Anomalies Enhanced: The Value of Higher Frequency Information

Yufeng Han
University of Colorado Denver

and

Dayong Huang
University of North Carolina at Greensboro

and

Guofu Zhou

Washington University in St. Louis*

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*Yufeng Han, The Business School, University of Colorado Denver, Denver, CO 80217, yufeng.han@ucdenver.edu; Dayong Huang, Bryan School of Business, University of North Carolina at Greensboro, Greensboro, NC 27402, d_huang@uncg.edu; Guofu Zhou, Olin Business School, Washington University in St. Louis, St. Louis, MO 63130, zhou@wustl.edu. We are grateful to Bon Balvers, Dashan Huang, Fuwei Jiang, Matthew Ringgenberg and seminar participants at Shanghai Advanced Institute of Finance, Southwestern University of Finance and Economics, and Washington University in St. Louis for very helpful comments.

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Abstract

Many anomalies are based on low frequency attributes, such as annual characteristics, that ignore higher frequency information. In this paper, we provide a simple strategy to incorporate the higher frequency information. We find that there is significant economic value-added. For eight major anomalies, we find that the enhanced anomalies can double the average returns while having similar or lower risks. The results are robust to a number of controls.

JEL Classification: G11, G23

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I Introduction

A fundamental problem in finance is to explain why different assets have different returns. Anomalies are those return patterns that cannot be explained by known theories. The study of anomalies not only helps to understand limitation of existing theories, but also serves as inspirations for developing new models. One common feature of many anomalies is that they are formed based on low frequency information. For example, annual accounting information is used to construct eight of the major anomalies: the book-to-market ratio anomaly of Fama and French (1996, 2008), the operating profit anomaly of Fama and French (2015), the gross profitability anomaly of Novy-Marx (2013), the asset growth anomaly of Cooper, Gulen, and Schill (2008), the investment growth anomaly of Xing (2008), the net stock issue anomaly of Ritter (1991), the accrual anomaly examined in Sloan (1996), and the net operating assets anomaly of Hirshleifer, Hou, Teoh, and Zhang (2004). These anomalies are also the objects of recent studies by Fama and French (2008), Stambaugh, Yu, and Yuan (2012), and Hou, Xue, and Zhang (2015). In academic research, the anomalous portfolios formed based on annual attributes of the stocks are assumed to be rebalanced on an annual basis. In practice, however, an active portfolio manager who trades on the anomalies is likely to rebalance the portfolios at a higher frequency, say the common monthly interval. Then the important question is whether there is any economic value of doing so.

In this paper, we provide a simple strategy to make use of higher frequency information to enhance the overall performance of the original lower frequency anomaly. For the previous eight annual anomalies, their readily available higher frequency information is their performance in each month. Our idea is very simple. With monthly information from the beginning month to the 12th ending month for any of the anomalies, we keep only "good" stocks in the long leg of the anomaly, and only "bad" stocks in the short leg.

What are the "good" or "bad" stocks? We use two approaches to measure the performance of a stock. The first is an intuitive one rooted in technical analysis and is widely used in practice. We compute and compare a stock's short- and long-term performance by its moving average prices (MAs) over the past 50 and 200 days, respectively. If the 50-day MA price is greater than the 200-day MA price, i,e., the short-term trend is above long-term trend, we regard the stock as good and keep it in the long leg of an anomaly, and we sell it otherwise. We do the opposite for the short leg. The approach is known in technical anal-

ysis as moving average convergence/divergence (MACD) which was proposed by by Gerald Appel in the late 1970s. Mathematically, MACD here is approximately equivalent to comparing the return in the past 50 days with the return of the past 200 days. In the academic literature, Brock, Lakonishok, and LeBaron (1992), Lo, Mamaysky, and Wang (2000) and Neely, Rapach, Tu, and Zhou (2014), among others, provide evidence on the value of using similar MA rules, while Zhu and Zhou (2009) and Barberis, Greenwood, Jin, and Shleifer (2015) provide related theoretical models.

