 4$ denote the latest available quarterly book equity as of quarter t, and $\text{IBQ}_{t-j+1,t}$ and $\text{DVQ}_{t-j+1,t}$ be the sum of quarterly earnings and quarterly dividends from quarter $t-j+1$ to t, respectively. BEQ_t can then be imputed as $\text{BEQ}_{t-j}+\text{IBQ}_{t-j+1,t}-\text{DVQ}_{t-j+1,t}$. We do not use prior book equity from more than four quarters ago (i.e., $1 \leq j \leq 4$) to reduce imputation errors. Quarterly earnings are income before extraordinary items (Compustat quarterly item IBQ). Quarterly dividends are zero if dividends per share (item DVPSXQ) are zero. Otherwise, total dividends are dividends per share times beginning-of-quarter shares outstanding adjusted for stock splits during the quarter. Shares outstanding are from Compustat (quarterly item CSHOQ supplemented with annual item CSHO for fiscal quarter four) or CRSP (item SHROUT), and the share adjustment factor is from Compustat (quarterly item AJEXQ supplemented with annual item AJEX for fiscal quarter four) or CRSP (item CFACSHR). Because we use quarterly book equity at least four months after the fiscal quarter end, all the Compustat data used in the imputation are at least four-month lagged prior to the portfolio formation. In addition, we do not impute quarterly book equity backward using future earnings and book equity information to avoid look-ahead bias.

B.2.4 Dm, Debt-to-market

At the end of June of each year t, we split stocks into deciles based on debt-to-market, Dm, which is total debt (Compustat annual item DLC plus DLTT) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Dm.

Firms with no debt are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.5 $\mathrm{Dm^q}$1, $\mathrm{Dm^q}$6, and $\mathrm{Dm^q}$12, Quarterly Debt-to-market

At the beginning of each month t, we split stocks into deciles based on quarterly debt-to-market, $\mathrm{Dm^q}$, which is total debt (Compustat quarterly item DLCQ plus item DLTTQ) for the latest fiscal quarter ending at least four months ago divided by the market equity (from CRSP) at the end of month $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing $\mathrm{Dm^q}$. Firms with no debt are excluded. We calculate decile returns for the current month t ($\mathrm{Dm^q}$1), from month t to $t+5$ ($\mathrm{Dm^q}$6), and from month t to $t+11$ ($\mathrm{Dm^q}$12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Dm^q}$6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Dm^q}$6 decile. For sufficient data coverage, the $\mathrm{Dm^q}$ portfolios start in January 1972.

B.2.6 Am, Assets-to-market

At the end of June of each year t, we split stocks into deciles based on asset-to-market, Am, which is total assets (Compustat annual item AT) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Am. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.7 $\mathrm{Am^q}$1, $\mathrm{Am^q}$6, and $\mathrm{Am^q}$12, Quarterly assets-to-market

At the beginning of each month t, we split stocks into deciles based on quarterly asset-to-market, $\mathrm{Am^q}$, which is total assets (Compustat quarterly item ATQ) for the latest fiscal quarter ending at least four months ago divided by the market equity (from CRSP) at the end of month $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing $\mathrm{Am^q}$. We calculate decile returns for the current month t ($\mathrm{Am^q}$1), from month t to $t+5$ ($\mathrm{Am^q}$6), and from month t to $t+11$ ($\mathrm{Am^q}$12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Am^q}$6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Am^q}$6 decile. For sufficient data coverage, the $\mathrm{Am^q}$ portfolios start in January 1972.

B.2.8 Rev1, Rev6, and Rev12, Reversal

To capture the De Bondt and Thaler (1985) long-term reversal (Rev) effect, at the beginning of each month t, we split stocks into deciles based on the prior returns from month $t-60$ to $t-13$. Monthly decile returns are computed for the current month t (Rev1), from month t to $t+5$ (Rev6), and from month t to $t+11$ (Rev12), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, Rev6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Rev6 decile. To be included in a portfolio for month t, a stock must have a valid price at the end of

$t-61$ and a valid return for $t-13$. In addition, any missing returns from month $t-60$ to $t-14$ must be -99.0, which is the CRSP code for a missing ending price.

B.2.9 Ep, Earnings-to-price

At the end of June of each year t, we split stocks into deciles based on earnings-to-price, Ep, which is income before extraordinary items (Compustat annual item IB) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Ep. Firms with non-positive earnings are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.10 $\mathrm{Ep^q1}$, $\mathrm{Ep^q6}$, and $\mathrm{Ep^q12}$, Quarterly Earnings-to-price

At the beginning of each month t, we split stocks into deciles based on quarterly earnings-to-price, $\mathrm{Ep^q}$, which is income before extraordinary items (Compustat quarterly item IBQ) divided by the market equity (from CRSP) at the end of month $t-1$. Before 1972, we use quarterly earnings from fiscal quarters ending at least four months prior to the portfolio formation. Starting from 1972, we use quarterly earnings from the most recent quarterly earnings announcement dates (item RDQ). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent quarterly earnings to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Firms with non-positive earnings are excluded. For firms with more than one share class, we merge the market equity for all share classes before computing $\mathrm{Ep^q}$. We calculate decile returns for the current month t ($\mathrm{Ep^q1}$), from month t to $t+5$ ($\mathrm{Ep^q6}$), and from month t to $t+11$ ($\mathrm{Ep^q12}$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Ep^q6}$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Ep^q6}$ decile.

B.2.11 Efp1, Efp6, and Efp12, Earnings Forecast-to-price

Following Elgers, Lo, and Pfeiffer (2001), we define analysts' earnings forecast-to-price, Efp, as the consensus median forecasts (IBES unadjusted file, item MEDEST) for the current fiscal year (fiscal period indicator = 1) divided by share price (unadjusted file, item PRICE). We require earnings forecasts to be denominated in US dollars (currency code = USD). At the beginning of each month t, we sort stocks into deciles based on Efp estimated with forecasts in month $t-1$. Firms with non-positive forecasts are excluded. Monthly decile returns are calculated for the current month t (Efp1), from month t to $t+5$ (Efp6), and from month t to $t+11$ (Efp12), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, Efp6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Efp6 decile. Because the earnings forecast data start in January 1976, the Efp deciles start in February 1976.

B.2.12 Cp, Cash Flow-to-price

At the end of June of each year t, we split stocks into deciles based on cash flow-to-price, Cf, which is cash flows for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. Cash flows are income before extraordinary items (Compustat annual item IB) plus depreciation (item DP)). For firms with more than one share class, we merge the market equity for all share classes before computing Cp. Firms with non-positive cash flows are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.13 $\mathrm{Cp}^{\mathrm{q}}1$, $\mathrm{Cp}^{\mathrm{q}}6$, and $\mathrm{Cp}^{\mathrm{q}}12$, Quarterly Cash Flow-to-price

At the beginning of each month t, we split stocks into deciles based on quarterly cash flow-to-price, Cp^{q}, which is cash flows for the latest fiscal quarter ending at least four months ago divided by the market equity (from CRSP) at the end of month $t-1$. Quarterly cash flows are income before extraordinary items (Compustat quarterly item IBQ) plus depreciation (item DPQ). For firms with more than one share class, we merge the market equity for all share classes before computing Cp^{q}. Firms with non-positive cash flows are excluded. We calculate decile returns for the current month t ($\mathrm{Ep}^{\mathrm{q}}1$), from month t to $t+5$ ($\mathrm{Ep}^{\mathrm{q}}6$), and from month t to $t+11$ ($\mathrm{Ep}^{\mathrm{q}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Ep}^{\mathrm{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Ep}^{\mathrm{q}}6$ decile.

B.2.14 Dp, Dividend Yield

At the end of June of each year t, we sort stocks into deciles based on dividend yield, Dp, which is the total dividends paid out from July of year $t-1$ to June of t divided by the market equity (from CRSP) at the end of June of t. We calculate monthly dividends as the begin-of-month market equity times the difference between returns with and without dividends. Monthly dividends are then accumulated from July of $t-1$ to June of t. We exclude firms that do not pay dividends. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.15 $\mathrm{Dp}^{\mathrm{q}}1$, $\mathrm{Dp}^{\mathrm{q}}6$, and $\mathrm{Dp}^{\mathrm{q}}12$, Quarterly Dividend Yield

At the beginning of each month t, we split stocks into deciles on quarterly dividend yield, Dp^{q}, which is the total dividends paid out from months $t-3$ to $t-1$ divided by the market equity (from CRSP) at the end of month $t-1$. We calculate monthly dividends as the begin-of-month market equity times the difference between returns with and without dividends. Monthly dividends are then accumulated from month $t-3$ to $t-1$. We exclude firms that do not pay dividends. We calculate monthly decile returns for the current month t ($\mathrm{Dp}^{\mathrm{q}}1$), from month t to t+5 ($\mathrm{Dp}^{\mathrm{q}}6$), and from month t to $t+11$ ($\mathrm{Dp}^{\mathrm{q}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Dp}^{\mathrm{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Dp}^{\mathrm{q}}6$ decile.

B.2.16 Op and Nop, (Net) Payout Yield

Per Boudoukh, Michaely, Richardson, and Roberts (2007), total payouts are dividends on common stock (Compustat annual item DVC) plus repurchases. Repurchases are the total expenditure on the purchase of common and preferred stocks (item PRSTKC) plus any reduction (negative change over the prior year) in the value of the net number of preferred stocks outstanding (item PSTKRV). Net payouts equal total payouts minus equity issuances, which are the sale of common and preferred stock (item SSTK) minus any increase (positive change over the prior year) in the value of the net number of preferred stocks outstanding (item PSTKRV). At the end of June of each year t, we sort stocks into deciles based on total payouts (net payouts) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$ (Op and Nop, respectively). For firms with more than one share class, we merge the market equity for all share classes before computing Op and Nop. Firms with non-positive total payouts (zero net payouts) are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the data on total expenditure and the sale of common and preferred stocks start in 1971, the Op and Nop portfolios start in July 1972.

B.2.17 Op^{q}1, Op^{q}6, Op^{q}12, Nop^{q}1, Nop^{q}6, and Nop^{q}12, Quarterly (Net) Payout Yield

Quarterly total payouts are dividends plus repurchases from the latest fiscal quarter. Quarterly dividends are zero if dividends per share (Compustat quarterly item DVPSXQ) are zero. Otherwise, quarterly dividends are dividends per share times beginning-of-quarter shares outstanding (item CSHOQ) adjusted for stock splits during the quarter (item AJEXQ for the adjustment factor). Quarterly repurchases are the quarterly change in year-to-date expenditure on the purchase of common and preferred stocks (item PRSTKCY) plus any reduction (negative change in the prior quarter) in the book value of preferred stocks (item PSTKQ). Quarterly net payouts equal total payouts minus equity issuances, which are the quarterly change in year-to-date sale of common and preferred stock (item SSTKY) minus any increase (positive change over the prior quarter) in the book value of preferred stocks (item PSTKQ). At the beginning of month t, we split stocks into deciles based on quarterly payouts (net payouts) for the latest fiscal quarter ending at least four months ago, divided by the market equity at the end of month $t-1$ (Op^{q} and Nop^{q}, respectively). For firms with more than one share class, we merge the market equity for all share classes before computing Op^{q} and Nop^{q}. Firms with non-positive total payouts (zero net payouts) are excluded. We calculate monthly decile returns for the current month t (Op^{q}1 and Nop^{q}1), from month t to $t+5$ (Op^{q}6 and Nop^{q}6), and from month t to $t+11$ (Op^{q}12 and Nop^{q}12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Op^{q}6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Op^{q}6 decile. For sufficient data coverage, the Op^{q} and Nop^{q} portfolios start in January 1985.

B.2.18 Sr, Five-year Sales Growth Rank

Following Lakonishok, Shleifer, and Vishny (1994), we measure five-year sales growth rank, Sr, in June of year t as the weighted average of the annual sales growth ranks for the prior five years: $\sum_{j=1}^{5}(6-j)\times\text{Rank}(t-j)$. The sales growth for year $t-j$ is the growth rate in sales (Compustat annual item SALE) from the fiscal year ending in $t-j-1$ to the fiscal year ending in $t-j$. Only firms with data for all five prior years are used to determine the annual sales growth ranks, and we exclude firms with non-positive sales. For each year from $t-5$ to $t-1$, we rank stocks into deciles based on their annual sales growth, and then assign rank i ($i = 1, \dots, 10$) to a firm if its annual sales growth falls into the i^{th} decile. At the end of June of each year t, we assign stocks into deciles based on Sr. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced at the end of June in year $t+1$.

B.2.19 Sg, Sales Growth

At the end of June of each year t, we assign stocks into deciles based on Sg, which is the growth in annual sales (Compustat annual item SALE) from the fiscal year ending in calendar year $t-2$ to the fiscal year ending in $t-1$. Firms with non-positive sales are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced at the end of June in year $t+1$.

B.2.20 Em, Enterprise Multiple

Enterprise multiple, Em, is enterprise value divided by operating income before depreciation (Compustat annual item OIBDP). Enterprise value is the market equity plus the total debt (item DLC plus item DLTT) plus the book value of preferred stocks (item PSTKRV) minus cash and short-term investments (item CHE). At the end of June of each year t, we split stocks into deciles based on Em for the fiscal year ending in calendar year $t-1$. The Market equity (from CRSP) is measured at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Em. Firms with negative enterprise value or operating income before depreciation are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.21 $\text{Em}^{\text{q}}1$, $\text{Em}^{\text{q}}6$, and $\text{Em}^{\text{q}}12$, Quarterly Enterprise Multiple

Em^{q}, is enterprise value scaled by operating income before depreciation (Compustat quarterly item OIBDPQ). Enterprise value is the market equity plus total debt (item DLCQ plus item DLTTQ) plus the book value of preferred stocks (item PSTKQ) minus cash and short-term investments (item CHEQ). At the beginning of each month t, we split stocks into deciles on Em^{q} for the latest fiscal quarter ending at least four months ago. The Market equity (from CRSP) is measured at the end of month $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Em^{q}. Firms with negative enterprise value or operating income before depreciation are excluded. Monthly decile returns are calculated for the current month t ($\text{Em}^{\text{q}}1$), from month t to $t+5$ ($\text{Em}^{\text{q}}6$), and from month t to $t+11$ ($\text{Em}^{\text{q}}12$), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in $\text{Em}^{\text{q}}6$ means that for a given decile in each month there exist six subdeciles, each initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\text{Em}^{\text{q}}6$ decile. For sufficient data coverage, the EM^{q} portfolios start in January 1975.

B.2.22 Sp, Sales-to-price

At the end of June of each year t, we sort stocks into deciles based on sales-to-price, Sp, which is sales (Compustat annual item SALE) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Sp. Firms with non-positive sales are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.23 $\mathrm{Sp^q1}$, $\mathrm{Sp^q6}$, and $\mathrm{Sp^q12}$, Quarterly Sales-to-price

At the beginning of each month t, we sort stocks into deciles based on quarterly sales-to-price, $\mathrm{Sp^q}$, which is sales (Compustat quarterly item SALEQ) divided by the market equity at the end of month $t-1$. Before 1972, we use quarterly sales from fiscal quarters ending at least four months prior to the portfolio formation. Starting from 1972, we use quarterly sales from the most recent quarterly earnings announcement dates (item RDQ). Sales are generally announced with earnings during quarterly earnings announcements (Jegadeesh and Livnat 2006). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent quarterly sales to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Firms with non-positive sales are excluded. For firms with more than one share class, we merge the market equity for all share classes before computing $\mathrm{Sp^q}$. Monthly decile returns are calculated for the current month t ($\mathrm{Sp^q1}$), from month t to $t+5$ ($\mathrm{Sp^q6}$), and from month t to $t+11$ ($\mathrm{Sp^q12}$), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in $\mathrm{Sp^q6}$ means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Sp^q6}$ decile.

B.2.24 Ocp, Operating Cash Flow-to-price

At the end of June of each year t, we sort stocks into deciles based on operating cash flows-to-price, Ocp, which is operating cash flows for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. Operating cash flows are measured as funds from operation (Compustat annual item FOPT) minus change in working capital (item WCAP) prior to 1988, and then as net cash flows from operating activities (item OANCF) stating from 1988. For firms with more than one share class, we merge the market equity for all share classes before computing Ocp. Firms with non-positive operating cash flows are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the data on funds from operation start in 1971, the Ocp portfolios start in July 1972.

B.2.25 $\mathrm{Ocp^q1}$, $\mathrm{Ocp^q6}$, and $\mathrm{Ocp^q12}$, Quarterly Operating Cash Flow-to-price

At the beginning of each month t, we split stocks on quarterly operating cash flow-to-price, $\mathrm{Ocp^q}$, which is operating cash flows for the latest fiscal quarter ending at least four months ago divided by the market equity at the end of month $t-1$. Operating cash flows are measured as the quarterly change in year-to-date funds from operation (Compustat quarterly item FOPTY) minus change in quarterly working capital (item WCAPQ) prior to 1988, and then as the quarterly change in year-to-date net cash flows from operating activities (item OANCFY) stating from 1988. For firms with more than one share class, we merge the market equity for all share classes before computing $\mathrm{Ocp^q}$. Firms with non-positive operating cash flows are excluded. Monthly decile returns are calculated for the current month t ($\mathrm{Ocp^q1}$), from month t to $t+5$ ($\mathrm{Ocp^q6}$), and from month t to $t+11$ ($\mathrm{Ocp^q12}$), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Ocp^q6}$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Ocp^q6}$ decile. Because the data on year-to-date funds from operation start in 1984, the $\mathrm{Ocp^q}$ portfolios start in January 1985.

B.2.26 Ir, Intangible Return

Following Daniel and Titman (2006), at the end of June of each year t, we perform the cross-sectional regression of each firm's past five-year log stock return on its five-year-lagged log book-to-market and five-year log book return:

$$r(t-5,t) = \gamma_0 + \gamma_1 bm_{t-5} + \gamma_2 r^B(t-5,t) + u_t \tag{B3}$$

in which $r(t-5,t)$ is the past five-year log stock return from the end of year $t-6$ to the end of $t-1$, bm_{t-5} is the five-year-lagged log book-to-market, and $r^B(t-5,t)$ is the five-year log book return. The five-year-lagged log book-to-market is computed as $bm_{t-5} = \log(B_{t-5}/M_{t-5})$, in which B_{t-5} is the book equity for the fiscal year ending in calendar year $t-6$ and M_{t-5} is the market equity (from CRSP) at the end of December of $t-6$. For firms with more than one share class, we merge the market equity for all share classes before computing bm_{t-5}. The five-year log book return is computed as $r^B(t-5,t) = \log(B_t/B_{t-5}) + \sum_{s=t-5}^{t-1}(r_s - \log(P_s/P_{s-1}))$, in which B_t is the book equity for the fiscal year ending in calendar year $t-1$, r_s is the stock return from the end of year $s-1$ to the end of year s, and P_s is the stock price per share at the end of year s. Following Davis, Fama, and French (2000), we measure book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (Compustat annual item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock.

A firm's intangible return, Ir, is defined as its residual from the annual cross-sectional regression. At the end of June of each year t, we sort stocks based on Ir for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of year $t+1$.

B.2.27 Vhp and Vfp, (Analyst-based) Intrinsic Value-to-market

Following Frankel and Lee (1998), at the end of June of each year t, we implement the residual income model to estimate the intrinsic value:

$$\mathrm{Vh}_t = \mathrm{B}_t + \frac{(E_t[\mathrm{Roe}_{t+1}] - r)}{(1+r)}\mathrm{B}_t + \frac{(E_t[\mathrm{Roe}_{t+2}] - r)}{(1+r)r}\mathrm{B}_{t+1} \tag{B4}$$

$$\mathrm{Vf}_t = \mathrm{B}_t + \frac{(E_t[\mathrm{Roe}_{t+1}] - r)}{(1+r)}\mathrm{B}_t + \frac{(E_t[\mathrm{Roe}_{t+2}] - r)}{(1+r)^2}\mathrm{B}_{t+1} + \frac{(E_t[\mathrm{Roe}_{t+3}] - r)}{(1+r)^2 r}\mathrm{B}_{t+2} \tag{B5}$$

in which Vh_t is the historical Roe-based intrinsic value and Vf_t is the analysts earnings forecast-based intrinsic value. B_t is the book equity (Compustat annual item CEQ) for the fiscal year ending in calendar year $t-1$. Future book equity is computed using the clean surplus accounting: $\mathrm{B}_{t+1} = (1 + (1-k)E_t[\mathrm{Roe}_{t+1}])\mathrm{B}_t$, and $\mathrm{B}_{t+2} = (1 + (1-k)E_t[\mathrm{Roe}_{t+2}])\mathrm{B}_{t+1}$. $E_t[\mathrm{Roe}_{t+1}]$ and $E_t[\mathrm{Roe}_{t+2}]$ are the return on equity expected for the current and next fiscal years. k is the dividend payout ratio, measured as common stock dividends (item DVC) divided by earnings (item IBCOM) for the fiscal year ending in calendar year $t-1$. For firms with negative earnings, we divide dividends by 6% of average total assets (item AT). r is a constant discount rate of 12%. When estimating Vh_t, we replace all Roe expectations with most recent Roe_t: $\mathrm{Roe}_t = \mathrm{Ni}_t/[(\mathrm{B}_t + \mathrm{B}_{t-1})/2]$, in which

Ni_t is earnings for the fiscal year ending in $t-1$, and B_t and B_{t-1} are the book equity from the fiscal years ending in $t-1$ and $t-2$.