Empirically, we find that the performance of the eight anomalies is greatly enhanced by the above MA approach. Without the enhancement, a composite portfolio that invests equally in the eight anomalies has a return of 0.64% per month (t-value = 8.58). Its Fama and French (1996) three-factor alpha is 0.60% per month (t-value = 9.25), and its Fama and French (2015) five-factor alpha is 0.39% per month (t-value = 6.46). With the MA enhancement, the composite portfolio now earns 1.47% per month (t-value = 8.50), more than twice of the original anomalies. The performance improvement is even greater if measured by risk-adjusted abnormal returns – its Fama and French (1996) three-factor alpha is 1.61% per month (t-value = 10.6) and its Fama and French (2015) five-factor alpha is 1.25% per month (t-value = 5.58), roughly three times of the performance of the original composite portfolio.

The second approach for measuring the performance is based on the popular CAPM alpha.[1] If a stock's 2-month (roughly equivalent to 50-day) moving average alphas, measured monthly, is lower than its 12-month moving averages, we remove it from the long leg, and do the opposite for the short leg. With this alpha approach, the composite portfolio now earns 1.13% per month (t-value = 8.05). Although this is not as high as the MA approach, the return is still almost twice the magnitude of the original anomaly. Since the MA enhanced anomalies perform better and since the MA signals are the ones that are followed widely in practice, our analysis below will focus on using the MA approach.[2]

Our methodology is based on double information: information of the original anomaly and the subsequent performance of stocks. This is different from a double sorting strategy because the buy leg can be the same as the original leg if all the stocks in the portfolio perform

[1] Alternatively, we can use Fama-French three-factor alpha, which yields similar results.

[2] As an example of attention to technical analysis, Blooomberg business news reports on August 4 of 2015, even for the largest stock, that "Apple's share volume Tuesday was one of the highest this year after the stock broke through its 200-day moving average."

well. In other words, there are no new divisions of portfolios with use of the subsequent information. Our methodology is also different from the momentum strategy of Jegadeesh (1990) that compares stocks cross-sectionally. In contrast, we select stocks by their own *time series* properties. Moskowitz, Ooi, and Pedersen (2012) document that there are time series trends across asset classes at the 12-month frequency. In contrast, we focus here on short-term time series trends of individual stocks. Han, Zhou, and Zhu (2014) review theoretical rationales for the existence of such time series trends.

To assess practical profitability of the MA enhanced anomalies, the first question is to examine to what degree of extra returns will evaporate due to transaction costs. This question is legitimate because enhanced anomalies are rebalanced monthly, much more frequently than the original portfolios. We address the question in two ways. In the first approach, we tract the portion of stocks that are brought in and drop out of the long and short legs in each month relative to the previous month. Our results show that, much of the rebalancing occurs in June, which is the same time of forming the original anomalies and the turnover rate can be as high as 100%. In other months of the year, however, the average turnover rate is quite low, and is around 15% only. The relative inactive trading, coupled with the large improvement of abnormal returns, show that the MA enhanced anomalies cannot be explained away by transaction costs, especially true with decreasing brokerage fees and bid/ask spreads over time. In the second approach, we sort stocks into groups with three different illiquidity measures, percentage of zero returns (Lesmond, Ogden, and Trzcinka, 1999a), proportional bid-ask spread, and Amihud (2002) price impact measure, respectively. We find that the abnormal returns of the original anomalies are often concentrated on illiquid stocks, whereas those of the MA enhanced anomalies are equally large and significant for either liquid or illiquid stocks. Furthermore, the highest performance is often achieved for more liquid stocks, not for illiquid stocks. These findings also support that the MA enhanced anomalies can survive transaction costs.

Next, we examine what stock characteristics that make the MA enhancement effective. We focus on information uncertainty. Intuitively, the more uncertain the information, the less reliable the annual characteristics and hence it may be more important for the enhancement. Indeed, when measuring information uncertainty by using idiosyncratic volatility, firm age and number of analyst, we find that for stocks of the highest information uncertainty, the MA improves the original anomaly the most. For example, for stocks with the low-

est idiosyncratic volatility (information uncertainty) to the highest idiosyncratic volatility (information uncertainty), the original asset growth anomaly yields Fama-French five-factor alpha of 0.11% (insignificant), 0.63%, and 0.70%, whereas the MA enhanced anomaly yields 1.02%, 1.54%, and 1.85%, respectively.

A related question is whether there are significant differences in firm and market characteristics between the stocks that are dropped from the long or short legs of an anomaly and those kept. Interestingly, despite the fact that the MA rule is only price based, our results do suggests that the stock price trends captured by the MAs are related to stock fundamentals.

Stambaugh et al. (2012) find that the performance of the original anomalies is stronger when investors' sentiment is high. Interestingly, we find that the MA strategy enhances the original anomalies regardless of the level of investors' sentiment. However, it does improve more during periods of high investors' sentiment.

Finally, we examine the robustness of the MA strategy in three ways. First, we consider its performance using alternative specifications of the MA lags. Since the 200-day moving average has been widely used for decades to measure the long-term trend, we consider only alternative lags of 5-, 20-, and 100-day for the short-term lag. Although the performances vary across the lags, but they are still economically significant, delivering a monthly extra return of 0.59% to 0.85% for the composite portfolio of the anomalies, comparable to the improvement of 0.84% with the popular 50-day lag used earlier.

Second, we examine the performance improvement using value-weighting. As it is well known, anomalies are concentrated in small- and mid-cap firms, and so the anomalously returns decrease with value-weighting. Nevertheless, the MA strategy still provides substantial improvement over the original anomalies. For example, the Fama-French five-factor alpha is 0.24% for the composite portfolio of the original value-weighted anomalies, but it increases to 0.96% for the MA enhanced composite portfolio. Therefore, the absolute performance increase is economically significant, and the percentage of improvement is striking, with about four folds.

Third, we examine the abnormal performance using alternative pricing models such as Carhart (1997) four-factor model and Hou et al. (2015) four-factor model. The results show that the performance improvement survives different risk adjustments. For example, the composite portfolio has an alpha of 0.33% after adjusting for the risks proxied by the

investment and profitability factors for the original anomalies, but increases to 0.77% for the MA enhanced anomalies.

In short, our paper contributes to the study of anomalies and market efficiency in several dimensions. First, popular anomalies rely on annual accounting data and ignore monthly information. We propose a simple strategy of using monthly information to improve their performance and this strategy can be used to other anomalies or to other investment portfolios at different investment horizons. Second, we provide various economic insights to understand why the MA strategy can improve the performances. Third, recent asset pricing models such as Fama and French (2015) and Hou et al. (2015) have come a long away in explaining anomalies. Our enhanced anomalies make the previously almost successful explanations become difficult. Hence, our study raises the bar for testing asset pricing models and for developing new ones.

The rest of the paper is organized as follows. Section II describes our data and methods to construct anomalies and the moving average filter but leave the detailed discussion of the anomalies to the appendix. Section III provides evidence for the performance improvement produced by the MA approach. Section IV analyzes the additional turnover generated by the monthly rebalance using the MA approach and examines the relation between performance improvement and liquidity of stocks. Section V explores the relation between performance improvement and firm characteristics, in particular information uncertainty. Section VI describes the performance improvement under different market conditions. Section VII provides robustness tests in several dimensions. Section VIII concludes the paper.

II Data and Methodology

We consider eight well-documented popular anomalies largely following Fama and French (2008), and Stambaugh et al. (2012). These anomalies use annual accounting data and are relatively straightforward to construct.