When estimating Vf_t, we use analyst earnings forecasts from IBES to construct Roe expectations. Let Fy1 and Fy2 be the one-year-ahead and two-year-ahead consensus mean forecasts (IBES unadjusted file, item MEANEST; fiscal period indicator = 1 and 2) reported in June of year t. Let s be the number of shares outstanding from IBES (unadjusted file, item SHOUT). When IBES shares are not available, we use shares from CRSP (daily item SHROUT) on the IBES pricing date (item PRDAYS) that corresponds to the IBES report. Then $E_t[\text{Roe}_{t+1}] = s\text{Fy1}/[(\text{B}_{t+1} + \text{B}_t)/2]$, in which $\text{B}_{t+1} = (1 + s(1-k)\text{Fy1})\text{B}_t$. Analogously, $E_t[\text{Roe}_{t+2}] = s\text{Fy2}/[(\text{B}_{t+2} + \text{B}_{t+1})/2]$, in which $\text{B}_{t+2} = (1+s(1-k)\text{Fy2})\text{B}_{t+1}$. Let Ltg denote the long-term earnings growth rate forecast from IBES (item MEANEST; fiscal period indicator = 0). Then $E_t[\text{Roe}_{t+3}] = s\text{Fy2}(1+\text{Ltg})/[(\text{B}_{t+3}+\text{B}_{t+2})/2]$, in which $\text{B}_{t+3} = (1+s(1-k)\text{Fy2}(1+\text{Ltg}))\text{B}_{t+2}$. If Ltg is missing, we set $E_t[\text{Roe}_{t+3}]$ to be $E_t[\text{Roe}_{t+2}]$. Firms are excluded if their expected Roe or dividend payout ratio is higher than 100%. We also exclude firms with negative book equity.

At the end of June of each year t, we sort stocks into deciles based on the ratios of Vh and Vf scaled by the market equity (from CRSP) at the end of December of $t-1$, denoted Vhp and Vfp, respectively. For firms with more than one share class, we merge the market equity for all share classes before computing intrinsic value-to-market. Firms with non-positive intrinsic value are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because analyst forecast data start in 1976, the Vfp portfolios start in July 1977.

B.2.28 Ebp, Enterprise Book-to-price, and Ndp, Net Debt-to-price

Following Penman, Richardson, and Tuna (2007), we measure enterprise book-to-price, Ebp, as the ratio of the book value of net operating assets (net debt plus book equity) to the market value of net operating assets (net debt plus market equity). Net Debt-to-price, Ndp, is the ratio of net debt to the market equity. Net debt is financial liabilities minus financial assets. We measure financial liabilities as the sum of long-term debt (Compustat annual item DLTT), debt in current liabilities (item DLC), carrying value of preferred stock (item PSTK), and preferred dividends in arrears (item DVPA, zero if missing), less preferred treasury stock (item TSTKP, zero if missing). We measure financial assets as cash and short-term investments (item CHE). Book equity is common equity (item CEQ) plus any preferred treasury stock (item TSTKP, zero if missing) less any preferred dividends in arrears (item DVPA, zero if missing). Market equity is the number of common shares outstanding times share price (from CRSP).

At the end of June of each year t, we sort stocks into deciles based on Ebp, and separately, on Ndp, for the fiscal year ending in calendar year $t-1$. Market equity is measured at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Ebp and Ndp. When forming the Ebp portfolios, we exclude firms with non-positive book or market value of net operating assets. For the Ndp portfolios, we exclude firms with non-positive net debt. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.29 $\text{Ebp}^{\text{q}}1$, $\text{Ebp}^{\text{q}}6$, $\text{Ebp}^{\text{q}}12$, $\text{Ndp}^{\text{q}}1$, $\text{Ndp}^{\text{q}}6$, and $\text{Ndp}^{\text{q}}12$, Quarterly Enterprise Book-to-price, Quarterly Net Debt-to-price

We measure quarterly enterprise book-to-price, Ebp^{q}, as the ratio of the book value of net operating assets (net debt plus book equity) to the market value of net operating assets (net debt plus market equity). Quarterly net debt-to-price, Ndp^{q}, is the ratio of net debt to market equity. Net debt is financial liabilities minus financial assets. Financial liabilities are the sum of long-term debt (Compustat quarterly item DLTTQ), debt in current liabilities (item DLCQ), and the carrying value of preferred stock (item PSTKQ). Financial assets are cash and short-term investments (item CHEQ). Book equity is common equity (item CEQQ). Market equity is the number of common shares outstanding times share price (from CRSP).

At the beginning of each month t, we split stocks into deciles based on Ebp^{q}, and separately, on Ndp^{q}, for the latest fiscal quarter ending at least four months ago. Market equity is measured at the end of month $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Ebp^{q} and Ndp^{q}. When forming the Ebp^{q} portfolios, we exclude firms with non-positive book or market value of net operating assets. For the Ndp^{q} portfolios, we exclude firms with non-positive net debt. Monthly decile returns are calculated for the current month t ($\text{Ebp}^{\text{q}}1$ and $\text{Ndp}^{\text{q}}1$), from month t to $t+5$ ($\text{Ebp}^{\text{q}}6$ and $\text{Ndp}^{\text{q}}6$), and from month t to $t+11$ ($\text{Ebp}^{\text{q}}12$ and $\text{Ndp}^{\text{q}}12$), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, $\text{Ebp}^{\text{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\text{Ebp}^{\text{q}}6$ decile. For sufficient data coverage, the Ebp^{q} and Ndp^{q} portfolios start in January 1976.

B.2.30 Dur, Equity Duration

Following Dechow, Sloan, and Soliman (2004), we calculate firm-level equity duration, Dur, as:

$$\text{Dur} = \frac{\sum_{t=1}^{T} t \times \text{CD}_t/(1+r)^t}{\text{ME}} + \left(T + \frac{1+r}{r}\right) \frac{\text{ME} - \sum_{t=1}^{T} \text{CD}_t/(1+r)^t}{\text{ME}}, \tag{B6}$$

in which CD_t is the net cash distribution in year t, ME is market equity, T is the length of forecasting period, and r is the cost of equity. Market equity is price per share times shares outstanding (Compustat annual item PRCC_F times item CSHO). Net cash distribution, $\text{CD}_t = \text{BE}_{t-1}(\text{ROE}_t - g_t)$, in which BE_{t-1} is the book equity at the end of year $t-1$, ROE_t is return on equity in year t, and g_t is the book equity growth in t. Following Dechow et al., we use autoregressive processes to forecast ROE and book equity growth in future years. We model ROE as a first-order autoregressive process with an autocorrelation coefficient of 0.57 and a long-run mean of 0.12, and the growth in book equity as a first-order autoregressive process with an autocorrelation coefficient of 0.24 and a long-run mean of 0.06. For the starting year ($t = 0$), we measure ROE as income before extraordinary items (item IB) divided by one-year lagged book equity (item CEQ), and the book equity growth rate as the annual change in sales (item SALE). Nissim and Penman (2001) show that past sales growth is a better indicator of future book equity growth than past book equity growth. Finally, we use a forecasting period of $T = 10$ years and a cost of equity of $r = 0.12$. Firms are excluded if book equity ever becomes negative during the forecasting period. At the end of June of each year t, we sort stocks into deciles based on Dur constructed with data from the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.2.31 Ltg1, Ltg6, and Ltg12, Long-term Growth Forecasts

The long-term growth forecast, Ltg, is measured as the consensus median forecast of the long-term earnings growth rate from IBES (item MEDEST, fiscal period indictor = 0). At the beginning of each month t, we sort stocks into deciles based on Ltg reported in $t-1$. Monthly decile returns are calculated for the current month t (Ltg1), from month t to $t+5$ (Ltg6), and from month t to $t+11$ (Ltg12), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, Ltg6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ltg6 decile. Because the long-term growth forecasts data start in December 1981, the deciles start in January 1982.

B.3 Investment

B.3.1 Aci, Abnormal Corporate Investment

At the end of June of year t, we measure abnormal corporate investment, Aci, as $\text{Ce}_{t-1}/[(\text{Ce}_{t-2}+\text{Ce}_{t-3}+\text{Ce}_{t-4})/3]-1$, in which Ce_{t-j} is capital expenditure (Compustat annual item CAPX) scaled by sales (item SALE) for the fiscal year ending in calendar year $t-j$. The last three-year average capital expenditure is designed to project the benchmark investment in the portfolio formation year. We exclude firms with sales less than ten million dollars. At the end of June of each year t, we sort stocks into deciles based on Aci. Monthly decile returns are computed from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.2 I/A, Investment-to-assets

At the end of June of each year t, we sort stocks into deciles based on investment-to-assets, I/A, which is measured as total assets (Compustat annual item AT) for the fiscal year ending in calendar year $t-1$ divided by total assets for the fiscal year ending in $t-2$ minus one. Monthly decile returns are computed from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.3 Ia^q1, Ia^q6, and Ia^q12, Quarterly Investment-to-assets

Quarterly investment-to-assets, Ia^q, is defined as quarterly total assets (Compustat quarterly item ATQ) divided by four-quarter-lagged total assets minus one. At the beginning of each month t, we sort stocks into deciles based on Ia^q for the latest fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t (Ia^q1), from month t to $t+5$ (Ia^q6), and from month t to $t+11$ (Ia^q12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Ia^q6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ia^q6 decile.

B.3.4 dPia, Changes in PPE and Inventory-to-assets

Changes in PPE and Inventory-to-assets, dPia, is defined as the annual change in gross property, plant, and equipment (Compustat annual item PPEGT) plus the annual change in inventory (item INVT) scaled by one-year-lagged total assets (item AT). At the end of June of each year t, we sort stocks into deciles based on dPia for the fiscal year ending in calendar year $t-1$. Monthly decile returns are computed from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.5 Noa and dNoa, (Changes in) Net Operating Assets

Following Hirshleifer, Hou, Teoh, and Zhang (2004), we measure net operating assets as operating assets minus operating liabilities. Operating assets are total assets (Compustat annual item AT) minus cash and short-term investment (item CHE). Operating liabilities are total assets minus debt included in current liabilities (item DLC, zero if missing), minus long-term debt (item DLTT, zero if missing), minus minority interests (item MIB, zero if missing), minus preferred stocks (item PSTK, zero if missing), and minus common equity (item CEQ). Noa is net operating assets scalded by one-year-lagged total assets. Changes in net operating assets, dNoa, is the annual change in net operating assets scaled by one-year-lagged total assets. At the end of June of each year t, we sort stocks into deciles based on Noa, and separately, on dNOA, for the fiscal year ending in calendar year $t-1$. Monthly decile returns are computed from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.6 dLno, Changes in Long-term Net Operating Assets

Following Fairfield, Whisenant, and Yohn (2003), we measure changes in long-term net operating assets as the annual change in net property, plant, and equipment (Compustat item PPENT) plus the change in intangibles (item INTAN) plus the change in other long-term assets (item AO) minus the change in other long-term liabilities (item LO) and plus depreciation and amortization expense (item DP). dLno is the change in long-term net operating assets scaled by the average of total assets (item AT) from the current and prior years. At the end of June of each year t, we sort stocks into deciles based on dLno for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.7 Ig, Investment Growth

At the end of June of each year t, we sort stocks into deciles based on investment growth, Ig, which is the growth rate in capital expenditure (Compustat annual item CAPX) from the fiscal year ending in calendar year $t-2$ to the fiscal year ending in $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.8 2Ig, Two-year Investment Growth

At the end of June of each year t, we sort stocks into deciles based on two-year investment growth, 2Ig, which is the growth rate in capital expenditure (Compustat annual item CAPX) from the fiscal year ending in calendar year $t-3$ to the fiscal year ending in $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.9 3Ig, Three-year Investment Growth

At the end of June of each year t, we sort stocks into deciles based on three-year investment growth, 3Ig, which is the growth rate in capital expenditure (Compustat annual item CAPX) from the fiscal year ending in calendar year $t-4$ to the fiscal year ending in $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.10 Nsi, Net Stock Issues

At the end of June of year t, we measure net stock issues, Nsi, as the natural log of the ratio of the split-adjusted shares outstanding at the fiscal year ending in calendar year $t-1$ to the split-adjusted shares outstanding at the fiscal year ending in $t-2$. The split-adjusted shares outstanding is shares outstanding (Compustat annual item CSHO) times the adjustment factor (item AJEX). At the end of June of each year t, we sort stocks with negative Nsi into two portfolios (1 and 2), stocks with zero Nsi into one portfolio (3), and stocks with positive Nsi into seven portfolios (4 to 10). Monthly decile returns are from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.11 dIi, % Change in Investment - % Change in Industry Investment

Following Abarbanell and Bushee (1998), we define the %d(·) operator as the percentage change in the variable in the parentheses from its average over the prior two years, e.g., %d(Investment) = [Investment(t) − E[Investment(t)]]/E[Investment(t)], in which E[Investment(t)] = [Investment($t-1$) + Investment($t-2$)]/2. dIi is defined as %d(Investment) − %d(Industry investment), in which investment is capital expenditure in property, plant, and equipment (Compustat annual item CAPXV). Industry investment is the aggregate investment across all firms with the same two-digit SIC code. Firms with non-positive $E[Investment(\mathrm{t})]$ are excluded and we require at least two firms in each industry. At the end of June of each year t, we sort stocks into deciles based on dIi for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.12 Cei, Composite Equity Issuance

At the end of June of each year t, we sort stocks into deciles based on composite equity issuance, Cei, which is the log growth rate in the market equity not attributable to stock return, $\log\left(\mathrm{ME_t}/\mathrm{ME_{t-5}}\right) - r(t-5,t)$. $r(t-5,t)$ is the cumulative log stock return from the last trading day of June in year $t-5$ to the last trading day of June in year t, and ME_t is the market equity (from CRSP) on the last trading day of June in year t. Monthly decile returns are from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.13 Cdi, Composite Debt Issuance

Following Lyandres, Sun, and Zhang (2008), at the end of June of each year t, we sort stocks into deciles based on composite debt issuance, Cdi, which is the log growth rate of the book value of debt (Compustat annual item DLC plus item DLTT) from the fiscal year ending in calendar year $t-6$ to the fiscal year ending in year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of year $t+1$.

B.3.14 Ivg, Inventory Growth

At the end of June of each year t, we sort stocks into deciles based on inventory growth, Ivg, which is the annual growth rate in inventory (Compustat annual item INVT) from the fiscal year ending in calendar year $t-2$ to the fiscal year ending in $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.15 Ivc, Inventory Changes

At the end of June of each year t, we sort stocks into deciles based on inventory changes, Ivc, which is the annual change in inventory (Compustat annual item INVT) scaled by the average of total assets (item AT) for the fiscal years ending in $t-2$ and $t-1$. We exclude firms that carry no inventory for the past two fiscal years. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.16 Oa, Operating Accruals

Prior to 1988, we use the balance sheet approach in Sloan (1996) to measure operating accruals, Oa, as changes in noncash working capital minus depreciation, in which the noncash working capital is changes in noncash current assets minus changes in current liabilities less short-term debt and taxes payable. In particular, Oa equals (dCA – dCASH) – (dCL – dSTD – dTP) – DP, in which dCA is the change in current assets (Compustat annual item ACT), dCASH is the change in cash or cash equivalents (item CHE), dCL is the change in current liabilities (item LCT), dSTD is the change in debt included in current liabilities (item DLC), dTP is the change in income taxes payable (item TXP), and DP is depreciation and amortization (item DP). Missing changes in income taxes payable are set to zero.

Starting from 1988, we follow Hribar and Collins (2002) to measure Oa using the statement of cash flows as net income (item NI) minus net cash flow from operations (item OANCF). Doing so helps mitigate measurement errors that can arise from nonoperating activities such as acquisitions and divestitures. Data from the statement of cash flows are only available since 1988. At the end of June of each year t, we sort stocks into deciles on Oa for the fiscal year ending in calendar year $t-1$ scaled by total assets (item AT) for the fiscal year ending in $t-2$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.17 Ta, Total Accruals

Prior to 1988, we use the balance sheet approach in Richardson, Sloan, Soliman, and Tuna (2005) to measure total accruals, Ta, as dWc + dNco + dFin. dWc is the change in net non-cash working capital. Net non-cash working capital is current operating asset (Coa) minus current operating liabilities (Col), with Coa = current assets (Compustat annual item ACT) − cash and short-term investments (item CHE) and Col = current liabilities (item LCT) − debt in current liabilities (item DLC). dNco is the change in net non-current operating assets. Net non-current operating assets are non-current operating assets (Nca) minus non-current operating liabilities (Ncl), with Nca = total assets (item AT) − current assets − long-term investments (item IVAO), and Ncl = total liabilities (item LT) − current liabilities − long-term debt (item DLTT). dFin is the change in net financial assets. Net financial assets are financial assets (Fna) minus financial liabilities (Fnl), with Fna = short-term investments (item IVST) + long-term investments, and Fnl = long-term debt + debt in current liabilities + preferred stocks (item PSTK). Missing changes in debt in current liabilities, long-term investments, long-term debt, short-term investments, and preferred stocks are set to zero.

Starting from 1988, we use the cash flow approach to measure Ta as net income (item NI) minus total operating, investing, and financing cash flows (items OANCF, IVNCF, and FINCF) plus sales of stocks (item SSTK, zero if missing) minus stock repurchases and dividends (items PRSTKC and DV, zero if missing). Data from the statement of cash flows are only available since 1988. At the end of June of each year t, we sort stocks into deciles based on Ta for the fiscal year ending in calendar year $t-1$ scaled by total assets for the fiscal year ending in $t-2$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.18 dWc, dCoa, and dCol, Changes in Net Non-cash Working Capital, in Current Operating Assets, and in Current Operating Liabilities

Richardson, Sloan, Soliman, and Tuna (2005, Table 10) show that several components of total accruals also forecast returns in the cross section. dWc is the change in net non-cash working capital. Net non-cash working capital is current operating asset (Coa) minus current operating liabilities (Col), with Coa = current assets (Compustat annual item ACT) − cash and short term investments (item CHE) and Col = current liabilities (item LCT) − debt in current liabilities (item DLC). dCoa is the change in current operating asset and dCol is the change in current operating liabilities. Missing changes in debt in current liabilities are set to zero. At the end of June of each year t, we sort stocks into deciles based, separately, on dWc, dCoa, and dCol for the fiscal year ending in calendar year $t-1$, all scaled by total assets (item AT) for the fiscal year ending in calendar year $t-2$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.19 dNco, dNca, and dNcl, Changes in Net Non-current Operating Assets, in Non-current Operating Assets, and in Non-current Operating Liabilities

dNco is the change in net non-current operating assets. Net non-current operating assets are non-current operating assets (Nca) minus non-current operating liabilities (Ncl), with Nca = total assets (Compustat annual item AT) − current assets (item ACT) − long-term investments (item IVAO), and Ncl = total liabilities (item LT) − current liabilities (item LCT) − long-term debt (item DLTT). dNca is the change in non-current operating assets and dNcl is the change in non-current operating liabilities. Missing changes in long-term investments and long-term debt are set to zero. At the end of June of each year t, we sort stocks into deciles based, separately, on dNco, dNca, and dNcl for the fiscal year ending in calendar year $t-1$, all scaled by total assets for the fiscal year ending in calendar year $t-2$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.20 dFin, dSti, dLti, dFnl, and dBe, Changes in Net Financial Assets, in Short-term Investments, in Long-term Investments, in Financial Liabilities, and in Book Equity

dFin is the change in net financial assets. Net financial assets are financial assets (Fna) minus financial liabilities (Fnl), with Fna = short-term investments (Compustat annual item IVST) + long-term investments (item IVAO), and Fnl = long-term debt (item DLTT) + debt in current liabilities (item DLC) + preferred stock (item PSTK). dSti is the change in short-term investments, dLti is the change in long-term investments, and dFnl is the change in financial liabilities. dBe is the change in book equity (item CEQ). Missing changes in debt in current liabilities, long-term investments, long-term debt, short-term investments, and preferred stocks are set to zero (at least one change has to be non-missing when constructing any variable). When constructing dSti (dLti), we exclude firms that do not have long-term (short-term) investments in the past two fiscal years. At the end of June of each year t, we sort stocks into deciles based, separately, on dFin, dSti, dLti, dFnl, and dBe for the fiscal year ending in calendar year $t-1$, all scaled by total assets (item AT) for the fiscal year ending in calendar year $t-2$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.21 Dac, Discretionary Accruals

We measure discretionary accruals, Dac, using the modified Jones model from Dechow, Sloan, and Sweeney (1995):

$$\frac{\mathrm{Oa}_{i,t}}{\mathrm{A}_{i,t-1}} = \alpha_1 \frac{1}{\mathrm{A}_{i,t-1}} + \alpha_2 \frac{\mathrm{dSALE}_{i,t} - \mathrm{dREC}_{i,t}}{\mathrm{A}_{i,t-1}} + \alpha_3 \frac{\mathrm{PPE}_{i,t}}{\mathrm{A}_{i,t-1}} + e_{i,t}, \tag{B7}$$

in which $\mathrm{Oa}_{i,t}$ is operating accruals for firm i (see Appendix B.3.16), A_{t-1} is total assets (Compustat annual item AT) at the end of year $t-1$, $\mathrm{dSALE}_{i,t}$ is the annual change in sales (item SALE) from year $t-1$ to t, $\mathrm{dREC}_{i,t}$ is the annual change in net receivables (item RECT) from year $t-1$ to t, and $\mathrm{PPE}_{i,t}$ is gross property, plant, and equipment (item PPEGT) at the end of year t. We estimate the cross-sectional regression (B7) for each two-digit SIC industry and year combination, formed separately for NYSE/AMEX firms and for NASDAQ firms. We require at least six firms for each regression. The discretionary accrual for stock i is defined as the residual from the regression, $e_{i,t}$. At the end of June of each year t, we sort stocks into deciles based on Dac for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.22 Poa, Percent Operating Accruals

Accruals are traditionally scaled by total assets. Hafzalla, Lundholm, and Van Winkle (2011) show that scaling accruals by the absolute value of earnings (percent accruals) is more effective in selecting firms for which the differences between sophisticated and naive forecasts of earnings are the most extreme. To construct the percent operating accruals (Poa) deciles, at the end of June of each year t, we sort stocks into deciles based on operating accruals scaled by the absolute value of net income (Compustat annual item NI) for the fiscal year ending in calendar year $t-1$. See Appendix B.3.16 for the measurement of operating accruals. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.23 Pta, Percent Total Accruals

At the end of June of each year t, we sort stocks into deciles on percent total accruals, Pta, calculated as total accruals scaled by the absolute value of net income (Compustat annual item NI) for the fiscal year ending in calendar year $t-1$. See Appendix B.3.17 for the measurement of total accruals. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of year $t+1$.

B.3.24 Pda, Percent Discretionary Accruals

At the end of June of each year t, we split stocks into deciles based on percent discretionary accruals, Pda, calculated as the discretionary accruals, Dac, for the fiscal year ending in calendar year $t-1$ multiplied with total assets (Compustat annual item AT) for the fiscal year ending in $t-2$ scaled by the absolute value of net income (item NI) for the fiscal year ending in $t-1$. See Appendix B.3.21 for the measurement of discretionary accruals. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.3.25 Nxf, Nef, and Ndf, Net External, Equity, and Debt Financing

Net external financing, Nxf, is the sum of net equity financing, Nef, and net debt financing, Ndf (Bradshaw, Richardson, and Sloan 2006). Nef is the proceeds from the sale of common and preferred stocks (Compustat annual item SSTK) less cash payments for the repurchases of common and preferred stocks (item PRSTKC) less cash payments for dividends (item DV). Ndf is the cash proceeds from the issuance of long-term debt (item DLTIS) less cash payments for long-term debt reductions (item DLTR) plus the net changes in current debt (item DLCCH, zero if missing). At the end of June of each year t, we sort stocks into deciles based on Nxf, and, separately, on Nef and Ndf, for the fiscal year ending in calendar year $t-1$ scaled by the average of total assets for fiscal years ending in $t-2$ and $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the data on financing activities start in 1971, the portfolios start in July 1972.

B.4 Profitability

B.4.1 Roe1, Roe6, and Roe12, Return on Equity

Return on equity, Roe, is income before extraordinary items (Compustat quarterly item IBQ) divided by one-quarter-lagged book equity (Hou, Xue, and Zhang 2015). Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (item TXDITCQ) if available, minus the book value of preferred stock (item PSTKQ). Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the book value of preferred stock, or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity.

Before 1972, the sample coverage is limited for quarterly book equity in Compustat quarterly files. We expand the coverage by using book equity from Compustat annual files as well as by imputing quarterly book equity with clean surplus accounting. Specifically, whenever available we first use quarterly book equity from Compustat quarterly files. We then supplement the coverage for fiscal quarter four with annual book equity from Compustat annual files. Following Davis, Fama, and French (2000), we measure annual book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (Compustat annual item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if available. If not, stockholders' equity is the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock.

If both approaches are unavailable, we apply the clean surplus relation to impute the book equity. First, if available, we backward impute the beginning-of-quarter book equity as the end-of-quarter book equity minus quarterly earnings plus quarterly dividends. Quarterly earnings are income before extraordinary items (Compustat quarterly item IBQ). Quarterly dividends are zero if dividends per share (item DVPSXQ) are zero. Otherwise, total dividends are dividends per share times beginning-of-quarter shares outstanding adjusted for stock splits during the quarter. Shares outstanding are from Compustat (quarterly item CSHOQ supplemented with annual item CSHO for fiscal quarter four) or CRSP (item SHROUT), and the share adjustment factor is from Compustat (quarterly item AJEXQ supplemented with annual item AJEX for fiscal quarter four) or CRSP (item CFACSHR). Because we impose a four-month lag between earnings and the holding period month (and the book equity in the denominator of ROE is one-quarter-lagged relative to earnings), all the Compustat data in the backward imputation are at least four-month lagged prior to the portfolio formation. If data are unavailable for the backward imputation, we impute the book equity for quarter t forward based on book equity from prior quarters. Let BEQ_{t-j}, $1 \leq j \leq 4$ denote the latest available quarterly book equity as of quarter t, and $\text{IBQ}_{t-j+1,t}$ and $\text{DVQ}_{t-j+1,t}$ be the sum of quarterly earnings and quarterly dividends from quarter $t-j+1$ to t, respectively. BEQ_t can then be imputed as $\text{BEQ}_{t-j} + \text{IBQ}_{t-j+1,t} - \text{DVQ}_{t-j+1,t}$. We do not use prior book equity from more than four quarters ago (i.e., $1 \leq j \leq 4$) to reduce imputation errors.

At the beginning of each month t, we sort all stocks into deciles based on their most recent past Roe. Before 1972, we use the most recent Roe computed with quarterly earnings from fiscal quarters ending at least four months prior to the portfolio formation. Starting from 1972, we use Roe computed with quarterly earnings from the most recent quarterly earnings announcement dates (Compustat quarterly item RDQ). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Roe to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for the current month t (Roe1), from month t to $t+5$ (Roe6), and from month t to $t+11$ (Roe12). The deciles are rebalanced monthly. The holding period that is longer than one month as in, for instance, Roe6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Roe6 decile.

B.4.2 dRoe1, dRoe6, and dRoe12, Changes in Return on Equity

Change in return on equity, dRoe, is return on equity minus its value from four quarters ago. See Appendix B.4.1 for the measurement of return on equity. At the beginning of each month t, we sort all stocks into deciles on their most recent past dRoe. Before 1972, we use the most recent dRoe with quarterly earnings from fiscal quarters ending at least four months ago. Starting from 1972, we use dRoe computed with quarterly earnings from the most recent quarterly earnings announcement dates (Compustat quarterly item RDQ). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent dRoe to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for the current month t (dRoe1), from month t to $t+5$ (dRoe6), and from month t to $t+11$ (dRoe12). The deciles are rebalanced monthly. The holding period that is longer than one month as in, for instance, dRoe6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the dRoe6 decile.

B.4.3 Roa1, Roa6, and Roa12, Return on Assets

Return on assets, Roa, is income before extraordinary items (Compustat quarterly item IBQ) divided by one-quarter-lagged total assets (item ATQ). At the beginning of each month t, we sort all stocks into deciles based on Roa computed with quarterly earnings from the most recent earnings announcement dates (item RDQ). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Roa to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for month t (Roa1), from month t to $t+5$ (Roe6), and from month t to $t+11$ (Roe12). The deciles are rebalanced at the beginning of $t+1$. The holding period that is longer than one month as in, for instance, Roa6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Roa6 decile. For sufficient data coverage, the Roa portfolios start in January 1972.

B.4.4 dRoa1, dRoa6, and dRoa12, Changes in Return on Assets

Change in return on assets, dRoa, is return on assets minus its value from four quarters ago. See Appendix B.4.3 for the measurement of return on assets. At the beginning of each month t, we sort all stocks into deciles based on dRoa computed with quarterly earnings from the most recent earnings announcement dates (Compustat quarterly item RDQ). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent dRoa to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale earnings information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for month t (dRoa1), from month t to $t+5$ (dRoa6), and from month t to $t+11$ (dRoa12). The deciles are rebalanced at the beginning of $t+1$. The holding period that is longer than one month as in, for instance, dRoa6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the dRoa6 decile. For sufficient data coverage, the dRoa portfolios start in January 1973.

B.4.5 Rna, Pm, and Ato, Return on Net Operating Assets, Profit Margin, Asset Turnover

Soliman (2008) use DuPont analysis to decompose Roe as Rna + FLEV $\times$ SPREAD, in which Roe is return on equity, Rna is return on net operating assets, FLEV is financial leverage, and SPREAD is the difference between return on net operating assets and borrowing costs. We can further decompose Rna as Pm $\times$ Ato, in which Pm is profit margin and Ato is asset turnover.

Following Soliman (2008), we use annual sorts to form Rna, Pm, and Ato deciles. At the end of June of year t, we measure Rna as operating income after depreciation (Compustat annual item OIADP) for the fiscal year ending in calendar year $t-1$ divided by net operating assets (Noa) for the fiscal year ending in $t-2$. Noa is operating assets minus operating liabilities. Operating assets are total assets (item AT) minus cash and short-term investment (item CHE), and minus other investment and advances (item IVAO, zero if missing). Operating liabilities are total assets minus debt in current liabilities (item DLC, zero if missing), minus long-term debt (item DLTT, zero if missing), minus minority interests (item MIB, zero if missing), minus preferred stocks (item PSTK, zero if missing), and minus common equity (item CEQ). Pm is operating income after depreciation divided by sales (item SALE) for the fiscal year ending in calendar year $t-1$. Ato is sales for the fiscal year ending in calendar year $t-1$ divided by Noa for the fiscal year ending in $t-2$. At the end of June of each year t, we sort stocks into three sets of deciles based on Rna, Pm, and Ato. We exclude firms with non-positive Noa for the fiscal year ending in calendar year $t-2$ when forming the Rna and the Ato portfolios. Monthly decile returns are calculated from July of year t to June of $t + 1$, and the deciles are rebalanced in June of $t + 1$.

B.4.6 Cto, Capital Turnover

At the end of June of each year t, we split stocks into deciles based on capital turnover, Cto, measured as sales (Compustat annual item SALE) for the fiscal year ending in calendar year $t - 1$ divided by total assets (item AT) for the fiscal year ending in $t - 2$. Monthly decile returns are calculated from July of year t to June of $t + 1$, and the deciles are rebalanced in June of $t + 1$.

B.4.7 Rna^{q}1, Rna^{q}6, Rna^{q}12, Pm^{q}1, Pm^{q}6, Pm^{q}12, Ato^{q}1, Ato^{q}6, and Ato^{q}12, Quarterly Return on Net Operating Assets, Quarterly Profit Margin, Quarterly Asset Turnover

Quarterly return on net operating assets, Rna^q, is quarterly operating income after depreciation (Compustat quarterly item OIADPQ) divided by one-quarter-lagged net operating assets (Noa). Noa is operating assets minus operating liabilities. Operating assets are total assets (item ATQ) minus cash and short-term investments (item CHEQ), and minus other investment and advances (item IVAOQ, zero if missing). Operating liabilities are total assets minus debt in current liabilities (item DLCQ, zero if missing), minus long-term debt (item DLTTQ, zero if missing), minus minority interests (item MIBQ, zero if missing), minus preferred stocks (item PSTKQ, zero if missing), and minus common equity (item CEQQ). Quarterly profit margin, Pm^q, is quarterly operating income after depreciation divided by quarterly sales (item SALEQ). Quarterly asset turnover, Ato^q, is quarterly sales divided by one-quarter-lagged Noa.

At the beginning of each month t, we sort stocks into deciles based on Rna^q or Pm^q for the latest fiscal quarter ending at least four months ago. Separately, we sort stocks into deciles based on Ato^q computed with quarterly sales from the most recent earnings announcement dates (item RDQ). Sales are generally announced with earnings during quarterly earnings announcements (Jegadeesh and Livnat 2006). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Ato^q to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for month t (Rna^{q}1, Pm^{q}1, and Ato^{q}1), from month t to $t+5$ (Rna^{q}6, Pm^{q}6, and Ato^{q}6), and from month t to $t+11$ (Rna^{q}12, Pm^{q}12, and Ato^{q}12). The deciles are rebalanced at the beginning of $t + 1$. The holding period that is longer than one month as in, for instance, Ato^{q}6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Atoq6 decile. For sufficient data coverage, the Rna^q portfolios start in January 1976 and the Ato^q portfolios start in January 1972.

B.4.8 Cto^{q}1, Cto^{q}6, and Cto^{q}12, Quarterly Capital Turnover

Quarterly capital turnover, Cto^q, is quarterly sales (Compustat quarterly item SALEQ) scaled by one-quarter-lagged total assets (item ATQ). At the beginning of each month t, we sort stocks into deciles based on Cto^q computed with quarterly sales from the most recent earnings announcement dates (item RDQ). Sales are generally announced with earnings during quarterly earnings announcements (Jegadeesh and Livnat 2006). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Ato^{q} to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. Monthly decile returns are calculated for month t ($\text{Cto}^{\text{q}}1$), from month t to $t+5$ ($\text{Cto}^{\text{q}}6$), and from month t to $t+11$ ($\text{Cto}^{\text{q}}12$). The deciles are rebalanced at the beginning of $t+1$. The holding period that is longer than one month as in, for instance, $\text{Cto}^{\text{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the $\text{Cto}^{\text{q}}6$ decile. For sufficient data coverage, the Cto^{q} portfolios start in January 1972.

B.4.9 Gpa, Gross Profits-to-assets

Following Novy-Marx (2013), we measure gross profits-to-assets, Gpa, as total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS) divided by total assets (item AT, the denominator is current, not lagged, total assets). At the end of June of each year t, we sort stocks into deciles based on Gpa for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.10 Gla, Gross Profits-to-lagged assets

Gross profits-to-lagged assets, Gla, is total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS) divided by one-year-lagged total assets (item AT). At the end of June of each year t, we sort stocks into deciles based on Gla for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.11 $\text{Gla}^{\text{q}}1$, $\text{Gla}^{\text{q}}6$, and $\text{Gla}^{\text{q}}12$, Quarterly Gross Profits-to-lagged Assets

Gla^{q}, is quarterly total revenue (Compustat quarterly item REVTQ) minus cost of goods sold (item COGSQ) divided by one-quarter-lagged total assets (item ATQ). At the beginning of each month t, we sort stocks into deciles based on Gla^{q} for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for month t ($\text{Gla}^{\text{q}}1$), from month t to $t+5$ ($\text{Gla}^{\text{q}}6$), and from month t to $t+11$ ($\text{Gla}^{\text{q}}12$). The deciles are rebalanced at the beginning of $t+1$. The holding period that is longer than one month as in, for instance, $\text{Gla}^{\text{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the $\text{Gla}^{\text{q}}6$ decile. For sufficient data coverage, the Gla^{q} portfolios start in January 1976.

B.4.12 Ope, Operating Profits to Equity

Following Fama and French (2015), we measure operating profitability to equity, Ope, as total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS, zero if missing), minus selling, general, and administrative expenses (item XSGA, zero if missing), and minus interest expense (item XINT, zero if missing), scaled by book equity (the denominator is current, not lagged, book equity). We require at least one of the three expense items (COGS, XSGA, and XINT) to be non-missing. Book equity is stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock. At the end of June of each year t, we sort stocks into deciles based on Ope for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.13 Ole, Operating profits-to-lagged Equity

Ole is total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS, zero if missing), minus selling, general, and administrative expenses (item XSGA, zero if missing), and minus interest expense (item XINT, zero if missing), scaled by one-year-lagged book equity. We require at least one of the three expense items (COGS, XSGA, and XINT) to be non-missing. Book equity is stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock. At the end of June of each year t, we sort stocks into deciles on Ole for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.14 Ole^{q}1, Ole^{q}6, and Ole^{q}12, Quarterly Operating Profits-to-lagged Equity

Quarterly operating profits-to-lagged equity, Ole^{q}, is quarterly total revenue (Compustat quarterly item REVTQ) minus cost of goods sold (item COGSQ, zero if missing), minus selling, general, and administrative expenses (item XSGAQ, zero if missing), and minus interest expense (item XINTQ, zero if missing), scaled by one-quarter-lagged book equity. We require at least one of the three expense items (COGSQ, XSGAQ, and XINTQ) to be non-missing. Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (item TXDITCQ) if available, minus the book value of preferred stock (item PSTKQ). Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the book value of preferred stock, or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity.

At the beginning of each month t, we split stocks on Ole^{q} for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for month t (Ole^{q}1), from month t to $t+5$ (Ole^{q}6), and from month t to $t+11$ (Ole^{q}12). The deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in Ole^{q}6 means that for a given decile in each month there exist six subdeciles, each initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ole^{q}6 decile. For sufficient data coverage, the Ole^{q} portfolios start in January 1972.

B.4.15 Opa, Operating Profits-to-assets

Following Ball, Gerakos, Linnainmaa, and Nikolaev (2015a), we measure operating profits-to-assets, Opa, as total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS), minus selling, general, and administrative expenses (item XSGA), and plus research and development expenditures (item XRD, zero if missing), scaled by book assets (item AT, the denominator is current, not lagged, total assets). At the end of June of each year t, we sort stocks into deciles based on Opa for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.16 Ola, Operating Profits-to-lagged Assets

Operating profits-to-lagged assets, Ola, is total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS), minus selling, general, and administrative expenses (item XSGA), and plus research and development expenditures (item XRD, zero if missing), scaled by one-year-lagged book assets (item AT). At the end of June of each year t, we sort stocks into deciles based on Ola for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.17 $\text{Ola}^{\text{q}}1$, $\text{Ola}^{\text{q}}6$, and $\text{Ola}^{\text{q}}12$, Quarterly Operating Profits-to-lagged Assets

Quarterly operating profits-to-lagged assets, Ola^{q}, is quarterly total revenue (Compustat quarterly item REVTQ) minus cost of goods sold (item COGSQ), minus selling, general, and administrative expenses (item XSGAQ), plus research and development expenditures (item XRDQ, zero if missing), scaled by one-quarter-lagged book assets (item ATQ). At the beginning of each month t, we sort stocks into deciles based on Ola^{q} for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for month t ($\text{Ola}^{\text{q}}1$), from month t to $t+5$ ($\text{Ola}^{\text{q}}6$), and from month t to $t+11$ ($\text{Ola}^{\text{q}}12$). The deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in $\text{Ola}^{\text{q}}6$ means that for a given decile in each month there exist six subdeciles, each initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\text{Ola}^{\text{q}}6$ decile. For sufficient data coverage, the Ola^{q} portfolios start in January 1976.

B.4.18 Cop, Cash-based Operating Profitability

Following Ball, Gerakos, Linnainmaa, and Nikolaev (2015b), we measure cash-based operating profitability, Cop, as total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS), minus selling, general, and administrative expenses (item XSGA), plus research and development expenditures (item XRD, zero if missing), minus change in accounts receivable (item RECT), minus change in inventory (item INVT), minus change in prepaid expenses (item XPP), plus change in deferred revenue (item DRC plus item DRLT), plus change in trade accounts payable (item AP), and plus change in accrued expenses (item XACC), all scaled by book assets (item AT, the denominator is current, not lagged, total assets). All changes are annual changes in balance sheet items and we set missing changes to zero. At the end of June of each year t, we sort stocks into deciles based on Cop for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.19 Cla, Cash-based Operating Profits-to-lagged Assets

Cash-based operating profits-to-lagged assets, Cla, is total revenue (Compustat annual item REVT) minus cost of goods sold (item COGS), minus selling, general, and administrative expenses (item XSGA), plus research and development expenditures (item XRD, zero if missing), minus change in accounts receivable (item RECT), minus change in inventory (item INVT), minus change in prepaid expenses (item XPP), plus change in deferred revenue (item DRC plus item DRLT), plus change in trade accounts payable (item AP), and plus change in accrued expenses (item XACC), all scaled by one-year-lagged book assets (item AT). All changes are annual changes in balance sheet items and we set missing changes to zero. At the end of June of each year t, we sort stocks into deciles based on Cla for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.20 Cla^{q}1, Cla^{q}6, and Cla^{q}12, Quarterly Cash-based Operating Profits-to-lagged Assets

Quarterly cash-based operating profits-to-lagged assets, Cla, is quarterly total revenue (Compustat quarterly item REVTQ) minus cost of goods sold (item COGSQ), minus selling, general, and administrative expenses (item XSGAQ), plus research and development expenditures (item XRDQ, zero if missing), minus change in accounts receivable (item RECTQ), minus change in inventory (item INVTQ), plus change in deferred revenue (item DRCQ plus item DRLTQ), and plus change in trade accounts payable (item APQ), all scaled by one-quarter-lagged book assets (item ATQ). All changes are quarterly changes in balance sheet items and we set missing changes to zero. At the beginning of each month t, we split stocks on Cla^q for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for month t (Cla^{q}1), from month t to $t+5$ (Cla^{q}6), and from month t to $t+11$ (Cla^{q}12). The deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in Cla^{q}6 means that for a given decile in each month there exist six subdeciles, each initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Cla^{q}6 decile. For sufficient data coverage, the Cla^q portfolios start in January 1976.