The first anomaly is the book-to-market ratio (BM) of Fama and French (1996, 2008). It is well known that firms with higher book-to-market ratio have higher returns in the future and these returns do not disappear after adjusting risk using the CAPM of Sharpe (1964) and Lintner (1965). The second anomaly is the gross profitability (GP) of Novy-Marx

(2013), who shows that firms with higher gross profit have higher future returns. The third anomaly is the operating profit (OP) of Fama and French (2015), who show that firms with higher operating profits have higher future returns. The fourth anomaly is the asset growth (AG) of Cooper et al. (2008), Hou et al. (2015), and Fama and French (2015), who show that firms with higher asset growth rates have lower future returns. The fifth anomaly is the investment growth (IK) of Xing (2008), who shows that firms with higher investment have lower future returns. The sixth anomaly is the net stock issue (NS) examined in Ritter (1991), Loughran and Ritter (1995), and Fama and French (2008). Larger the net stock issue, lower the future returns. The seventh anomaly is the accrual (AC) examined in Sloan (1996) and Fama and French (2008). Larger the accrual, lower the future returns. The eight anomaly is the net operating assets (NOA) of Hirshleifer et al. (2004). They show that firms with larger operating assets have lower future returns.

For each anomaly, in June of each year t, we rank all stocks based on one of the eight accounting variables for the fiscal year ending in calendar year $t-1$. All stocks are assigned into one of the deciles. We then construct the equal-weighted decile portfolios and further the spread portfolio, which takes a long position on either Decile one or ten, whichever has the highest average return (Decile High) and takes a short position on the other extreme decile (Decile Low). The portfolios are rebalanced at the end of June of year $t+1$. We delete stocks whose prices are less than \$5 at the time of portfolio formation to avoid any microstructure issues. We provide details of the anomaly variables in the appendix.

To construct the MA filter, we first construct the MAs on the last trading day of each month. The MA of stock j for month m with lag L is defined as

$$MA_{jm}(L) = \frac{P^m_{j,d-L+1} + P^m_{j,d-L+2} + \cdots + P^m_{j,d-1} + P^m_{j,d}}{L}, \tag{1}$$

where P^m_{jd} is the closing price for stock j on the last trading day d of month m. The MA filter is constructed using two MAs, representing the short trend and long trend. Following the common practice in the industry, we use MA(50) as the short trend signal and MA(200) as the long trend signal. We will examine the robustness of our results to alternative MA specifications later. The MA filter works as follows. At the end of each month m, we compare the short trend signal with the long trend signal, i.e., $MA(50) - MA(200)$, and drop the undesirable stocks from the two extreme deciles. More specifically, for Decile High (the long leg of the spread portfolio of the anomaly), we drop any stocks if the short trend

signal is below the long trend signal, i.e., if $MA_{jm}(50) - MA_{jm}(200) < 0$, drop stocks j; for Decile Low (the short leg), we drop any stocks if the short trend signal is above the long trend signal, i.e., if $MA_{jm}(50) - MA_{jm}(200) > 0$, drop stocks j. Intuitively, for both extreme deciles, we drop stocks whose trends begin to reverse and keep stocks whose trends continue.We then form the equal-weighted portfolios using the stocks left in the deciles and form the spread portfolios (High-Low).

For the moving average (MA) of CAPM alphas, we calculate the MA similarly but with the monthly estimated CAPM alpha instead of daily prices. The monthly CAPM alpha is estimated using rolling 60 months of returns. To be comparable to the MA of prices, we use 2-month MA of alpha as the short trend signal and 12-month MA of alpha as the long trend signal. The filter works similarly.

III Improved Performance

In this section, we present evidence that using the moving average (MA) filter of prices or CAPM alphas greatly enhances the performance of the accounting-based anomalies. We first compare the average returns and Sharpe ratios between the original anomalies and the MA enhanced anomalies. We then compare the risk-adjusted returns, and in particularly we examine whether the new Fama-French five-factor model can explain the improved performance of the MA enhanced anomalies.