B.4.21 F, Fundamental Score

Piotroski (2000) classifies each fundamental signal as either good or bad depending on the signal's implication for future stock prices and profitability. An indicator variable for a particular signal is one if its realization is good and zero if it is bad. The aggregate signal, denoted F, is the sum of the nine binary signals. F is designed to measure the overall quality, or strength, of the firm's financial position. Nine fundamental signals are chosen to measure three areas of a firm's financial condition, profitability, liquidity, and operating efficiency.

Four variables are selected to measure profitability: (i) Roa is income before extraordinary items (Compustat annual item IB) scaled by one-year-lagged total assets (item AT). If the firm's Roa is positive, the indicator variable F_{Roa} equals one and zero otherwise. (ii) Cf/A is cash flow from operation scaled by one-year-lagged total assets. Cash flow from operation is net cash flow from operating activities (item OANCF) if available, or funds from operation (item FOPT) minus the annual change in working capital (item WCAP). If the firm's Cf/A is positive, the indicator variable $F_{\mathrm{Cf/A}}$ equals one and zero otherwise. (iii) dRoa is the current year's Roa less the prior year's Roa. If dRoa is positive, the indicator variable F_{dROA} is one and zero otherwise. Finally, (iv) the indicator F_{Acc} equals one if Cf/A $>$ Roa and zero otherwise.

Three variables are selected to measure changes in capital structure and a firm's ability to meet future debt obligations. Piotroski (2000) assumes that an increase in leverage, a deterioration of liquidity, or the use of external financing is a bad signal about financial risk. (i) dLever is the change in the ratio of total long-term debt (Compustat annual item DLTT) to the average of current and one-year-lagged total assets. F_{dLever} is one if the firm's leverage ratio falls, i.e., dLever < 0, and zero otherwise. (ii) dLiquid measures the change in a firm's current ratio from the prior year, in which the current ratio is the ratio of current assets (item ACT) to current liabilities (item LCT). An improvement in liquidity (ΔdLiquid > 0) is a good signal about the firm's ability to service current debt obligations. The indicator $\mathrm{F}_{\mathrm{dLiquid}}$ equals one if the firm's liquidity improves and zero otherwise. (iii) The indicator, Eq, equals one if the firm does not issue common equity during the current year and zero otherwise. The issuance of common equity is sales of common and preferred stocks (item SSTK) minus any increase in preferred stocks (item PSTK). Issuing equity is interpreted as a bad signal (inability to generate sufficient internal funds to service future obligations).

The remaining two signals are designed to measure changes in the efficiency of the firm's operations that reflect two key constructs underlying the decomposition of return on assets. (i) dMargin is the firm's current gross margin ratio, measured as gross margin (Compustat annual item SALE minus item COGS) scaled by sales (item SALE), less the prior year's gross margin ratio. An improvement in margins signifies a potential improvement in factor costs, a reduction in inventory costs, or a rise in the price of the firm's product. The indictor $\mathrm{F}_{\mathrm{dMargin}}$ equals one if dMargin > 0 and zero otherwise. (ii) dTurn is the firm's current year asset turnover ratio, measured as total sales scaled by one-year-lagged total assets (item AT), minus the prior year's asset turnover ratio. An improvement in asset turnover ratio signifies greater productivity from the asset base. The indicator, $\mathrm{F}_{\mathrm{dTurn}}$, equals one if dTurn > 0 and zero otherwise.

Piotroski (2000) forms a composite score, F, as the sum of the individual binary signals:

$$\mathrm{F} \equiv \mathrm{F}_{\mathrm{Roa}} + \mathrm{F}_{\mathrm{dRoa}} + \mathrm{F}_{\mathrm{Cf/A}} + \mathrm{F}_{\mathrm{Acc}} + \mathrm{F}_{\mathrm{dMargin}} + \mathrm{F}_{\mathrm{dTurn}} + \mathrm{F}_{\mathrm{dLever}} + \mathrm{F}_{\mathrm{dLiquid}} + \mathrm{Eq}. \tag{B8}$$

At the end of June of each year t, we sort stocks based on F for the fiscal year ending in calender year $t-1$ to form seven portfolios: low (F = 0,1,2), 3, 4, 5, 6, 7, and high (F = 8, 9). Because extreme F scores are rare, we combine scores 0, 1, and 2 into the low portfolio and scores 8 and 9 into the high portfolio. Monthly portfolio returns are calculated from July of year t to June of $t+1$, and the portfolios are rebalanced in June of $t+1$. For sufficient data coverage, the F portfolio returns start in July 1972.

B.4.22 $\mathrm{F}^{\mathrm{q}}1$, $\mathrm{F}^{\mathrm{q}}6$, and $\mathrm{F}^{\mathrm{q}}12$, Quarterly Fundamental Score

To construct quarterly F-score, F^{q}, we use quarterly accounting data and the same nine binary signals from Piotroski (2000). Among the four signals related to profitability: (i) Roa is quarterly income before extraordinary items (Compustat quarterly item IBQ) scaled by one-quarter-lagged total assets (item ATQ). If the firm's Roa is positive, the indicator variable $\mathrm{F}_{\mathrm{Roa}}$ equals one and zero otherwise. (ii) Cf/A is quarterly cash flow from operation scaled by one-quarter-lagged total assets. Cash flow from operation is the quarterly change in year-to-date net cash flow from operating activities (item OANCFY) if available, or the quarterly change in year-to-date funds from operation (item FOPTY) minus the quarterly change in working capital (item WCAPQ). If the firm's Cf/A is positive, the indicator variable $\mathrm{F}_{\mathrm{Cf/A}}$ equals one and zero otherwise. (iii) dRoa is the current quarter's Roa less the Roa from four quarters ago. If dRoa is positive, the indicator variable $\mathrm{F}_{\mathrm{dROA}}$ is one and zero otherwise. Finally, (iv) the indicator $\mathrm{F}_{\mathrm{Acc}}$ equals one if Cf/A $>$ Roa and zero otherwise.

Among the three signals related changes in capital structure and a firm's ability to meet future debt obligations: (i) dLever is the change in the ratio of total long-term debt (Compustat quarterly item DLTTQ) to the average of current and one-quarter-lagged total assets. $\mathrm{F}_{\mathrm{dLever}}$ is one if the firm's leverage ratio falls, i.e., dLever < 0, relative to its value four quarters ago, and zero otherwise. (ii) dLiquid measures the change in a firm's current ratio between the current quarter and four quarters ago, in which the current ratio is the ratio of current assets (item ACTQ) to current liabilities (item LCTQ). An improvement in liquidity (dLiquid > 0) is a good signal about the firm's ability to service current debt obligations. The indicator $\mathrm{F}_{\mathrm{dLiquid}}$ equals one if the firm's liquidity improves and zero otherwise. (iii) The indicator, Eq, equals one if the firm does not issue common equity during the past four quarters and zero otherwise. The issuance of common equity is sales of common and preferred stocks minus any increase in preferred stocks (item PSTKQ). To measure sales of common and preferred stocks, we first compute the quarterly change in year-to-date sales of common and preferred stocks (item SSTKY) and then take the total change for the past four quarters. Issuing equity is interpreted as a bad signal (inability to generate sufficient internal funds to service future obligations).

For the remaining two signals, (i) dMargin is the firm's current gross margin ratio, measured as gross margin (item SALEQ minus item COGSQ) scaled by sales (item SALEQ), less the gross margin ratio from four quarters ago. The indictor $\mathrm{F}_{\mathrm{dMargin}}$ equals one if dMargin > 0 and zero otherwise. (ii) dTurn is the firm's current asset turnover ratio, measured as (item SALEQ) scaled by one-quarter-lagged total assets (item ATQ), minus the asset turnover ratio from four quarters ago. The indicator, $\mathrm{F}_{\mathrm{dTurn}}$, equals one if dTurn > 0 and zero otherwise.

The composite score, F^{q}, is the sum of the individual binary signals:

$$\mathrm{F}^{\mathrm{q}} \equiv \mathrm{F}_{\mathrm{Roa}} + \mathrm{F}_{\mathrm{dRoa}} + \mathrm{F}_{\mathrm{Cf/A}} + \mathrm{F}_{\mathrm{Acc}} + \mathrm{F}_{\mathrm{dMargin}} + \mathrm{F}_{\mathrm{dTurn}} + \mathrm{F}_{\mathrm{dLever}} + \mathrm{F}_{\mathrm{dLiquid}} + \mathrm{Eq}. \tag{B9}$$

At the beginning of each month t, we sort stocks based on Fq for the fiscal quarter ending at least four quarters ago to form seven portfolios: low (F^{q} = 0,1,2), 3, 4, 5, 6, 7, and high (F^{q} = 8, 9). Monthly portfolio returns are calculated for month t (F^{q}1), from month t to $t+5$ (F^{q}6), and from month t to $t+11$ (F^{q}12), and the portfolios are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, F^{q}6, means that for a given portfolio in each month there exist six subportfolios, each of which is initiated in a different month in prior six months. We take the simple average of the subportfolio returns as the monthly return of the F^{q}6 portfolio. For sufficient data coverage, the F^{q} portfolios start in January 1985.

B.4.23 Fp1, Fp6, and Fp12, Failure Probability

Failure probability (Fp) is from Campbell, Hilscher, and Szilagyi (2008, Table IV, Column 3):

$$\begin{aligned} \mathrm{Fp}_t \equiv & -9.164 - 20.264\mathrm{NIMTAAVG}_t + 1.416\mathrm{TLMTA}_t - 7.129\mathrm{EXRETAVG}_t \\ & + 1.411\mathrm{SIGMA}_t - 0.045\mathrm{RSIZE}_t - 2.132\mathrm{CASHMTA}_t + 0.075\mathrm{MB}_t - 0.058\mathrm{PRICE}_t \end{aligned} \tag{B10}$$

in which

$$\mathrm{NIMTAAVG}_{t-1,t-12} \equiv \frac{1-\phi^3}{1-\phi^{12}}\left(\mathrm{NIMTA}_{t-1,t-3} + \cdots + \phi^9\mathrm{NIMTA}_{t-10,t-12}\right) \tag{B11}$$

$$\mathrm{EXRETAVG}_{t-1,t-12} \equiv \frac{1-\phi}{1-\phi^{12}}\left(\mathrm{EXRET}_{t-1} + \cdots + \phi^{11}\mathrm{EXRET}_{t-12}\right), \tag{B12}$$

and $\phi = 2^{-1/3}$. NIMTA is net income (Compustat quarterly item NIQ) divided by the sum of market equity (share price times the number of shares outstanding from CRSP) and total liabilities (item LTQ). The moving average NIMTAAVG captures the idea that a long history of losses is a better predictor of bankruptcy than one large quarterly loss in a single month. EXRET $\equiv$

$\log(1+R_{it})-\log(1+R_{\text{S\&P500},t})$ is the monthly log excess return on each firm's equity relative to the S&P 500 index. The moving average EXRETAVG captures the idea that a sustained decline in stock market value is a better predictor of bankruptcy than a sudden stock price decline in a single month.

TLMTA is total liabilities divided by the sum of market equity and total liabilities. SIGMA is the annualized three-month rolling sample standard deviation: $\sqrt{\frac{252}{N-1}\sum_{k\in\{t-1,t-2,t-3\}} r_k^2}$, in which k is the index of trading days in months $t-1, t-2$, and $t-3$, r_k is the firm-level daily return, and N is the total number of trading days in the three-month period. SIGMA is treated as missing if there are less than five nonzero observations over the three months in the rolling window. RSIZE is the relative size of each firm measured as the log ratio of its market equity to that of the S&P 500 index. CASHMTA, aimed to capture the liquidity position of the firm, is cash and short-term investments (Compustat quarterly item CHEQ) divided by the sum of market equity and total liabilities (item LTQ). MB is the market-to-book equity, in which we add 10% of the difference between the market equity and the book equity to the book equity to alleviate measurement issues for extremely small book equity values (Campbell, Hilscher, and Szilagyi 2008). For firm-month observations that still have negative book equity after this adjustment, we replace these negative values with \$1 to ensure that the market-to-book ratios for these firms are in the right tail of the distribution. PRICE is each firm's log price per share, truncated above at \$15. We further eliminate stocks with prices less than \$1 at the portfolio formation date. We winsorize the variables on the right-hand side of equation (B10) at the 1th and 99th percentiles of their distributions each month.

At the beginning of each month t, we split stocks into deciles based on Fp calculated with accounting data from the fiscal quarter ending at least four months ago. Because unlike earnings, other quarterly data items in the definition of Fp might not be available upon earnings announcement, we impose a four-month gap between the fiscal quarter end and portfolio formation to guard against look-ahead bias. We calculate decile returns for the current month t (Fp1), from month t to t+5 (Fp6), and from month t to t+11 (Fp12). The deciles are rebalanced at the beginning of month t+1. The holding period that is longer than one month as in, for instance, Fp6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Fp6 decile. For sufficient data coverage, the Fp deciles start in January 1976.

B.4.24 O, Ohlson's O-score

We follow Ohlson (1980, Model One in Table 4) to construct O-score (Dichev 1998):

$$\begin{aligned}\text{O} \equiv\ & -1.32 - 0.407\log(\text{TA}) + 6.03\text{TLTA} - 1.43\text{WCTA} + 0.076\text{CLCA} \\ & - 1.72\text{OENEG} - 2.37\text{NITA} - 1.83\text{FUTL} + 0.285\text{INTWO} - 0.521\text{CHIN}, \quad \text{(B13)}\end{aligned}$$

in which TA is total assets (Compustat annual item AT). TLTA is the leverage ratio defined as total debt (item DLC plus item DLTT) divided by total assets. WCTA is working capital (item ACT minus item LCT) divided by total assets. CLCA is current liability (item LCT) divided by current assets (item ACT). OENEG is one if total liabilities (item LT) exceeds total assets and zero otherwise. NITA is net income (item NI) divided by total assets. FUTL is the fund provided by operations (item PI plus item DP) divided by total liabilities. INTWO is equal to one if net income is negative for the last two years and zero otherwise. CHIN is $(\text{NI}_s - \text{NI}_{s-1})/(|\text{NI}_s| + |\text{NI}_{s-1}|)$, in which NI_s and NI_{s-1} are the net income for the current and prior years. We winsorize all non-dummy variables on the right-hand side of equation (B13) at the 1th and 99th percentiles of their distributions each year. At the end of June of each year t, we sort stocks into deciles based on O-score for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.25 $\mathrm{O^q1}$, $\mathrm{O^q6}$, and $\mathrm{O^q12}$, Quarterly O-score

We use quarterly accounting data to construct the quarterly O-score as:

$$\begin{aligned} \mathrm{O^q} \equiv & -1.32 - 0.407\log(\mathrm{TA^q}) + 6.03\mathrm{TLTA^q} - 1.43\mathrm{WCTA^q} + 0.076\mathrm{CLCA^q} \\ & - 1.72\mathrm{OENEG^q} - 2.37\mathrm{NITA^q} - 1.83\mathrm{FUTL^q} + 0.285\mathrm{INTWO^q} - 0.521\mathrm{CHIN^q}, \end{aligned} \tag{B14}$$

in which $\mathrm{TA^q}$ is total assets (Compustat quarterly item ATQ). $\mathrm{TLTA^q}$ is the leverage ratio defined as total debt (item DLCQ plus item DLTTQ) divided by total assets. $\mathrm{WCTA^q}$ is working capital (item ACTQ minus item LCT) divided by total assets. $\mathrm{CLCA^q}$ is current liability (item LCTQ) divided by current assets (item ACTQ). $\mathrm{OENEG^q}$ is one if total liabilities (item LTQ) exceeds total assets and zero otherwise. $\mathrm{NITA^q}$ is the sum of net income (item NIQ) for the trailing four quarters divided by total assets at the end of the current quarter. $\mathrm{FUTL^q}$ is the the sum of funds provided by operations (item PIQ plus item DPQ) for the trailing four quarters divided by total liabilities at the end of the current quarter. $\mathrm{INTWO^q}$ is equal to one if net income is negative for the current quarter and four quarters ago, and zero otherwise. $\mathrm{CHIN^q}$ is $(\mathrm{NIQ}_s - \mathrm{NIQ}_{s-4})/(|\mathrm{NIQ}_s| + |\mathrm{NIQ}_{s-4}|)$, in which NIQ_s and NIQ_{s-4} are the net income for the current quarter and four quarters ago. We winsorize all non-dummy variables on the right-hand side of equation (B14) at the 1th and 99th percentiles of their distributions each month.

At the beginning of each month t, we sort stocks into deciles based on $\mathrm{O^q}$ calculated with accounting data from the fiscal quarter ending at least four months ago. We calculate decile returns for the current month t ($\mathrm{O^q1}$), from month t to $t+5$ ($\mathrm{O^q6}$), and from month t to $t+11$ ($\mathrm{O^q12}$). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, $\mathrm{O^q6}$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{O^q6}$ decile. For sufficient data coverage, the $\mathrm{O^q}$ portfolios start in January 1973.

B.4.26 Z, Altman's Z-score

We follow Altman (1968) to construct the Z-score (Dichev 1998):

$$\mathrm{Z} \equiv 1.2\mathrm{WCTA} + 1.4\mathrm{RETA} + 3.3\mathrm{EBITTA} + 0.6\mathrm{METL} + \mathrm{SALETA}, \tag{B15}$$

in which WCTA is working capital (Compustat annual item ACT minus item LCT) divided by total assets (item AT), RETA is retained earnings (item RE) divided by total assets, EBITTA is earnings before interest and taxes (item OIADP) divided by total assets, METL is the market equity (from CRSP, at fiscal year end) divided by total liabilities (item LT), and SALETA is sales (item SALE) divided by total assets. For firms with more than one share class, we merge the market equity for all share classes before computing Z. We winsorize all non-dummy variables on the right-hand side of equation (B15) at the 1th and 99th percentiles of their distributions each year. At the end of June of each year t, we split stocks into deciles based on Z-score for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.27 Z^q1, Z^q6, and Z^q12, Quarterly Z-score

We use quarterly accounting data to construct the quarterly Z-score as:

$$Z^q \equiv 1.2\text{WCTA}^q + 1.4\text{RETA}^q + 3.3\text{EBITTA}^q + 0.6\text{METL}^q + \text{SALETA}^q, \tag{B16}$$

in which WCTA^q is working capital (Compustat quarterly item ACTQ minus item LCTQ) divided by total assets (item ATQ), RETA^q is retained earnings (item REQ) divided by total assets, EBITTA^q is the sum of earnings before interest and taxes (item OIADPQ) for the trailing four quarters divided by total assets at the end of the current quarter, METL^q is the market equity (from CRSP, at fiscal quarter end) divided by total liabilities (item LTQ), and SALETA^q is the sum of sales (item SALEQ) for the trailing four quarters divided by total assets at the end of the current quarter. For firms with more than one share class, we merge the market equity for all share classes before computing Z^q. We winsorize all non-dummy variables on the right-hand side of equation (B16) at the 1th and 99th percentiles of their distributions each month.

At the beginning of each month t, we split stocks into deciles based on Z^q calculated with accounting data from the fiscal quarter ending at least four months ago. We calculate decile returns for the current month t (Z^q1), from month t to $t+5$ (Z^q6), and from month t to $t+11$ (Z^q12). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Z^q6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Z^q6 decile. For sufficient data coverage, the Z^q portfolios start in January 1973.

B.4.28 G, Growth Score

Following Mohanram (2005), we construct the G-score as the sum of eight binary signals: $G \equiv G_1 + \ldots + G_8$. G_1 equals one if a firm's return on assets (Roa) is greater than the median Roa in the same industry (two-digit SIC code), and zero otherwise. Roa is net income before extraordinary items (Compustat annual item IB) scaled by the average of total assets (item AT) from the current and prior years. We also calculate an alternative measure of Roa using cash flow from operations instead of net income. Cash flow from operation is net cash flow from operating activities (item OANCF) if available, or funds from operation (item FOPT) minus the annual change in working capital (item WCAP). G_2 equals one if a firm's cash flow Roa exceeds the industry median, and zero otherwise. G_3 equals one if a firm's cash flow from operations exceeds net income, and zero otherwise.

G_4 equals one if a firm's earnings variability is less than the industry median. Earnings variability is the variance of a firm's quarterly Roa during the past 16 quarters (six quarters minimum). Quarterly Roa is quarterly net income before extraordinary items (Compustat quarterly item IBQ) scaled by one-quarter-lagged total assets (item ATQ). G_5 equals one if a firm's sales growth variability is less the industry median, and zero otherwise. Sales growth variability is the variance of a firm's quarterly sales growth during the past 16 quarters (six quarters minimum). Quarterly sales growth is the growth in quarterly sales (item SALEQ) from its value four quarters ago.

G_6 equals one if a firm's R&D (Compustat annual item XRD) deflated by one-year-lagged total assets is greater than the industry median, and zero otherwise. G_7 equals one if a firm's capital expenditure (item CAPX) deflated by one-year-lagged total assets is greater than the industry median, and zero otherwise. G_8 equals one if a firm's advertising expenses (item XAD) deflated by one-year-lagged total assets is greater than the industry median, and zero otherwise.

At the end of June of each year t, we sort stocks on G for the fiscal year ending in calender year $t-1$ to form seven portfolios: low (F = 0,1), 2, 3, 4, 5, 6, and high (F = 7,8). Because extreme G scores are rare, we combine scores 0, and 1 into the low portfolio and scores 7 and 8 into the high portfolio. Monthly portfolio returns are calculated from July of year t to June of $t+1$, and the portfolios are rebalanced in June of $t+1$. For sufficient data coverage, the G portfolio returns start in July 1976.

B.4.29 Cr1, Cr6, and Cr12, Credit Ratings

Following Avramov, Chordia, Jostova, and Philipov (2009), we measure credit ratings, Cr, by transforming S&P ratings into numerical scores as follows: AAA=1, AA+=2, AA=3, AA−=4, A+=5, A=6, A−=7, BBB+=8, BBB=9, BBB−=10, BB+=11, BB=12, BB−=13, B+=14, B=15, B−=16, CCC+=17, CCC=18, CCC−=19, CC=20, C=21, and D=22. Following Avramov et al., we exclude stocks with share price below \$1. At the beginning of each month t, we sort stocks into quintiles based on Cr at the end of $t-1$. We do not form deciles because a disproportional number of firms can have the same rating, which leads to fewer than ten portfolios. We calculate quintile returns for the current month t (Cr1), from month t to $t+5$ (Cr6), and from month t to $t+11$ (Cr12). The quintiles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Cr6, means that for a given quintile in each month there exist six subquintiles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subquintiles returns as the monthly return of the Cr6 quintile. For sufficient data coverage, the Cr portfolios start in January 1986.

B.4.30 Tbi, Taxable Income-to-book Income

Following Green, Hand, and Zhang (2013), we measure taxable income-to-book income, Tbi, as pretax income (Compustat annual item PI) divided by net income (item NI). At the end of June of each year t, we sort stocks into deciles based on Tbi for the fiscal year ending in calendar year $t-1$. We exclude firms with non-positive pretax income or net income. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.31 Tbi^{q}1, Tbi^{q}6, and Tbi^{q}12, Quarterly Taxable Income-to-book Income

Quarterly taxable income-to-book income, Tbi^q, is quarterly pretax income (Compustat quarterly item PIQ) divided by net income (NIQ). At the beginning of each month t, we split stocks into deciles based on Tbi^q calculated with accounting data from the fiscal quarter ending at least four months ago. We exclude firms with non-positive pretax income or net income. We calculate monthly decile returns for the current month t (Tbi^{q}1), from month t to $t+5$ (Tbi^{q}6), and from month t to $t+11$ (Tbi^{q}12). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Tbi^{q}6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Tbi^{q}6 decile.

B.4.32 Bl, Book Leverage

Following Fama and French (1992), we measure book leverage, Bl, as total assets (Compustat annual item AT) divided by book equity. Following Davis, Fama, and French (2000), we measure book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock. At the end of June of each year t, we sort stocks into deciles based on Bl for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.4.33 Bl$^{\text{q}}$1, Bl$^{\text{q}}$6, and Bl$^{\text{q}}$12, Quarterly Book Leverage

Quarterly book leverage, Bl$^{\text{q}}$, is total assets (Compustat quarterly item ATQ) divided by book equity. Book equity is shareholders' equity, plus balance sheet deferred taxes and investment tax credit (item TXDITCQ) if available, minus the book value of preferred stock (item PSTKQ). Depending on availability, we use stockholders' equity (item SEQQ), or common equity (item CEQQ) plus the book value of preferred stock, or total assets (item ATQ) minus total liabilities (item LTQ) in that order as shareholders' equity. At the beginning of each month t, we split stocks into deciles on Bl$^{\text{q}}$ for the fiscal quarter ending at least four months ago. We calculate monthly decile returns for the current month t (Bl$^{\text{q}}$1), from month t to $t+5$ (Bl$^{\text{q}}$6), and from month t to $t+11$ (Bl$^{\text{q}}$12). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Bl$^{\text{q}}$6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Bl$^{\text{q}}$6 decile. For sufficient data coverage, the Bl$^{\text{q}}$ portfolios start in January 1972.

B.4.34 Sg$^{\text{q}}$1, Sg$^{\text{q}}$6, and Sg$^{\text{q}}$12, Quarterly Sales Growth

Quarterly sales growth, Sg$^{\text{q}}$, is quarterly sales (Compustat quarterly item SALEQ) divided by its value four quarters ago. At the beginning of each month t, we sort stocks into deciles based on the latest Sg$^{\text{q}}$. Before 1972, we use the most recent Sg$^{\text{q}}$ from fiscal quarters ending at least four months ago. Starting from 1972, we use Sg$^{\text{q}}$ from the most recent quarterly earnings announcement dates (item RDQ). Sales are generally announced with earnings during quarterly earnings announcements (Jegadeesh and Livnat 2006). For a firm to enter the portfolio formation, we require the end of the fiscal quarter that corresponds to its most recent Sg$^{\text{q}}$ to be within six months prior to the portfolio formation. This restriction is imposed to exclude stale information. To avoid potentially erroneous records, we also require the earnings announcement date to be after the corresponding fiscal quarter end. We calculate monthly decile returns for the current month t (Sg$^{\text{q}}$1), from month t to $t+5$ (Sg$^{\text{q}}$6), and from month t to $t+11$ (Sg$^{\text{q}}$12). The deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Sg$^{\text{q}}$6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Sg$^{\text{q}}$6 decile.

B.5 Intangibles

B.5.1 Oca and Ioca, (Industry-adjusted) Organizational Capital-to-assets

Following Eisfeldt and Papanikolaou (2013), we construct the stock of organization capital, Oc, using the perpetual inventory method:

$$\text{Oc}_{it} = (1-\delta)\text{Oc}_{it-1} + \text{SG\&A}_{it}/\text{CPI}_t, \tag{B17}$$

in which Oc_{it} is the organization capital of firm i at the end of year t, $\text{SG\&A}_{it}$ is selling, general, and administrative (SG&A) expenses (Compustat annual item XSGA) in t, CPI_t is the average consumer price index during year t, and δ is the annual depreciation rate of Oc. The initial stock of Oc is $\text{Oc}_{i0} = \text{SG\&A}_{i0}/(g+\delta)$, in which $\text{SG\&A}_{i0}$ is the first valid SG&A observation (zero or positive) for firm i and g is the long-term growth rate of SG&A. We assume a depreciation rate of 15% for Oc and a long-term growth rate of 10% for SG&A. Missing SG&A values after the starting date are treated as zero. For portfolio formation at the end of June of year t, we require SG&A to be non-missing for the fiscal year ending in calendar year $t-1$ because this SG&A value receives the highest weight in Oc. In addition, we exclude firms with zero Oc. Organizational Capital-to-assets, Oca, is Oc scaled by total assets (item AT).

Following Eisfeldt and Papanikolaou (2013), we also industry-standardize Oca using the FF (1997) 17-industry classification. To calculate the industry-adjusted Oca, Ioca, we demean a firm's Oca by its industry mean and then divide the demeaned Oca by the standard deviation of Oca within its industry. To alleviate the impact of outliers, we winsorize Oca at the 1 and 99 percentiles of all firms each year before the industry standardization. At the end of June of each year t, we sort stocks into deciles based on Oca, and separately, on Ioca, for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.2 Adm, Advertising Expense-to-market

At the end of June of each year t, we sort stocks into deciles based on advertising expenses-to-market, Adm, which is advertising expenses (Compustat annual item XAD) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Adm. We keep only firms with positive advertising expenses. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because sufficient XAD data start in 1972, the Adm portfolios start in July 1973.

B.5.3 gAd, Growth in Advertising Expense

At the end of June of each year t, we sort stocks into deciles based on growth in advertising expenses, gAd, which is the growth rate of advertising expenses (Compustat annual item XAD) from the fiscal year ending in calendar year $t-2$ to the fiscal year ending in calendar year $t-1$. Following Lou (2014), we keep only firms with advertising expenses of at least 0.1 million dollars. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because sufficient XAD data start in 1972, the gAd portfolios start in July 1974.

B.5.4 Rdm, R&D Expense-to-market

At the end of June of each year t, we sort stocks into deciles based on R&D-to-market, Rdm, which is R&D expenses (Compustat annual item XRD) for the fiscal year ending in calendar year $t-1$ divided by the market equity (from CRSP) at the end of December of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing Rdm. We keep only firms with positive R&D expenses. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the accounting treatment of R&D expenses was standardized in 1975, the Rdm portfolios start in July 1976.

B.5.5 $\mathrm{Rdm}^{\mathrm{q}}1$, $\mathrm{Rdm}^{\mathrm{q}}6$, and $\mathrm{Rdm}^{\mathrm{q}}12$, Quarterly R&D Expense-to-market

At the beginning of each month t, we split stocks into deciles based on quarterly R&D-to-market, $\mathrm{Rdm}^{\mathrm{q}}$, which is quarterly R&D expense (Compustat quarterly item XRDQ) for the fiscal quarter ending at least four months ago scaled by the market equity (from CRSP) at the end of $t-1$. For firms with more than one share class, we merge the market equity for all share classes before computing $\mathrm{Rdm}^{\mathrm{q}}$. We keep only firms with positive R&D expenses. We calculate decile returns for the current month t ($\mathrm{Rdm}^{\mathrm{q}}1$), from month t to $t+5$ ($\mathrm{Rdm}^{\mathrm{q}}6$), and from month t to $t+11$ ($\mathrm{Rdm}^{\mathrm{q}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Rdm}^{\mathrm{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Rdm}^{\mathrm{q}}6$ decile. Because the quarterly R&D data start in late 1989, the $\mathrm{Rdm}^{\mathrm{q}}$ portfolios start in January 1990.

B.5.6 Rds, R&D Expenses-to-sales

At the end of June of each year t, we sort stocks into deciles based on R&D-to-sales, Rds, which is R&D expenses (Compustat annual item XRD) divided by sales (item SALE) for the fiscal year ending in calendar year $t-1$. We keep only firms with positive R&D expenses. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the accounting treatment of R&D expenses was standardized in 1975, the Rds portfolios start in July 1976.

B.5.7 $\mathrm{Rds}^{\mathrm{q}}1$, $\mathrm{Rds}^{\mathrm{q}}6$, and $\mathrm{Rds}^{\mathrm{q}}12$, Quarterly R&D Expense-to-sales

At the beginning of each month t, we split stocks into deciles based on quarterly R&D-to-sales, $\mathrm{Rds}^{\mathrm{q}}$, which is quarterly R&D expense (Compustat quarterly item XRDQ) scaled by sales (item SALEQ) for the fiscal quarter ending at least four months ago. We keep only firms with positive R&D expenses. We calculate decile returns for the current month t ($\mathrm{Rds}^{\mathrm{q}}1$), from month t to $t+5$ ($\mathrm{Rds}^{\mathrm{q}}6$), and from month t to $t+11$ ($\mathrm{Rds}^{\mathrm{q}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\mathrm{Rds}^{\mathrm{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\mathrm{Rds}^{\mathrm{q}}6$ decile. Because the quarterly R&D data start in late 1989, the $\mathrm{Rds}^{\mathrm{q}}$ portfolios start in January 1990.

B.5.8 Ol, Operating Leverage

Following Novy-Marx (2011), operating leverage, Ol, is operating costs scaled by total assets (Compustat annual item AT, the denominator is current, not lagged, total assets). Operating costs are cost of goods sold (item COGS) plus selling, general, and administrative expenses (item XSGA). At the end of June of year t, we sort stocks into deciles based on Ol for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.9 Ol^{q}1, Ol^{q}6, and Ol^{q}12, Quarterly Operating Leverage

At the beginning of each month t, we split stocks into deciles based on quarterly operating leverage, Ol^q, which is quarterly operating costs divided by assets (Compustat quarterly item ATQ) for the fiscal quarter ending at least four months ago. Operating costs are the cost of goods sold (item COGSQ) plus selling, general, and administrative expenses (item XSGAQ). We calculate decile returns for the current month t (Ol^{q}1), from month t to $t+5$ (Ol^{q}6), and from month t to $t+11$ (Ol^{q}12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Ol^{q}6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ol^{q}6 decile. For sufficient data coverage, the Ol^q portfolios start in January 1972.

B.5.10 Hn, Hiring Rate

Following Belo, Lin, and Bazdresch (2014), at the end of June of year t, we measure the hiring rate (Hn) as $(N_{t-1}-N_{t-2})/(0.5N_{t-1}+0.5N_{t-2})$, in which N_{t-j} is the number of employees (Compustat annual item EMP) from the fiscal year ending in calendar year $t-j$. At the end of June of year t, we sort stocks into deciles based on Hn. We exclude firms with zero Hn (these observations are often due to stale information on firm employment). Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.11 Rca, R&D Capital-to-assets

Following Li (2011), we measure R&D capital, Rc, by accumulating annual R&D expenses over the past five years with a linear depreciation rate of 20%:

$$\mathrm{Rc}_{it} = \mathrm{XRD}_{it} + 0.8\,\mathrm{XRD}_{it-1} + 0.6\,\mathrm{XRD}_{it-2} + 0.4\,\mathrm{XRD}_{it-3} + 0.2\,\mathrm{XRD}_{it-4}, \tag{B18}$$

in which XRD_{it-j} is firm i's R&D expenses (Compustat annual item XRD) in year $t-j$. R&D capital-to-assets, Rca, is Rc scaled by total assets (item AT). At the end of June of each year t, we sort stocks into deciles based on Rca for the fiscal year ending in calendar year $t-1$. We keep only firms with positive Rc. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. For portfolio formation at the end of June of year t, we require R&D expenses to be non-missing for the fiscal year ending in calendar year $t-1$, because this value of R&D expenses receives the highest weight in Rc. Because Rc requires past five years of R&D expenses data and the accounting treatment of R&D expenses was standardized in 1975, the Rca portfolios start in July 1980.

B.5.12 Bca, Brand Capital-to-assets

Following Belo, Lin, and Vitorino (2014), we construct brand capital, Bc, by accumulating advertising expenses with the perpetual inventory method:

$$\mathrm{Bc}_{it} = (1 - \delta)\mathrm{Bc}_{it-1} + \mathrm{XAD}_{it}. \tag{B19}$$

in which Bc_{it} is the brand capital for firm i at the end of year t, XAD_{it} is the advertising expenses (Compustat annual item XAD) in t, and δ is the annual depreciation rate of Bc. The initial stock of Bc is $\mathrm{Bc}_{i0} = \mathrm{XAD}_{i0}/(g + \delta)$, in which XAD_{i0} is first valid XAD (zero or positive) for firm i and g is the long-term growth rate of XAD. Following Belo et al., we assume a depreciation rate of 50% for Bc and a long-term growth rate of 10% for XAD. Missing values of XAD after the starting date are treated as zero. For the portfolio formation at the end of June of year t, we exclude firms with zero Bc and require XAD to be non-missing for the fiscal year ending in calendar year $t-1$. Brand capital-to-assets, Bca, is Bc scaled by total assets (item AT). At the end of June of each year t, we sort stocks into deciles based on Bca for the fiscal year ending in calendar year $t - 1$. Monthly decile returns are calculated from July of year t to June of $t + 1$, and the deciles are rebalanced in June of $t + 1$. Because sufficient XAD data start in 1972, the Bc portfolios start in July 1973.

B.5.13 Aop, Analysts Optimism

Following Frankel and Lee (1998), we measure analysts optimism, Aop, as (Vf−Vh)/|Vh|, in which Vf is the analysts forecast-based intrinsic value, and Vh is the historical Roe-based intrinsic value. See section B.2.27 for the construction of intrinsic values. At the end of June of each year t, we sort stocks into deciles based on Aop. Monthly decile returns are calculated from July of year t to June of $t + 1$, and the deciles are rebalanced in June of $t + 1$.

B.5.14 Pafe, Predicted Analysts Forecast Error

Following Frankel and Lee (1998), we define analysts forecast errors for year t as the actual realized Roe in year $t + 3$ minus the predicted Roe for $t + 3$ based on analyst forecasts. See section B.2.27 for the measurement of realized and predicted Roe. To calculate predicted analysts forecast errors, Pafe, for the portfolio formation at the end of June of year t, we estimate the intercept and slopes of the annual cross-sectional regressions of $\mathrm{Roe}_{t-1} - E_{t-4}[\mathrm{Roe}_{t-1}]$ on four firm characteristics for the fiscal year ending in calendar year $t-4$, including prior five-year sales growth, book-to-market, long-term earnings growth forecast, and analysts optimism. Prior five-year sale growth is the growth rate in sales (Compustat annual item SALE) from the fiscal year ending in calendar year $t-9$ to the fiscal year ending in $t-4$. Book-to-market is book equity (item CEQ) for the fiscal year ending in calendar year $t-4$ divided by the market equity (form CRSP) at the end of June in $t-3$. Long-term earnings growth forecast is from IBES (unadjusted file, item MEANEST; fiscal period indicator = 0), reported in June of $t-3$. See Section B.5.13 for the construction of analyst optimism. We winsorize the regressors at the 1st and 99th percentiles of their respective pooled distributions each year, and standardize all the regressors (by subtracting mean and dividing by standard deviation). Pafe for the portfolio formation year t is then obtained by applying the estimated intercept and slopes on the winsorized and standardized regressors for the fiscal year ending in calendar year $t - 1$. At the end of June of each year t, we sort stocks into deciles based on Pafe. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the long-term earnings growth forecast data start in 1981, the Pafe portfolios start in July 1985.

B.5.15 Parc, Patent-to-R&D Capital

Following Hirshleifer, Hsu, and Li (2013), we measure patent-to-R&D capital, Parc, as the ratio of firm i's patents granted in year t, Patents_{it}, scaled by its R&D capital for the fiscal year ending in calendar year $t-2$, $\text{Patents}_{it}/(\text{XRD}_{it-2}+0.8\,\text{XRD}_{it-3}+0.6\,\text{XRD}_{it-4}+0.4\,\text{XRD}_{it-5}+0.2\,\text{XRD}_{it-6})$, in which XRD_{it-j} is R&D expenses (Compustat annual item XRD) for the fiscal year ending in calendar year $t-j$. We require non-missing R&D expenses for the fiscal year ending in $t-2$ but set missing values to zero for other years ($t-6$ to $t-3$). The patent data are from the National Bureau of Economic Research patent database and are available from 1976 to 2006. At the end of June of each year t, we use Parc for $t-1$ to form deciles. Stocks with zero Parc are grouped into one portfolio (1) and stocks with positive Parc are sorted into nine portfolios (2 to 10). Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the accounting treatment of R&D expenses was standardized in 1975 and the NBER patent data stop in 2006, the Parc portfolios are available from July 1982 to June 2008.