A Average return and Sharpe ratio

Table I presents the average returns, standard deviations and Sharpe ratios of the MA enhanced anomalies and contrasts with the corresponding original anomalies. Panel A reports the summary statistics for the eight accounting-based anomalies, book-to-market (BM), gross profit (GP), operating profit (OP), asset growth (AG), investment growth (IK), net stock issue (NS), accrual (AC), and net operating asset (NOA). For each anomaly, we report the summary statistics for the short leg (*Low*), the long leg (*High*), and the spread portfolio (*High-Low*).[3] Consistent with the previous literature (e.g. Fama and French, 2008), all anomalies have statistically significant average returns at least at 5% for the spread portfo-

[3]For BM, GP, and OP anomalies, the long (short) leg is the $10^{th}(1^{st})$ decile, while for AG, IK, NS, AC, and NOA anomalies, the long (short) leg is $1^{st}(10^{th})$ decile.

lios, which vary from 0.40% per month for the accrual (AC) anomaly to 1.02% per month for the net stock issue (NS) anomaly. The Sharpe ratios range from 0.10 for the operating profit (OP) anomaly to 0.31 for the net stock issue (NS) anomaly.

Panel B reports the summary statistics for the corresponding MA enhanced anomalies. The improvement is substantial across all the anomalies. The average returns of the spread portfolios range from 1.16% per month for BM anomaly to 1.75% per month for NS anomaly. The MA filter does in general increase the volatility of the anomalies but the small increase in volatility does not offset the large increase in the average return. As a result, the Sharpe ratios are much higher for all the anomalies, ranging from 0.21 for BM and OP anomalies to 0.33 for NS anomaly.

Panel C analyzes the differences between the MA enhanced anomalies and the corresponding original anomalies. For the long leg (*High*) and the spread portfolio (*High-Low*), the difference is the return spread between the MA enhanced and the original anomalies, whereas for the short leg (*Low*), the difference is the return spread between the original and the MA enhanced anomalies. Taking the return difference allows us to assess the statistical significance of the performance improvement. Indeed, all anomalies enjoy statistically (at 1%) significant increases in average returns for the spread portfolios, which vary from 0.57% per month for BM anomaly to 0.94% per month for AG anomaly. Of course different anomalies perform differently, and the MA filter may have different impact on the performance. The last column of Panel C reports the percentage increase in the average return relative to the original anomalies. The smallest improvement is about 71.6% for NS anomaly as the average return increases from 1.02% to 1.75%, an increase of 0.73% per month. This, of course, is due to large average return for the original anomaly. For most anomalies, the percentage increase is around 130%. The largest increase is 232.5% for AC anomaly, the average return increasing from 0.40% to 1.34% per month. In addition, the Sharpe ratios of the differences of the spread portfolios are almost always similar to those of the original anomalies, which suggests that even measured by the Sharpe ratio, the performance increase is about 100%.

Where does the performance improvement come from? Examining the long and short leg separately in Panel C shows that the performance gains mostly come from the short leg, although for some anomalies, the gains also come from the long leg. All the differences in the short leg are statistically significant at 1%, while many differences in the long leg

are insignificant. It suggests that the MA filter enhances the performance of the anomalies mainly by successfully dropping stocks that are about to rebound. It is also worth noting that all the short legs of the original anomalies have significant positive returns, but the short legs of the MA enhanced anomalies are all insignificant as shown in Panel A and B, respectively.

To obtain an overall picture, we also report the performance improvement for a composite portfolio that invests equally into these eight anomalies. The average return of the spread portfolio is 0.64% and the Sharpe ratio is 0.36, higher than any of the anomalies because of much lower volatility. Similarly, we construct a composite portfolio for the MA enhanced anomalies, which yields an average return of 1.47% per month and a Sharpe ratio of 0.36. There is no apparent improvement in the Sharpe ratio because of much higher volatility. Nevertheless, the return difference between the spread portfolios is statistically significant and the percentage increase is 131.2% relative to the original composite portfolio.