B.5.16 Crd, Citations-to-R&D Expenses

Following Hirshleifer, Hsu, and Li (2013), we measure citations-to-R&D expenses, Crd, in year t as the adjusted number of citations occurring in year t to firm i's patents granted over the previous five years scaled by the sum of corresponding R&D expenses:

$$\text{Crd}_\text{t} = \frac{\sum_{s=1}^{5}\sum_{k=1}^{N_{t-s}} C_{ik}^{t-s}}{\sum_{s=1}^{5}\text{XRD}_{it-2-s}}, \tag{B20}$$

in which C_{ik}^{t-s} is the number of citations received in year t by patent k, granted in year $t-s$ scaled by the average number of citations received in year t by all patents of the same subcategory granted in year $t-s$. N_{t-s} is the total number of patents granted in year $t-s$ to firm i. XRD_{it-2-s} is R&D expenses (Compustat annual item XRD) for the fiscal year ending in calendar year $t-2-s$. At the end of June of each year t, we use Crd for $t-1$ to form deciles. Stocks with zero Crd are grouped into one portfolio (1) and stocks with positive Crd are sorted into nine portfolios (2 to 10). Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.17 Hs, Ha, and He, Industry Concentration (Sales, Assets, Book Equity)

Following Hou and Robinson (2006), we measure a firm's industry concentration with the Herfindahl index, $\sum_{i=1}^{N_j} s_{ij}^2$, in which s_{ij} is the market share of firm i in industry j, and N_j is the total number of firms in the industry. We calculate the market share of a firm using sales (Compustat annual item SALE), total assets (item AT), or book equity. Following Davis, Fama, and French (2000), we measure book equity as stockholders' book equity, plus balance sheet deferred taxes and investment tax credit (item TXDITC) if available, minus the book value of preferred stock. Stockholders' equity is the value reported by Compustat (item SEQ), if it is available. If not, we measure stockholders' equity as the book value of common equity (item CEQ) plus the par value of preferred stock (item PSTK), or the book value of assets (item AT) minus total liabilities (item LT). Depending on availability, we use redemption (item PSTKRV), liquidating (item PSTKL), or par value (item PSTK) for the book value of preferred stock. Industries are defined by three-digit SIC codes. We exclude financial firms (SIC between 6000 and 6999) and firms in regulated industries. Following Barclay and Smith (1995), the regulated industries include: railroads (SIC=4011) through 1980, trucking (4210 and 4213) through 1980, airlines (4512) through 1978, telecommunication (4812 and 4813) through

1982, and gas and electric utilities (4900 to 4939). To improve the accuracy of the concentration measure, we exclude an industry if the market share data are available for fewer than five firms or 80% of all firms in the industry. We measure industry concentration as the average Herfindahl index during the past three years. Industry concentrations calculated with sales, assets, and book equity are denoted, Hs, Ha, and He, respectively. At the end of June of each year t, we sort stocks into deciles based on Hs, Ha, and He for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.18 Age1, Age6, and Age12, Firm Age

Following Jiang, Lee, and Zhang (2005), we measure firm age, Age, as the number of months between the portfolio formation date and the first month that a firm appears in Compustat or CRSP (item permco). At the beginning of each month t, we sort stocks into quintiles based on Age at the end of $t-1$. We do not form deciles because a disproportional number of firms can have the same Age (e.g., caused by the inception of Nasdaq coverage in 1973). Monthly quintile returns are calculated for the current month t (Age1), from month t to $t+5$ (Age6), and from month t to $t+11$ (Age12), and the quintiles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Age6, means that for a given quintile in each month there exist six subquintiles, each of which is initiated in a different month in the prior six months. We take the simple average of the subquintiles returns as the monthly return of the Age6 quintile.

B.5.19 D1, D2, and D3, Price Delay

At the end of June of each year, we regress each stock's weekly returns over the prior year on the contemporaneous and four weeks of lagged market returns:

$$r_{it} = \alpha_i + \beta_i R_{mt} + \sum_{n=1}^{4} \delta_i^{(-n)} R_{mt-n} + \epsilon_{it}, \tag{B21}$$

in which r_{it} is the return on stock j in week t, and R_{mt} is the return on the CRSP value-weighted market index. Weekly returns are measured from Wednesday market close to the next Wednesday market close. Following Hou and Moskowitz (2005), we calculate three price delay measures:

$$\mathrm{D1}_i \equiv 1 - \frac{R^2_{\delta_i^{(-4)}=\delta_i^{(-3)}=\delta_i^{(-2)}=\delta_i^{(-1)}=0}}{R^2}, \tag{B22}$$

in which $R^2_{\delta_i^{(-4)}=\delta_i^{(-3)}=\delta_i^{(-2)}=\delta_i^{(-1)}=0}$ is the R^2 from regression equation (B21) with the restriction $\delta_i^{(-4)} = \delta_i^{(-3)} = \delta_i^{(-2)} = \delta_i^{(-1)} = 0$, and R^2 is without this restriction. In addition,

$$\mathrm{D2}_i \equiv \frac{\sum_{n=1}^{4} n\delta_i^{(-n)}}{\beta_i + \sum_{n=1}^{4} \delta_i^{(-n)}} \tag{B23}$$

$$\mathrm{D3}_i \equiv \frac{\sum_{n=1}^{4} \frac{n\delta_i^{(-n)}}{\mathrm{se}\left(\delta_i^{(-n)}\right)}}{\frac{\beta_i}{\mathrm{se}(\beta_i)} + \sum_{n=1}^{4} \frac{\delta_i^{(-n)}}{\mathrm{se}\left(\delta_i^{(-n)}\right)}}, \tag{B24}$$

in which $\mathrm{se}(\cdot)$ is the standard error of the point estimate in parentheses.

To improve precision of the price delay estimate, we sort firms into portfolios based on market equity and individual delay measure, compute the delay measure for the portfolio, and assign the portfolio delay measure to each firm in the portfolio. At the end of June of each year t, we sort stocks into size deciles based on the market equity (from CRSP) at the end of June in $t-j$ ($j = 1, 2, \ldots$). Within each size decile, we then sort stocks into deciles based on their first-stage individual delay measure, estimated using weekly return data from July of year $t-j-1$ to June of year $t-j$. The equal-weighted weekly returns of the 100 size-delay portfolios are computed over the following year from July of year $t-j$ to June of $t-j+1$. We then re-estimate the delay measure for each of the 100 portfolios using the entire past sample of weekly returns up to June of year t. The second-stage portfolio delay measure is then assigned to individual stocks within the 100 portfolios formed at end of June in year t. At the end of June of year t, we sort stocks into deciles based on D1, D2, and D3. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.20 dSi, % Change in Sales Minus % Change in Inventory

Following Abarbanell and Bushee (1998), we define the %d($\cdot$) operator as the percentage change in the variable in the parentheses from its average over the prior two years, e.g., %d(Sales) = [Sales(t) − E[Sales(t)]]/E[Sales(t)], in which E[Sales(t)] = [Sales($t-1$) + Sales($t-2$)]/2. dSi is calculated as %d(Sales) − %d(Inventory), in which sales is net sales (Compustat annual item SALE), and inventory is finished goods inventories (item INVFG) if available, or total inventories (item INVT). Firms with non-positive average sales or inventory during the past two years are excluded. At the end of June of each year t, we sort stocks into deciles based on dSi for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.21 dSa, % Change in Sales Minus % Change in Accounts Receivable

Following Abarbanell and Bushee (1998), we define the %d($\cdot$) operator as the percentage change in the variable in the parentheses from its average over the prior two years, e.g., %d(Sales) = [Sales(t) − E[Sales(t)]]/E[Sales(t)], in which E[Sales(t)] = [Sales($t-1$) + Sales($t-2$)]/2. dSa is calculated as %d(Sales) − %d(Accounts receivable), in which sales is net sales (Compustat annual item SALE) and accounts receivable is total receivables (item RECT). Firms with non-positive average sales or receivables during the past two years are excluded. At the end of June of each year t, we sort stocks into deciles based on dSa for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.22 dGs, % Change in Gross Margin Minus % Change in Sales

Following Abarbanell and Bushee (1998), we define the %d($\cdot$) operator as the percentage change in the variable in the parentheses from its average over the prior two years, e.g., %d(Sales) = [Sales(t) − E[Sales(t)]]/E[Sales(t)], in which E[Sales(t)] = [Sales($t-1$) + Sales($t-2$)]/2. dGs is calculated as %d(Gross margin) − %d(Sales), in which sales is net sales (Compustat annual item SALE) and gross margin is sales minus cost of goods sold (item COGS). Firms with non-positive average gross margin or sales during the past two years are excluded. At the end of June of each year t, we sort stocks into deciles based on dGs for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.23 dSs, % Change in Sales Minus % Change in SG&A

Following Abarbanell and Bushee (1998), we define the %d(·) operator as the percentage change in the variable in the parentheses from its average over the prior two years, e.g., %d(Sales) = [Sales(t) − E[Sales(t)]]/E[Sales(t)], in which E[Sales(t)] = [Sales($t-1$) + Sales($t-2$)]/2. dSs is calculated as %d(Sales) − %d(SG&A), in which sales is net sales (Compustat annual item SALE) and SG&A is selling, general, and administrative expenses (item XSGA). Firms with non-positive average sales or SG&A during the past two years are excluded. At the end of June of each year t, we sort stocks into deciles based on dSs for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.24 Etr, Effective Tax Rate

Following Abarbanell and Bushee (1998), we measure effective tax rate, Etr, as:

$$\text{Etr}(t) = \left[\frac{\text{TaxExpense}(t)}{\text{EBT}(t)} - \frac{1}{3}\sum_{\tau=1}^{3}\frac{\text{TaxExpense}(t-\tau)}{\text{EBT}(t-\tau)}\right] \times \text{dEPS}(t), \tag{B25}$$

in which TaxExpense(t) is total income taxes (Compustat annual item TXT) paid in year t, EBT(t) is pretax income (item PI) plus amortization of intangibles (item AM), and dEPS is the change in split-adjusted earnings per share (item EPSPX divided by item AJEX) between years $t-1$ and t, deflated by stock price (item PRCC_F) at the end of $t-1$. At the end of June of each year t, we sort stocks into deciles based on Etr for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of t+1, and the deciles are rebalanced in June of t+1.

B.5.25 Lfe, Labor Force Efficiency

Following Abarbanell and Bushee (1998), we measure labor force efficiency, Lfe, as:

$$\text{Lfe}(t) = \left[\frac{\text{Sales}(t)}{\text{Employees}(t)} - \frac{\text{Sales}(t-1)}{\text{Employees}(t-1)}\right] / \frac{\text{Sales}(t-1)}{\text{Employees}(t-1)}, \tag{B26}$$

in which Sales(t) is net sales (Compustat annual item SALE) in year t, and Employees(t) is the number of employees (item EMP). At the end of June of each year t, we sort stocks into deciles based on Lfe for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.26 Ana1, Ana6, and Ana12, Analysts Coverage

Following Elgers, Lo, and Pfeiffer (2001), we measure analysts coverage, Ana, as the number of analysts' earnings forecasts from IBES (item NUMEST) for the current fiscal year (fiscal period indicator = 1). We require earnings forecasts to be denominated in US dollars (currency code = USD). At the beginning of each month t, we sort stocks into quintiles on Ana from the IBES report in $t-1$. We do not form deciles because a disproportional number of firms can have the same Ana before 1980. Monthly quintile returns are calculated for the current month t (Ana1), from month t to t+5 (Ana6), and from month t to $t+11$ (Ana12). The quintiles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Ana6 means that for a given quintile in each month there exist six subquintiles, each of which is initiated in a different month in the prior six months.

We take the simple average of the subquintile returns as the monthly return of the Ana6 quintile. Because the earnings forecast data start in January 1976, the Ana portfolios start in February 1976.

B.5.27 Tan, Tangibility

Following Hahn and Lee (2009), we measure tangibility, Tan, as cash holdings (Compustat annual item CHE) + 0.715 $\times$ accounts receivable (item RECT) + 0.547 $\times$ inventory (item INVT) + 0.535 $\times$ gross property, plant, and equipment (item PPEGT), all scaled by total assets (item AT). At the end of June of each year t, we sort stocks into deciles on Tan for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.28 Tan$^{\mathrm{q}}$1, Tan$^{\mathrm{q}}$6, and Tan$^{\mathrm{q}}$12, Quarterly Tangibility

Tan$^{\mathrm{q}}$ is cash holdings (Compustat quarterly item CHEQ) + 0.715 $\times$ accounts receivable (item RECTQ) + 0.547 $\times$ inventory (item INVTQ) + 0.535 $\times$ gross property, plant, and equipment (item PPEGTQ), all scaled by total assets (item ATQ). At the beginning of each month t, we sort stocks into deciles based on Tan$^{\mathrm{q}}$ for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t (Tan$^{\mathrm{q}}$1), from month t to $t+5$ (Tan$^{\mathrm{q}}$6), and from month t to $t+11$ (Tan$^{\mathrm{q}}$12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Tan$^{\mathrm{q}}$6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Tan$^{\mathrm{q}}$6 decile. For sufficient data coverage, the Tan$^{\mathrm{q}}$ portfolios start in January 1972.

B.5.29 Rer, Industry-adjusted Real Estate Ratio

Following Tuzel (2010), we measure the real estate ratio as the sum of buildings (Compustat annual item PPENB) and capital leases (item PPENLS) divided by net property, plant, and equipment (item PPENT) prior to 1983. From 1984 onward, the real estate ratio is the sum of buildings at cost (item FATB) and leases at cost (item FATL) divided by gross property, plant, and equipment (item PPEGT). Industry-adjusted real estate ratio, Rer, is the real estate ratio minus its industry average. Industries are defined by two-digit SIC codes. To alleviate the impact of outliers, we winsorize the real estate ratio at the 1st and 99th percentiles of its distribution each year before computing Rer. Following Tuzel (2010), we exclude industries with fewer than five firms. At the end of June of each year t, we sort stocks into deciles based on Rer for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of t+1. Because the real estate data start in 1969, the Rer portfolios start in July 1970.

B.5.30 Kz, Financial Constraints (the Kaplan-Zingales Index)

Following Lamont, Polk, and Saa-Requejo (2001), we construct the Kaplan-Zingales index, Kz, as:

$$\mathrm{Kz}_{it} \equiv -1.002\times\frac{\mathrm{CF}_{it}}{\mathrm{K}_{it-1}}+0.283\times\mathrm{Q}_{it}+3.139\times\frac{\mathrm{Debt}_{it}}{\text{Total Capital}_{it}}-39.368\times\frac{\mathrm{Dividends}_{it}}{\mathrm{K}_{it-1}}-1.315\times\frac{\mathrm{Cash}_{it}}{\mathrm{K}_{it-1}}, \tag{B27}$$

in which CF_{it} is firm i's cash flows in year t, measured as income before extraordinary items (Compustat annual item IB) plus depreciation and amortization (item DP). K_{it-1} is net property, plant, and equipment (item PPENT) at the end of year $t-1$. Q_{it} is Tobin's Q, measured as total assets (item AT) plus the December-end market equity (from CRSP), minus book equity (item CEQ), and minus deferred taxes (item TXDB), scaled by total assets. Debt_{it} is the sum of short-term debt (item DLC) and long-term debt (item DLTT). TotalCapital_{it} is the sum of total debt and stockholders' equity (item SEQ). Dividends_{it} is total dividends (item DVC plus item DVP). Cash_{it} is cash holdings (item CHE). At the end of June of each year t, we sort stocks into deciles based on Kz for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.31 Kz$^{\text{q}}$1, Kz$^{\text{q}}$6, and Kz$^{\text{q}}$12, Quarterly Kaplan-Zingales Index

We construct the quarterly Kaplan-Zingales index, Kz^{q}, as:

$$\text{Kz}^{\text{q}}_{it} \equiv -1.002\frac{\text{CF}^{\text{q}}_{it}}{\text{K}^{\text{q}}_{it-1}} + 0.283\text{Q}^{\text{q}}_{it} + 3.139\frac{\text{Debt}^{\text{q}}_{it}}{\text{Total Capital}^{\text{q}}_{it}} - 39.368\frac{\text{Dividends}^{\text{q}}_{it}}{\text{K}^{\text{q}}_{it-1}} - 1.315\frac{\text{Cash}^{\text{q}}_{it}}{\text{K}^{\text{q}}_{it-1}}, \quad \text{(B28)}$$

in which $\text{CF}^{\text{q}}_{it}$ is firm i's trailing four-quarter total cash flows from quarter $t-3$ to t. Quarterly cash flows are measured as income before extraordinary items (Compustat quarterly item IBQ) plus depreciation and amortization (item DPQ). $\text{K}^{\text{q}}_{it-1}$ is net property, plant, and equipment (item PPENTQ) at the end of quarter $t-1$. Q^{q}_{it} is Tobin's Q, measured as total assets (item ATQ) plus the fiscal-quarter-end market equity (from CRSP), minus book equity (item CEQQ), and minus deferred taxes (item TXDBQ, zero if missing), scaled by total assets. $\text{Debt}^{\text{q}}_{it}$ is the sum of short-term debt (item DLCQ) and long-term debt (item DLTTQ). $\text{TotalCapital}^{\text{q}}_{it}$ is the sum of total debt and stockholders' equity (item SEQQ). $\text{Dividends}^{\text{q}}_{it}$ is the total dividends (item DVPSXQ times item CSHOQ), accumulated over the past four quarters from $t-3$ to t.

At the beginning of each month t, we sort stocks into deciles based on Kz^{q} for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t ($\text{Kz}^{\text{q}}1$), from month t to $t+5$ ($\text{Kz}^{\text{q}}6$), and from month t to $t+11$ ($\text{Kz}^{\text{q}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, $\text{Kz}^{\text{q}}6$, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\text{Kz}^{\text{q}}6$ decile. For sufficient data coverage, the Kz^{q} portfolios start in January 1977.

B.5.32 Ww, Financial Constraints (the Whited-Wu Index)

Following Whited and Wu (2006, Equation 13), we construct the Whited-Wu index, Ww, as:

$$\text{Ww}_{it} \equiv -0.091\text{CF}_{it} - 0.062\text{DIVPOS}_{it} + 0.021\text{TLTD}_{it} - 0.044\text{LNTA}_{it} + 0.102\text{ISG}_{it} - 0.035\text{SG}_{it}, \quad \text{(B29)}$$

in which CF_{it} is the ratio of firm i's cash flows in year t scaled by total assets (Compustat annual item AT) at the end of t. Cash flows are measured as income before extraordinary items (item IB) plus depreciation and amortization (item DP). DIVPOS_{it} is an indicator that takes the value of one if the firm pays cash dividends (item DVPSX), and zero otherwise. TLTD_{it} is the ratio of the long-term debt (item DLTT) to total assets. LNTA_{it} is the natural log of total assets. ISG_{it} is the firm's industry sales growth, computed as the sum of current sales (item SALE) across all firms in the industry divided by the sum of one-year-lagged sales minus one. Industries are defined by three-digit SIC codes and we exclude industries with fewer than two firms. SG_{it} is the firm's annual growth in sales. Because the coefficients in equation (B29) were estimated with quarterly accounting data in Whited and Wu (2006), we convert annual cash flow and sales growth rates into quarterly terms. Specifically, we divide CF_{it} by four and use the compounded quarterly growth for sales ($(1+\text{ISG}_{it})^{1/4}-1$ and $(1+\text{SG}_{it})^{1/4}-1$). At the end of June of each year t, we split stocks into deciles based on Ww for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.33 Ww$^{\text{q}}$1, Ww$^{\text{q}}$6, and Ww$^{\text{q}}$12, the Quarterly Whited-Wu Index

We construct the quarterly Whited-Wu index, Ww$^{\text{q}}$, as:

$$\text{Ww}^{\text{q}}_{it} \equiv -0.091\text{CF}^{\text{q}}_{it} - 0.062\text{DIVPOS}^{\text{q}}_{it} + 0.021\text{TLTD}^{\text{q}}_{it} - 0.044\text{LNTA}^{\text{q}}_{it} + 0.102\text{ISG}^{\text{q}}_{it} - 0.035\text{SG}^{\text{q}}_{it}, \tag{B30}$$

in which $\text{CF}^{\text{q}}_{it}$ is the ratio of firm i's cash flows in quarter t scaled by total assets (Compustat quarterly item ATQ) at the end of t. Cash flows are measured as income before extraordinary items (item IBQ) plus depreciation and amortization (item DPQ). $\text{DIVPOS}^{\text{q}}_{it}$ is an indicator that takes the value of one if the firm pays cash dividends (item DVPSXQ), and zero otherwise. $\text{TLTD}^{\text{q}}_{it}$ is the ratio of the long-term debt (item DLTTQ) to total assets. $\text{LNTA}^{\text{q}}_{it}$ is the natural log of total assets. $\text{ISG}^{\text{q}}_{it}$ is the firm's industry sales growth, computed as the sum of current sales (item SALEQ) across all firms in the industry divided by the sum of one-quarter-lagged sales minus one. Industries are defined by three-digit SIC codes and we exclude industries with fewer than two firms. $\text{SG}^{\text{q}}_{it}$ is the firm's quarterly growth in sales.

At the beginning of each month t, we sort stocks into deciles based on Ww$^{\text{q}}$ for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t (Ww$^{\text{q}}$1), from month t to $t+5$ (Ww$^{\text{q}}$6), and from month t to $t+11$ (Ww$^{\text{q}}$12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Ww$^{\text{q}}$6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ww$^{\text{q}}$6 decile. For sufficient data coverage, the Ww$^{\text{q}}$ portfolios start in January 1972.