Table II reports similar albeit weaker results using the MA of CAPM alphas. For example, the composite portfolio earns 1.13% per month after MA filtering, and thus the difference is 0.50% per month (significant at 1%). Similarly, the Sharpe ratio is about the same due to higher volatility after MA filtering, but all MA enhanced anomalies enjoy higher Sharpe ratios than the original anomalies. In addition, the percentage increase in average returns range from 44.1% (NS) to 167.5% (AC).

Finally, to understand the role of the original anomalies, we need to know the performance of the MA strategy when it applies to all the stocks. In this case, the spread of the MA yields 0.50%, which is lower than any of the gains which have a range of 0.57%–0.94%. The average gain is 0.84%. Therefore, the anomaly portfolios are important and they help contribute 0.34% return. Moreover, if one trades based on the MA strategy alone, one has to trade 100% of all the stocks. With the anomaly portfolios, one now trades only 20% of stocks and make 0.34% more return.

B Risk-adjusted return

Table I provides convincing evidence for the performance improvement of the MA enhanced anomalies. However, the increased average return could be due to more risk-taking. It is possible that MA filter increases the risks of the anomalies. Therefore in this subsection, we

examine risk-adjusted performance.

Table III reports the alphas of the anomalies with respect to the Fama and French (1996) three-factor model. Consistent with Stambaugh et al. (2012), we find that the alphas of the High-Low spread portfolios are large and significant for all anomalies (Panel A). The largest alpha is 0.97% with a t-value of 8.23 for the net stock issue (NS) anomaly, and the smallest alpha is 0.33% with a t-value of 2.41 for the value anomaly. In contrast to the average returns reported in Table I, the alphas are all significantly negative and large in magnitude for the short legs, and small and mostly insignificant for the long legs. Therefore, a major part of the anomalous returns comes from the short leg.

In contrast, both the short and long legs of the MA enhanced anomalies have significant alphas, but the short legs have much large negative alphas. Therefore, both the short and long legs contribute to the anomalous returns and the alphas of the spread portfolios are much larger than those for the original anomalies (Panel B). Panel C lists the differences in alpha for all the anomalies. The differences in the short leg are much larger than those in the long leg, indicating that the performance improvement mainly come form the short leg, consistent with Table I. However, unlike the results in Table I, the long leg also contributes significantly to the performance improvement. As a result, the increases in alpha are much larger than the increases in the average return reported in Table I. For example, for the BM anomaly, the percentage increase in alpha is $0.74/0.33 \times 100 = 224.2\%$ versus an increase of 0.57% in average return and 96.6% in percentage increase. Even for NS anomaly, the increase in alpha is 0.89% and the percentage increase is 91.75% versus an increase of 0.73% and a percentage increase of 71.6%. These two anomalies actually are the ones with the lowest increase in alpha - for all other anomalies, the MA filter increases the alphas by at least 1.0% per month. The last row reports the alphas of the composite portfolio, which shows similar results. The larger increases in alpha suggest that the MA filter in fact reduces the systematic risks, which is confirmed by the smaller betas (not reported), even though the MA filter increases the volatility relative to the original anomalies (Table I).

Fama and French (2015) recently propose two new factors, one related to the strength of profitability and the other related to the aggressiveness of investment,[4] and argue that the five-factor model performs better than the three-factor model. Panel A of Table IV presents the five-factor alphas for the original anomalies and the composite portfolio. Consistent with

[4]Hou et al. (2015) propose a similar model, which we use for robustness.

Hou et al. (2015), the alphas of the original anomalies become smaller for all anomalies and some become insignificant. Not surprisingly, the most significant reductions are from the short legs of the anomalies. On the other hand, even though some reductions in alpha are observed for the MA enhanced anomalies, the alphas are still very large (Panel B) and the increases in alpha relative to the original anomalies are only reduced by 10 to 20 basis points (Panel C). As a result, the percentage increases are actually higher. For example, for BM anomaly, the increase in alpha is three times; even NS anomaly now enjoys an increase of 119.0%.

IV Turnover Rate and Liquidity

It is natural to ask whether the proposed approach suffers from high trading costs since the portfolios now are rebalanced monthly. While it is difficult to directly answer this question, we first compare the turnover rates of the original and the MA enhanced anomalies to get a sense of how much more turnovers introduced by the MA filter. We then examine the performance for stocks with different liquidity to check whether the performance improvement is concentrated on illiquid stocks.

Figuring out the exact transaction costs for any anomaly is often difficult because there is no consensus on how to estimate the transaction costs for individual stocks, and more importantly, the transaction costs depend very much on the type of investors. Institutional investors often enjoy much lower transaction costs than retail investors. In addition, the actual implementation of an anomaly is quite different from how academic papers construct it, presumably to minimize transaction costs. Therefore in this section, we will only focus on how much more turnovers are introduced by the MA filter.

Table V reports the turnover rates. Panel A presents the turnover rates for the original anomalies, while Panel B for the MA enhanced anomalies. We compute the turnover rates for the rebalance month (e.g., June of each year) and the other months separately since the original anomalies are rebalanced annually. The turnover rate is computed as the average of the buy and sell turnover rates; the buy (sell) turnover rate is the ratio of the number of stocks bought (sold) to the total number of stocks before rebalance. Turnover rates in the rebalance month vary wide across the eight anomalies. Some anomalies, such as the gross profit anomaly, have relatively low turnover rates, 40.1% for the short leg and 32.1% for

the long leg. Other anomalies have very high turnover rates. For example, the investment anomaly has about 100% turnover rate for both short and long legs. It is not surprising that there are virtually no turnovers in the other months since portfolios are rebalanced annually, while the very small turnover rates reflect the delisting and newly addition of stocks.

In Panel B, the turnover rates are slightly higher in the rebalance month for the MA enhanced anomalies. For example, for NOA anomaly, the turnover rates are 46.0% and 76.4%, respectively, for the short and long legs after MA filter, but are 38.0% and 73.3%, respectively, for the short and long legs without the MA filter. The extra turnovers mainly reflect in the other months as each month the MA filter is applied. On average the extra turnover rate is 15%, which is low compared to the turnover rate in the rebalance month. The relative inactive trading from the MA enhanced anomalies, together with the large improvement of abnormal returns, should lead one to comfortably conclude that these new abnormal returns shall survive even after taking into account appropriate transaction costs.

Finally, the last column in Panel B reports the percentage of stocks retained after MA filtering in the rebalance month. The number varies across anomalies, but on average, about 50% stocks are retained after the MA filtering. Therefore about half of the stocks will change trend and thus are dropped from the portfolio. Note that this number simply shows the proportion of stocks that are held or sold short relative to the original anomaly, and it is different from the turnover rate since the latter concept compares positions of this month to those of the previous month. However, it sheds light on why the MA enhanced anomalies substantially outperform the original anomalies.

Another way to indirectly analyze the potential impact of transaction costs on the performance of the anomalies is to separate stocks into different groups by their liquidity and examine the performance of the anomalies for each liquidity group. We use three different liquidity measures, percentage of zero returns (%Zero, Lesmond, Ogden, and Trzcinka, 1999b), proportional bid-ask spread, and Amihud price impact measure. Table VI reports the performance as measured by the Fama-French 5-factor alphas of the anomalies with or without the MA filtering for different levels of %Zero. For each anomaly, in Decile High (Low), stocks are further divided into three groups by their levels of %Zero, and then we form the long/short spread portfolio for each %Zero group.[5] By comparing the performance of the long/short spread portfolios under the three different levels of %Zero, we can find

[5]Results are similar if we sort %Zero first or sort independently.