B.5.34 Sdd, Secured Debt-to-total Debt

Following Valta (2014), we measure secured debt-to-total debt, Sdd, as mortgages and other secured debt (Compustat annual item DM) divided by total debt. Total debt is debt in current liabilities (item DLC) plus long-term debt (item DLTT). At the end of June of each year t, we sort stocks into deciles based on Sdd for the fiscal year ending in calendar year $t-1$. Firms with no secured debt are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the data on secured debt start in 1981, the Sdd portfolios start in July 1982.

B.5.35 Cdd, Convertible Debt-to-total Debt

Following Valta (2014), we measure convertible debt-to-total debt, Cdd, as convertible debt (Compustat annual item DCVT) divided by total debt. Total debt is debt in current liabilities (item DLC) plus long-term debt (item DLTT). At the end of June of each year t, we sort stocks into deciles based on Cdd for the fiscal year ending in calendar year $t-1$. Firms with no convertible debt are excluded. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the data on convertible debt start in 1969, the Sdd portfolios start in July 1970.

B.5.36 Vcf1, Vcf6, and Vcf12, Cash Flow Volatility

Following Huang (2009), we measure cash flow volatility, Vcf, as the standard deviation of the ratio of operating cash flows to sales (Compustat quarterly item SALEQ) during the past 16 quarters (eight non-missing quarters minimum). Operating cash flows are income before extraordinary items (item IBQ) plus depreciation and amortization (item DPQ), and plus the change in working capital (item WCAPQ) from the last quarter. At the beginning of each month t, we sort stocks into deciles based on Vcf for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t (Vcf1), from month t to $t+5$ (Vcf6), and from month t to $t+11$ (Vcf12). The deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Vcf6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Vcf6 decile. For sufficient data coverage, the Vcf portfolios start in January 1978.

B.5.37 Cta1, Cta6, and Cta12, Cash-to-assets

Following Palazzo (2012), we measure cash-to-assets, Cta, as cash holdings (Compustat quarterly item CHEQ) scaled by total assets (item ATQ). At the beginning of each month t, we sort stocks into deciles based on Cta from the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t (Cta1), from month t to $t+5$ (Cta6), and from month t to $t+11$ (Cta12), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, Cta6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Cta6 decile. For sufficient data coverage, the Cta portfolios start in January 1972.

B.5.38 Gind, Corporate Governance

The data for Gompers, Ishii, and Metrick's (2003) firm-level corporate governance index (Gind, from September 1990 to December 2006) are from Andrew Metrick's Web site. Following Gompers et al. (Table VI), we use the following breakpoints to form the Gind portfolios: Gind $\leq$ $5, 6, 7, 8, 9, 10, 11, 12, 13$, and ≥ 14. Firms with dual share classes are excluded. We rebalance the portfolios in the months immediately following each publication of Gind, and calculate monthly portfolio returns between two adjacent publication dates. The first months following the publication dates are September 1990, July 1993, July 1995, February 1998, November 1999, January 2002, January 2004, and January 2006. The sample period for the Gind portfolios is from September 1990 to December 2006.

B.5.39 Acq, Accrual Quality

Following Francis, Lafond, Olsson, and Schipper (2005), we estimate accrual quality (Acq) with the following cross-sectional regression:

$$\mathrm{TCA}_{it} = \phi_{0,i} + \phi_{1,i}\mathrm{CFO}_{it-1} + \phi_{2,i}\mathrm{CFO}_{it} + \phi_{3,i}\mathrm{CFO}_{it+1} + \phi_{4,i}\mathrm{dREV}_{it} + \phi_{5,i}\mathrm{PPE}_{it} + v_{it}, \quad \text{(B31)}$$

in which TCA_{it} is firm i's total current accruals in year t, CFO_{it} is cash flow from operations, dREV_{it} is change in revenues (Compustat annual item SALE) from $t-1$ to t, and PPE_{it} is gross property, plant, and equipment (item PPEGT). $\text{TCA}_{it} = \text{dCA}_{it} - \text{dCL}_{it} - \text{dCASH}_{it} + \text{dSTDEBT}_{it}$, in which dCA_{it} is the change in current assets (item ACT) from year $t-1$ to t, dCL_{it} is the change in current liabilities (item LCT), dCASH_{it} is the change in cash (item CHE), and dSTDEBT_{it} is the change in debt in current liabilities (item DLC). $\text{CFO}_{it} = \text{NIBE}_{it} - (\text{dCA}_{it} - \text{dCL}_{it} - \text{dCASH}_{it} + \text{dSTDEBT}_{it} - \text{DEPN}_{it})$, in which NIBE_{it} is income before extraordinary items (item IB), and DEPN_{it} is depreciation and amortization expense (item DP). All variables are scaled by the average of total assets in t and $t-1$.

We estimate annual cross-sectional regressions in equation (B31) for each of FF (1997) 48 industries (excluding four financial industries) with at least 20 firms in year t. We winsorize the regressors at the 1st and 99th percentiles of their distributions each year. The annual cross-sectional regressions yield firm- and year-specific residuals, v_{it}. We measure accrual quality of firm i, $\text{Acq}_i = \sigma(v_i)$, as the standard deviation of firm i's residuals during the past five years from $t-4$ to t. For a firm to be included in our portfolio, its residual has to be available for all five years.

At the end of June of each year t, we sort stocks into deciles based on Acq for the fiscal year ending in calendar year $t-2$. To avoid look-ahead bias, we do not sort on Acq for the fiscal year ending in $t-1$, because the regression in equation (B31) requires the next year's CFO. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.40 Eper and Eprd, Earnings Persistence, Earnings Predictability

Following Francis, Lafond, Olsson, and Schipper (2004), we estimate earnings persistence, Eper, and earnings predictability, Eprd, from a first-order autoregressive model for annual split-adjusted earnings per share (Compustat annual item EPSPX divided by item AJEX). At the end of June of each year t, we estimate the autoregressive model in the ten-year rolling window up to the fiscal year ending in calendar year $t-1$. Only firms with a complete ten-year history are included. Eper is measured as the slope coefficient and Eprd is measured as the residual volatility. We sort stocks into deciles based on Eper, and separately, on Eper. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.41 Esm, Earnings Smoothness

Following Francis, Lafond, Olsson, and Schipper (2004), we measure earnings smoothness, Esm, as the ratio of the standard deviation of earnings (Compustat annual item IB) scaled by one-year-lagged total assets (item AT) to the standard deviation of cash flow from operations scaled by one-year-lagged total assets. Cash flow from operations is income before extraordinary items minus operating accruals. We measure operating accruals as the one-year change in current assets (item ACT) minus the change in current liabilities (item LCT), minus the change in cash (item CHE), plus the change in debt in current liabilities (item DLC), and minus depreciation and amortization (item DP). At the end of June of each year t, we sort stocks into deciles based on Esm, calculated over the ten-year rolling window up to the fiscal year ending in calendar year $t-1$. Only firms with a complete ten-year history are included. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.42 Evr, Value Relevance of Earnings

Following Francis, Lafond, Olsson, and Schipper (2004), we measure value relevance of earnings, Evr, as the R^2 from the following rolling-window regression:

$$R_{it} = \delta_{i0} + \delta_{i1}\,\mathrm{EARN}_{it} + \delta_{i2}\,\mathrm{dEARN}_{it} + \epsilon_{it}, \tag{B32}$$

in which R_{it} is firm i's 15-month stock return ending three months after the end of fiscal year ending in calendar year t. EARN_{it} is earnings (Compustat annual item IB) for the fiscal year ending in t, scaled by the fiscal year-end market equity (from CRSP). dEARN_{it} is the one-year change in earnings scaled by the market equity. For firms with more than one share class, we merge the market equity for all share classes. At the end of June of each year t, we split stocks into deciles on Evr, calculated over the ten-year rolling window up to the fiscal year ending in calendar year $t-1$. Only firms with a complete ten-year history are included. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.43 Etl and Ecs, Earnings Timeliness, Earnings Conservatism

Following Francis, Lafond, Olsson, and Schipper (2004), we measure earnings timeliness, Etl, and earnings conservatism, Ecs, from the following rolling-window regression:

$$\mathrm{EARN}_{it} = \alpha_{i0} + \alpha_{i1}\,\mathrm{NEG}_{it} + \beta_{i1}R_{it} + \beta_{i2}\mathrm{NEG}_{it}R_{it} + e_{it}, \tag{B33}$$

in which EARN_{it} is earnings (Compustat annual item IB) for the fiscal year ending in calendar year t, scaled by the fiscal year-end market equity. R_{it} is firm i's 15-month stock return ending three months after the end of fiscal year ending in calendar year t. NEG_{it} equals one if $R_{it} < 0$, and zero otherwise. For firms with more than one share class, we merge the market equity for all share classes. We measure Etl as the R^2 and Ecs as $(\beta_{i1} + \beta_{i2})/\beta_{i1}$ from the regression in (B33). At the end of June of each year t, we sort stocks into deciles based on Etl, and separately, on Ecs, both of which are calculated over the ten-year rolling window up to the fiscal year ending in calendar year $t-1$. Only firms with a complete ten-year history are included. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.44 Frm and Fra, Pension Plan Funding Rate

Following Franzoni and Martin (2006), we define market pension plan funding rates as (PA $-$ PO)/ME (denoted Frm) and (PA $-$ PO)/AT (denoted Fra), in which PA is the fair value of pension plan assets, PO is the projected benefit obligation, ME is the market equity, and AT is total assets (Compustat annual item AT). Between 1980 and 1997, PA is measured as the sum of overfunded pension plan assets (item PPLAO) and underfunded pension plan assets (item PPLAU), and PO is the sum of overfunded pension obligation (item PBPRO) and underfunded pension obligation (item PBPRU). When the above data are not available, we also measure PA as pension benefits (item PBNAA) and PO as the present value of vested benefits (item PBNVV) from 1980 to 1986. Starting from 1998, firms are not required to report separate items for overfunded and underfunded plans, and Compustat collapses PA and PO into corresponding items reserved previously for overfunded plans (item PPLAO and item PBPRO). ME is from CRSP measured at the end of December. For firms with more than one share class, we merge the market equity for all share classes.

At the end of June of each year t, we split stocks into deciles on Frm, and separately, on Fra, both of which are for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the pension data start in 1980, the Frm and Fra portfolios start in July 1981.

B.5.45 Ala and Alm, Asset Liquidity

Following Ortiz-Molina and Phillips (2014), we measure asset liquidity as cash + 0.75 × noncash current assets + 0.50 × tangible fixed assets. Cash is cash and short-term investments (Compustat annual item CHE). Noncash current assets is current assets (item ACT) minus cash. Tangible fixed assets is total assets (item AT) minus current assets (item ACT), minus goodwill (item GDWL, zero if missing), and minus intangibles (item INTAN, zero if missing). Ala is asset liquidity scaled by one-year-lagged total assets. Alm is asset liquidity scaled by one-year-lagged market value of assets. Market value of assets is total assets plus market equity (item PRCC_F times item CSHO) minus book equity (item CEQ). At the end of June of each year t, we sort stocks into deciles based on Ala, and separately, on Alm, both of which are for the fiscal year ending in calendar year $t-1$. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.5.46 Ala^{q}1, Ala^{q}6, Ala^{q}12, Alm^{q}1, Alm^{q}6, and Alm^{q}12, Quarterly Asset Liquidity

We measure quarterly asset liquidity as cash + 0.75 × noncash current assets + 0.50 × tangible fixed assets. Cash is cash and short-term investments (Compustat quarterly item CHEQ). Noncash current assets is current assets (item ACTQ) minus cash. Tangible fixed assets is total assets (item ATQ) minus current assets (item ACTQ), minus goodwill (item GDWLQ, zero if missing), and minus intangibles (item INTANQ, zero if missing). Ala^q is quarterly asset liquidity scaled by one-quarter-lagged total assets. Alm^q is quarterly asset liquidity scaled by one-quarter-lagged market value of assets. Market value of assets is total assets plus market equity (item PRCCQ times item CSHOQ) minus book equity (item CEQQ).

At the beginning of each month t, we sort stocks into deciles based on Ala^q, and separately, on Alm^q for the fiscal quarter ending at least four months ago. Monthly decile returns are calculated for the current month t (Ala^{q}1 and Alm^{q}1), from month t to $t+5$ (Ala^{q}6 and Alm^{q}6), and from month t to $t+11$ (Ala^{q}12 and Alm^{q}12). The deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Ala^{q}6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ala^{q}6 decile. For sufficient data coverage, the quarterly asset liquidity portfolios start in January 1976.

B.5.47 Dls1, Dls6, and Dls12, Disparity between Long- and Short-term Earnings Growth Forecasts

Following Da and Warachka (2011), we measure the implied short-term earnings growth forecast as $100 \times (A1_t - A0_t)/|A0_t|$, in which $A1_t$ is analysts' consensus median forecast (IBES unadjusted file, item MEDEST) for the current fiscal year (fiscal period indicator = 1), and $A0_t$ is the actual earnings per share for the latest reported fiscal year (item FY0A, measure indictor ='EPS'). We require both earnings forecasts and actual earnings to be denominated in US dollars (currency code = USD). The disparity between long- and short-term earnings growth forecasts, Dls, is analysts' consensus median forecast of the long-term earnings growth (item MEDEST, fiscal period indictor = 0) minus the implied short-term earnings growth forecast.

At the beginning of each month t, we sort stocks into deciles based on Dls computed with analyst forecasts reported in $t-1$. Monthly decile returns are calculated for the current month t (Dls1), from month t to $t+5$ (Dls6), and from month t to $t+11$ (Dls12), and the deciles are rebalanced at the beginning of $t+1$. The holding period longer than one month as in, for instance, Dls6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Dls6 decile. Because the long-term growth forecast data start in December 1981, the deciles start in January 1982.

B.5.48 Dis1, Dis6, and Dis12, Dispersion in Analyst Forecasts

Following Diether, Malloy, and Scherbina (2002), we measure dispersion in analyst earnings forecasts, Dis, as the ratio of the standard deviation of earnings forecasts (IBES unadjusted file, item STDEV) to the absolute value of the consensus mean forecast (unadjusted file, item MEANEST). We use the earnings forecasts for the current fiscal year (fiscal period indicator = 1) and we require them to be denominated in US dollars (currency code = USD). Stocks with a mean forecast of zero are assigned to the highest dispersion group. Firms with fewer than two forecasts are excluded. At the beginning of each month t, we sort stocks into deciles based on Dis computed with analyst forecasts reported in month $t-1$. Monthly decile returns are calculated for the current month t (Dis1), from month t to $t+5$ (Dis6), and from month t to $t+11$ (Dis12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Dis6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Dis6 decile. Because the analyst forecasts data start in January 1976, the Dis portfolios start in February 1976.

B.5.49 Dlg1, Dlg6, and Dlg12, Dispersion in Analyst Long-term Growth Forecasts

Following Anderson, Ghysels, and Juergens (2005), we measure dispersion in analyst long-term growth forecasts, Dlg, as the standard deviation of the long-term earnings growth rate forecasts from IBES (item STDEV, fiscal period indicator = 0). Firms with fewer than two forecasts are excluded. At the beginning of each month t, we sort stocks into deciles based on Dlg reported in month $t-1$. Monthly decile returns are calculated for the current month t (Dlg1), from month t to $t+5$ (Dlg6), and from month t to $t+11$ (Dlg12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Dlg6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Dlg6 decile. Because the long-term growth forecast data start in December 1981, the Dlg portfolios start in January 1982.

B.5.50 $R^1_{\rm a}$, $R^1_{\rm n}$, $R^{[2,5]}_{\rm a}$, $R^{[2,5]}_{\rm n}$, $R^{[6,10]}_{\rm a}$, $R^{[6,10]}_{\rm n}$, $R^{[11,15]}_{\rm a}$, $R^{[11,15]}_{\rm n}$, $R^{[16,20]}_{\rm a}$, and $R^{[16,20]}_{\rm n}$, Seasonality

Following Heston and Sadka (2008), at the beginning of each month t, we sort stocks into deciles based on various measures of past performance, including returns in month $t-12$ ($R^1_{\rm a}$), average returns from month $t-11$ to $t-1$ ($R^1_{\rm n}$), average returns across months $t-24, t-36, t-48$, and $t-60$ ($R^{[2,5]}_{\rm a}$), average returns from month $t-60$ to $t-13$ except for lags 24, 36, 48, and 60 ($R^{[2,5]}_{\rm n}$), average returns across months $t-72, t-84, t-96, t-108$, and $t-120$ ($R^{[6,10]}_{\rm a}$), average returns from month $t-120$ to $t-61$ except for lags 72, 84, 96, 108, and 120 ($R^{[6,10]}_{\rm n}$), average returns across months $t-132, t-144, t-156, t-168$, and $t-180$ ($R_{\mathrm{a}}^{[11,15]}$), average returns from month $t-180$ to $t-121$ except for lags 132, 144, 156, 168, and 180 ($R_{\mathrm{n}}^{[11,15]}$), average returns across months $t-192, t-204, t-216, t-228$, and $t-240$ ($R_{\mathrm{a}}^{[16,20]}$), average returns from month $t-240$ to $t-181$ except for lags 192, 204, 216, 228, and 240 ($R_{\mathrm{n}}^{[16,20]}$). Monthly decile returns are calculated for the current month t, and the deciles are rebalanced at the beginning of month $t+1$.

B.5.51 Ob, Order backlog

At the end of June of each year t, we sort stocks into deciles based on order backlog, Ob (Compustat annual item OB) for the fiscal year ending in calendar year $t-1$, scaled by the average of total assets (item AT) from the fiscal years ending in $t-2$ and $t-1$. Firms with no order backlog are excluded (most of them never have any order backlog). Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$. Because the order backlog data start in 1970, the Ob portfolios start in July 1971.

B.6 Trading frictions

B.6.1 Me, Market Equity

Market equity, Me, is price times shares outstanding from CRSP. At the end of June of each year t, we sort stocks into deciles based on the June-end Me. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced in June of $t+1$.

B.6.2 Iv, Idiosyncratic Volatility

Following Ali, Hwang, and Trombley (2003), at the end of June of each year t, we sort stocks into deciles based on idiosyncratic volatility, Iv, which is the residual volatility from regressing a stock's daily excess returns on the market excess return over the prior one year from July of year $t-1$ to June of t. We require a minimum of 100 daily returns when estimating Iv. Monthly decile returns are calculated from July of year t to June of $t+1$, and the deciles are rebalanced at the end of June of year $t+1$.

B.6.3 Ivff1, Ivff6, and Ivff12, Idiosyncratic Volatility per the FF 3-factor Model

Following Ang, Hodrick, Xing, and Zhang (2006), we calculate idiosyncratic volatility relative to the Fama-French three-factor model, Ivff, as the residual volatility from regressing a stock's excess returns on the Fama-French three factors. At the beginning of each month t, we sort stocks into deciles based on the Ivff estimated with daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Ivff1), from month t to $t+5$ (Ivff6), and from month t to $t+11$ (Ivff12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Ivff6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Ivff6 decile.

B.6.4 Ivc1, Ivc6, and Ivc12, Idiosyncratic Volatility per the CAPM

We calculate idiosyncratic volatility per the CAPM, Ivc, as the residual volatility from regressing a stock's excess returns on the value-weighted market excess return. At the beginning of each month

t, we sort stocks into deciles based on the Ivc estimated with daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Ivc1), from month t to $t+5$ (Ivc6), and from month t to $t+11$ (Ivc12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Ivc6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Ivc6 decile.

B.6.5 Ivq1, Ivq6, and Ivq12, Idiosyncratic Volatility per the q-factor Model

We calculate idiosyncratic volatility per the q-factor model, Ivq, as the residual volatility from regressing a stock's excess returns on the q-factors. At the beginning of each month t, we sort stocks into deciles based on the Ivq estimated with daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Ivq1), from month t to $t+5$ (Ivq6), and from month t to $t+11$ (Ivq12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Ivq6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Ivq6 decile. Because the q-factors start in January 1967, the Ivq portfolios start in February 1967.

B.6.6 Tv1, Tv6, and Tv12, Total Volatility

Following Ang, Hodrick, Xing, and Zhang (2006), at the beginning of each month t, we sort stocks into deciles based on total volatility, Tv, estimated as the volatility of a stock's daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t, (Tv1), from month t to $t+5$ (Tv6), and from month t to $t+11$ (Tv12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in, for instance, Tv6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdeciles returns as the monthly return of the Tv6 decile.

B.6.7 Sv1, Sv6, and Sv12, Systematic Volatility Risk

Following Ang, Hodrick, Xing, and Zhang (2006), we measure systematic volatility risk, Sv, as β^i_{dVXO} from the bivariate regression:

$$r^i_d = \beta^i_0 + \beta^i_{\mathrm{MKT}}\mathrm{MKT}_d + \beta^i_{\mathrm{dVXO}}\mathrm{dVXO}_d + \epsilon^i_d, \tag{B34}$$

in which r^i_d is stock i's excess return on day d, MKT_d is the market factor return, and dVXO_d is the aggregate volatility shock measured as the daily change in the Chicago Board Options Exchange S&P 100 volatility index (VXO). At the beginning of each month t, we sort stocks into deciles based on β^i_{dVXO} estimated with the daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Sv1), from month t to $t+5$ (Sv6), and from month t to $t+11$ (Sv12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period that is longer than one month as in Sv6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the Sv6 decile. Because the VXO data start in January 1986, the Sv portfolios start in February 1986.

B.6.8 β1, β6, and β12, Market Beta

At the beginning of each month t, we sort stocks into deciles on their market beta, β, which is estimated with monthly returns from month $t-60$ to $t-1$. We require a minimum of 24 monthly returns. Monthly decile returns are calculated for the current month t (β1), from month t to $t+5$ (β6), and from month t to $t+11$ (β12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in β6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the β6 decile.

B.6.9 β^{FP}1, β^{FP}6, and β^{FP}12, The Frazzini-Pedersen Beta

Following Frazzini and Pedersen (2013), we estimate the market beta for stock i, β^{FP}, as $\hat{\rho}\hat{\sigma}_i/\hat{\sigma}_m$, in which $\hat{\sigma}_i$ and $\hat{\sigma}_m$ are the estimated return volatilities for the stock and the market, and $\hat{\rho}$ is their return correlation. To estimate return volatilities, we compute the standard deviations of daily log returns over a one-year rolling window (with at least 120 daily returns). To estimate return correlations, we use overlapping three-day log returns, $r_{it}^{3d} = \sum_{k=0}^{2} \log(1 + r_{t+k}^{i})$, over a five-year rolling window (with at least 750 daily returns). At the beginning of each month t, we sort stocks into deciles based on β^{FP} estimated at the end of month $t-1$. Monthly decile returns are calculated for the current month t (β^{FP}1), from month t to $t+5$ (β^{FP}6), and from month t to $t+11$ (β^{FP}12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in β^{FP}6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the β^{FP}6 decile.

B.6.10 β^{D}1, β^{D}6, and β^{D}12, The Dimson Beta

Following Dimson (1979), we use the lead and the lag of the market return along with the current market return, when estimating the market beta:

$$r_{id} - r_{fd} = \alpha_i + \beta_{i1}(r_{md-1} - r_{fd-1}) + \beta_{i2}(r_{md} - r_{fd}) + \beta_{i3}(r_{md+1} - r_{fd+1}) + \epsilon_{id}, \tag{B35}$$

in which r_{id} is stock i's return on day d, r_{md} is the market return, and r_{fd} is the risk-free rate. The Dimson beta of stock i, β^{D}, is calculated as $\hat{\beta}_{i1} + \hat{\beta}_{i2} + \hat{\beta}_{i3}$. At the beginning of each month t, we sort stocks into deciles based on β^{D} estimated with the daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (β^{D}1), from month t to $t+5$ (β^{D}6), and from month t to $t+11$ (β^{D}12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in β^{D}6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six-month period. We take the simple average of the subdecile returns as the monthly return of the β^{D}6 decile.

B.6.11 Tur1, Tur6, and Tur12, Share Turnover

Following Datar, Naik, and Radcliffe (1998), we calculate a stock's share turnover, Tur, as its average daily share turnover over the prior six months. We require a minimum of 50 daily observations.

Daily turnover is the number of shares traded on a given day divided by the number of shares outstanding on that day.[8] At the beginning of each month t, we sort stocks into deciles based on Tur over the prior six months from $t-6$ to $t-1$. Monthly decile returns are calculated for the current month t (Tur1), from month t to $t+5$ (Tur6), and from month t to $t+11$ (Tur12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Tur6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Tur6 decile.

B.6.12 Cvt1, Cvt6, and Cvt12, Coefficient of Variation of Share Turnover

Following Chordia, Subrahmanyam, and Anshuman (2001), we calculate a stock's coefficient of variation (the ratio of the standard deviation to the mean) for its daily share turnover, Cvt, over the prior six months. We require a minimum of 50 daily observations. Daily turnover is the number of shares traded on a given day divided by the number of shares outstanding on that day. We adjust the trading volume of NASDAQ stocks per Gao and Ritter (2010) (see footnote 8). At the beginning of each month t, we sort stocks into deciles based on Cvt over the prior six months from $t-6$ to $t-1$. Monthly decile returns are calculated for the current month t (Cvt1), from month t to $t+5$ (Cvt6), and from month t to $t+11$ (Cvt12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Cvt6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Cvt6 decile.

B.6.13 Dtv1, Dtv6, and Dtv12, Dollar Trading Volume

At the beginning of each month t, we sort stocks into deciles based on their average daily dollar trading volume, Dtv, over the prior six months from $t-6$ to $t-1$. We require a minimum of 50 daily observations. Dollar trading volume is share price times the number of shares traded. We adjust the trading volume of NASDAQ stocks per Gao and Ritter (2010) (see footnote 8). Monthly decile returns are calculated for the current month t (Dtv1), from month t to $t+5$ (Dtv6), and from month t to $t+11$ (Dtv12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Dtv6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Dtv6 decile.

[8] We adjust the NASDAQ trading volume to account for the institutional differences between NASDAQ and NYSE-Amex volumes (Gao and Ritter 2010). Prior to February 1, 2001, we divide NASDAQ volume by two. This procedure adjusts for the practice of counting as trades both trades with market makers and trades among market makers. On February 1, 2001, according to the director of research of NASDAQ and Frank Hathaway (the chief economist of NASDAQ), a "riskless principal" rule goes into effect and results in a reduction of approximately 10% in reported volume. From February 1, 2001 to December 31, 2001, we thus divide NASDAQ volume by 1.8. During 2002, securities firms began to charge institutional investors commissions on NASDAQ trades, rather than the prior practice of marking up or down the net price. This practice results in a further reduction in reported volume of approximately 10%. For 2002 and 2003, we divide NASDAQ volume by 1.6. For 2004 and later years, in which the volume of NASDAQ (and NYSE) stocks has mostly been occurring on crossing networks and other venues, we use a divisor of 1.0.

B.6.14 Cvd1, Cvd6, and Cvd12, Coefficient of Variation of Dollar Trading Volume

Following Chordia, Subrahmanyam, and Anshuman (2001), we calculate a stock's coefficient of variation (the ratio of the standard deviation to the mean) for its daily dollar trading volume, Cvd, over the prior six months. We require a minimum of 50 daily observations. Dollar trading volume is share price times the number of shares. We adjust the trading volume of NASDAQ stocks per Gao and Ritter (2010) (see footnote 8). At the beginning of each month t, we sort stocks into deciles based on Cvd over the prior six months from $t-6$ to $t-1$. Monthly decile returns are calculated for the current month t (Cvd1), from month t to $t+5$ (Cvd6), and from month t to $t+11$ (Cvd12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Cvd6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Cvd6 decile.

B.6.15 Pps1, Pps6, and Pps12, Share Price

At the beginning of each month t, we sort stocks into deciles based on share price, Pps, at the end of month $t-1$. Monthly decile returns are calculated for the current month t (Pps1), from month t to $t+5$ (Pps6), and from month t to $t+11$ (Pps12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Pps6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Pps6 decile.

B.6.16 Ami1, Ami6, and Ami12, Absolute Return-to-volume

We calculate the Amihud (2002) illiquidity measure, Ami, as the ratio of absolute daily stock return to daily dollar trading volume, averaged over the prior six months. We require a minimum of 50 daily observations. Dollar trading volume is share price times the number of shares traded. We adjust the trading volume of NASDAQ stocks per Gao and Ritter (2010) (see footnote 8). At the beginning of each month t, we sort stocks into deciles based on Ami over the prior six months from $t-6$ to $t-1$. Monthly decile returns are calculated for the current month t (Ami1), from month t to $t+5$ (Ami6), and from month t to $t+11$ (Ami12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Ami6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Ami6 decile.

B.6.17 $\mathrm{Lm}^1 1$, $\mathrm{Lm}^1 6$, $\mathrm{Lm}^1 12$, $\mathrm{Lm}^6 1$, $\mathrm{Lm}^6 6$, $\mathrm{Lm}^6 12$, $\mathrm{Lm}^{12} 1$, $\mathrm{Lm}^{12} 6$, $\mathrm{Lm}^{12} 12$, Turnover-adjusted Number of Zero Daily Volume

Following Liu (2006), we calculate the standardized turnover-adjusted number of zero daily trading volume over the prior x month, Lm^x, as follows:

$$\mathrm{Lm}^x \equiv \left[\text{Number of zero daily volume in prior } x \text{ months} + \frac{1/(x\text{–month TO})}{\text{Deflator}}\right] \frac{21x}{\text{NoTD}}, \quad \text{(B36)}$$

in which x-month TO is the sum of daily turnover over the prior x months ($x = 1, 6$, and 12). Daily turnover is the number of shares traded on a given day divided by the number of shares outstanding on that day. We adjust the trading volume of NASDAQ stocks per Gao and Ritter (2010) (see footnote 8). NoTD is the total number of trading days over the prior x months. We set the deflator to $\max\{1/(x{-}\text{month TO})\}+1$, in which the maximization is taken across all sample stocks each month. Our choice of the deflator ensures that $(1/(x{-}\text{month TO}))/\text{Deflator}$ is between zero and one for all stocks. We require a minimum of 15 daily turnover observations when estimating Lm^1, 50 for Lm^6, and 100 for Lm^{12}.

At the beginning of each month t, we sort stocks into deciles based on Lm^x, with $x = 1, 6$, and 12. We calculate decile returns for the current month t (Lm^x1), from month t to $t+5$ (Lm^x6), and from month t to $t+11$ (Lm^x12). The deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Lm^x6 means that for a given decile in each month there exist six subdeciles, each initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Lm^x6 decile.

B.6.18 Mdr1, Mdr6, and Mdr12, Maximum Daily Return

At the beginning of each month t, we sort stocks into deciles based on maximal daily return, Mdr, in month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Mdr1), from month t to $t+5$ (Mdr6), and from month t to $t+11$ (Mdr12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in, for instance, Mdr6, means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdeciles returns as the monthly return of the Mdr6 decile.

B.6.19 Ts1, Ts6, and Ts12, Total Skewness

At the beginning of each month t, we sort stocks into deciles based on total skewness, Ts, calculated with daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Ts1), from month t to $t+5$ (Ts6), and from month t to $t+11$ (Ts12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Ts6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Ts6 decile.

B.6.20 Isc1, Isc6, and Isc12, Idiosyncratic Skewness per the CAPM

At the beginning of each month t, we sort stocks into deciles based on idiosyncratic skewness, Isc, calculated as the skewness of the residuals from regressing a stock's excess return on the market excess return using daily observations from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Isc1), from month t to $t+5$ (Isc6), and from month t to $t+11$ (Isc12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Isc6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Isc6 decile.

B.6.21 Isff1, Isff6, and Isff12, Idiosyncratic Skewness per the FF 3-factor Model

At the beginning of each month t, we sort stocks into deciles based on idiosyncratic skewness, Isff, calculated as the skewness of the residuals from regressing a stock's excess return on the Fama-

French three factors using daily observations from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Isff1), from month t to $t+5$ (Isff6), and from month t to $t+11$ (Isff12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Isff6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Isff6 decile.

B.6.22 Isq1, Isq6, and Isq12, Idiosyncratic Skewness per the q-factor Model

At the beginning of each month t, we sort stocks into deciles based on idiosyncratic skewness, Isq, calculated as the skewness of the residuals from regressing a stock's excess return on the q-factors using daily observations from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Isq1), from month t to $t+5$ (Isq6), and from month t to $t+11$ (Isq12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Isq6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Isq6 decile. Because the q-factors start in January 1967, the Ivq portfolios start in February 1967.

B.6.23 Cs1, Cs6, and Cs12, Coskewness

Following Harvey and Siddique (2000), we measure coskewness, Cs, as:

$$\mathrm{Cs} = \frac{E[\epsilon_i \epsilon_m^2]}{\sqrt{E[\epsilon_i^2]}E[\epsilon_m^2]}, \tag{B37}$$

in which ϵ_i is the residual from regressing stock i's excess return on the market excess return, and ϵ_m is the demeaned market excess return. At the beginning of each month t, we sort stocks into deciles based on Cs calculated with daily returns from month $t-1$. We require a minimum of 15 daily returns. Monthly decile returns are calculated for the current month t (Cs1), from month t to $t+5$ (Cs6), and from month t to $t+11$ (Cs12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Cs6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Cs6 decile.

B.6.24 Srev, Short-term Reversal

At the beginning of each month t, we sort stocks into short-term reversal (Srev) deciles based on the return in month $t-1$. To be included in a decile in month t, a stock must have a valid price at the end of month $t-2$ and a valid return for month $t-1$. Monthly decile returns are calculated for the current month t, and the deciles are rebalanced at the beginning of month $t+1$.

B.6.25 β^-1, β^-6, and β^-12, Downside Beta

Following Ang, Chen, and Xing (2006), we define downside beta, β^-, as:

$$\beta^- = \frac{\mathrm{Cov}(r_i, r_m | r_m < \mu_m)}{\mathrm{Var}(r_m | r_m < \mu_m)}, \tag{B38}$$

in which r_i is stock i's excess return r_m is the market excess return, and μ_m is the average market excess return. At the beginning of each month t, we sort stocks into deciles based on β^-, which is estimated with daily returns from prior 12 months from $t-12$ to $t-1$ (we only use daily observations with $r_m < \mu_m$). We require a minimum of 50 daily returns. Monthly decile returns are calculated for the current month t (β^-1), from month t to $t+5$ (β^-6), and from month t to $t+11$ (β^-12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in β^-6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the β^-6 decile.

B.6.26 Tail1, Tail6, and Tail12, Tail Risk

Following Kelly and Jiang (2014), we estimate common tail risk, λ_t, by pooling daily returns for all stocks in month t, as follows:

$$\lambda_t = \frac{1}{K_t}\sum_{k=1}^{K_t} \log \frac{R_{kt}}{\mu_t}, \tag{B39}$$

in which μ_t is the fifth percentile of all daily returns in month t, R_{kt} is the kth daily return that is below μ_t, and K_t is the total number of daily returns that are below μ_t. At the beginning of each month t, we split stocks on tail risk, Tail, estimated as the slope from regressing a stock's excess returns on one-month-lagged common tail risk over the most recent 120 months from $t-120$ to $t-1$. We require a minimum of least 36 monthly observations. Monthly decile returns are calculated for the current month t (Tail1), from month t to $t+5$ (Tail6), and from month t to $t+11$ (Tail12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Tail6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Tail6 decile.

B.6.27 β^{lcc}1, β^{lcc}6, β^{lcc}12, β^{lrc}1, β^{lrc}6, β^{lrc}12, β^{lcr}1, β^{lcr}6, and β^{lcr}12, Liquidity Betas (Illiquidity-illiquidity, Return-illiquidity, and Illiquidity-return)

Following Acharya and Pedersen (2005), we measure illiquidity using the Amihud (2002) measure, Ami. For stock i in month t, Ami_t^i is the average ratio of absolute daily return to daily dollar trading volume. We require a minimum of 15 daily observations. Dollar trading volume is share price times the number of shares traded. We adjust the trading volume of NASDAQ stocks per Gao and Ritter (2010) (see footnote 8). The Market illiquidity, Ami_t^M, is the value-weighted average of $\min(\mathrm{Ami}_t^i, (30-0.25)/(0.30P_{t-1}^M))$, in which P_{t-1}^M is the ratio of the total market capitalization of S&P 500 at the end of month $t-1$ to its value at the end of July 1962. We measure market illiquidity innovations, ϵ_{Mt}^c, as the residual from the regression below:

$$(0.25+0.30\mathrm{Ami}_t^M P_{t-1}^M) = a_0 + a_1(0.25+0.30\mathrm{Ami}_{t-1}^M P_{t-1}^M) + a_2(0.25+0.30\mathrm{Ami}_{t-2}^M P_{t-1}^M) + \epsilon_{Mt}^c \tag{B40}$$

Innovations to individual stocks' illiquidity, ϵ_{it}^c, are measured analogously by replacing Ami^M with $\min(\mathrm{Ami}_t^i, (30-0.25)/(0.30P_{t-1}^M))$ in equation (B40). Finally, innovations to the market return are measured as the residual, ϵ_{Mt}^r, from the second-order autoregression of the market return. Following

Acharya and Pedersen, we define three measures of liquidity betas:

$$\text{Illiquidity} - \text{illiquidity}: \qquad \beta_i^{\text{lcc}} \equiv \frac{\text{Cov}(\epsilon_{it}^c, \epsilon_{Mt}^c)}{\text{var}(\epsilon_{Mt}^r - \epsilon_{Mt}^c)} \tag{B41}$$

$$\text{Return} - \text{illiquidity}: \qquad \beta_i^{\text{lrc}} \equiv \frac{\text{Cov}(r_{it}, \epsilon_{Mt}^c)}{\text{var}(\epsilon_{Mt}^r - \epsilon_{Mt}^c)} \tag{B42}$$

$$\text{Illiquidity} - \text{return}: \qquad \beta_i^{\text{lcr}} \equiv \frac{\text{Cov}(\epsilon_{it}^c, \epsilon_{Mt}^r)}{\text{var}(\epsilon_{Mt}^r - \epsilon_{Mt}^c)} \tag{B43}$$

At the beginning of each month t, we sort stocks, separately, on β^{lcc}, β^{lrc}, and β^{lcr}, estimated with the past 60 months (at least 24 months) from $t-60$ to $t-1$. Monthly decile returns are calculated for the current month t ($\beta^{\text{lcc}}1$, $\beta^{\text{lrc}}1$, and $\beta^{\text{lcr}}1$), from month t to $t+5$ ($\beta^{\text{lcc}}6$, $\beta^{\text{lrc}}6$, and $\beta^{\text{lcr}}6$), and from month t to $t+11$ ($\beta^{\text{lcc}}12$, $\beta^{\text{lrc}}12$, and $\beta^{\text{lcr}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in $\beta^{\text{lcc}}6$ means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\beta^{\text{lcc}}6$ decile.

B.6.28 Shl1, Shl6, and Shl12, The High-low Bid-ask Spread Estimator

The monthly Corwin and Shultz (2012) stock-level bid-ask spread estimator, Shl, are obtained from Shane Corwin's Web site. At the beginning of each month t, we sort stocks into deciles based on Shl for month $t-1$. Monthly decile returns are calculated for the current month t (Shl1), from month t to $t+5$ (Shl6), and from month t to $t+11$ (Shl12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Shl6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Shl6 decile.

B.6.29 Sba1, Sba6, and Sba12, Bid-ask Spread

The monthly Hou and Loh (2015) stock-level bid-ask spread, Sba, are provided by Roger Loh for the sample period from 1984 to 2012 (excluding 1986 due to missing data). At the beginning of each month t, we sort stocks into deciles based on Sba for month $t-1$. Monthly decile returns are calculated for the current month t (Sba1), from month t to $t+5$ (Sba6), and from month t to $t+11$ (Sba12), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in Sba6 means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the Sba6 decile. The sample period for the Sba portfolios is from February 1984 to January 2013 (excluding February 1986 to January 1987).

B.6.30 $\beta^{\text{Lev}}1$, $\beta^{\text{Lev}}6$, and $\beta^{\text{Lev}}12$, The Leverage Beta

At the beginning of each quarter, we estimate a stock's financial intermediary leverage beta, β^{Lev}, from regressing its quarterly returns in excess of the three-month Treasury bill rate on the quarterly non-traded leverage factor during the past 40 quarters (20 quarters minimum). Following Adrian, Etula, and Muir (2014), we construct the leverage of financial intermediary using quarterly aggregate data on total financial assets and liabilities of security broker-dealers from Table L.129

of the Federal Reserve Flow of Funds. To be consistent with the original data used by Adrian et al., we combine the repurchase agreement (repo) liabilities and the reverse repo assets into net repo liabilities. The financial intermediary leverage is measured as total financial assets/(total financial assets $-$ total financial liabilities). The non-traded leverage factor is the seasonally adjusted log change in the level of leverage. The log changes are seasonally adjusted using quarterly seasonal dummies in expanding window regressions. Following Adrian et al., we start using the security broker-dealer data in the first quarter of 1968. The three-month Treasury bill rate data are from the Federal Reserve Bank database.

At the beginning of each month t, we sort stocks into deciles based on β^{Lev} estimated at the beginning of the current quarter. Monthly decile returns are calculated for the current month t ($\beta^{\text{Lev}}1$), from month t to $t+5$ ($\beta^{\text{Lev}}6$), and from month t to $t+11$ ($\beta^{\text{Lev}}12$), and the deciles are rebalanced at the beginning of month $t+1$. The holding period longer than one month as in $\beta^{\text{Lev}}6$ means that for a given decile in each month there exist six subdeciles, each of which is initiated in a different month in the prior six months. We take the simple average of the subdecile returns as the monthly return of the $\beta^{\text{Lev}}6$ decile. Because the financial intermediary leverage data start in 1968 and we need at least 20 quarters to estimate β^{Lev}, the β^{Lev} portfolios start in January 1973.