out the contribution of liquidity to the abnormal performance of the anomalies. Panel A shows the results for the original anomalies. for almost all anomalies, the performance is strongest for stocks with the highest %Zero, or the most illiquid stocks. Some anomalies such as BM and GP are only significant for the most illiquid stocks, some are significant except for the most liquid stocks (e.g., AG anomaly), and the others are significant for all stocks (e.g., NOA anomaly). On the contrary, the MA enhanced anomalies (Panel B) almost always show the strongest performance with the most liquid stocks, which suggests that the performance improvement of the MA filter is likely not substantially affected by additional transaction costs, In addition, the Fama-French 5-factor alphas are significant in all three levels of %Zero. For example, for NOA anomaly, the Fama-French 5-factor alpha is 2.15%, 1.78%, and 1.59% per month, respectively, for the three levels of %Zero from the lowest (most liquid) to the highest (most illiquid). Panel C shows the performance improvement under the three levels of %Zero. Not surprisingly, the most liquid stocks often show the largest performance improvement. For example, again for NOA anomaly, the performance improvement is 1.16%, 0.80%, and 0.77% per month across the three levels of %Zero.

Table VII and VIII report the results with the proportional bid-ask spread and Amihud measure, which are largely similar to the results reported in Table VI. Specifically, the original anomalies often show the strongest performance for the most illiquid stock, whereas the MA enhanced anomalies often have the strongest performance for more liquid stocks, but have significant abnormal returns (Fama-French five-factor alphas) under all the three levels of liquidity. For example, for the original asset growth anomaly, the Fama-French 5-factor alpha is 0.43%, 0.47%, and 0.82%, respectively, for stocks with the lowest spread (most liquid) to the highest spread (least liquid), and 0.39%, 0.38%, and 0.77%, respectively, for stocks with the lowest Amihud measure (most liquid) to the highest Amihud measure (least liquid). In contrast, for the MA enhanced AG anomaly, the Fama-French 5-factor alpha is 1.51%, 1.48%, and 1.38%, respectively, for the three different spread groups, and 1.50%, 1.22%, and 2.03%, respectively, for the three different Amihud price impact groups.

V Firm Characteristics and MA Filter

In this section, we examine whether the performance improvement gained by the MA filter is positively related to information uncertainty, and whether the stocks dropped by the MA

filter are different in firm characteristics from the stocks kept in the portfolio.

A Information Uncertainty

Han, Yang, and Zhou (2013) show that the profitability of a simple moving average timing strategy is critically dependent on information uncertainty of stocks. Stocks with high information uncertainty generate higher profits from the MA timing strategy. Han et al. (2014) use moving average prices to construct a trend factor and also find that the performance of the trend factor positively related to information uncertainty. In this subsection, we use three information proxies including idiosyncratic volatility, firm age and number of analyst following to examine their impact on the performance enhancement of the MA filter on the anomalies.

Table IX reports the results of using idiosyncratic volatility to proxy for information uncertainty. The higher the idiosyncratic volatility, the higher the information uncertainty. To gauge the impact of information uncertainty, we further sort stocks into three groups by their idiosyncratic volatility, similar to liquidity analysis in the previous section. We then form decile portfolios in each group to create 3×10 decile portfolios. Panel A provides the Fama-French five-factor alphas for the original anomalies. All anomalies except for BM, GP, and OP show stronger performance for more volatile (more uncertain) stocks. For example, the NOA anomaly yields the Fama-French five-factor alpha of 0.35%, 0.77%, and 1.27% per month, respectively, for the lowest, medium, and highest idiosyncratic volatility stocks, all of which are statistically significant. Panel B lists the Fama-French five-factor alphas for the corresponding MA enhanced anomalies. For almost all anomalies, performance is monotonically increasing with the level of idiosyncratic volatility (information uncertainty). For example, the MA enhanced NOA anomaly yields the five-factor alpha of 0.88%, 1.65%, and 2.50% per month, respectively, for the lowest, medium, and highest idiosyncratic volatility (information uncertainty). Therefore, as shown in Panel C, the performance improvement relative to the original anomalies is also almost always monotonically increasing with the increase of the idiosyncratic volatility (information uncertainty). For example, the performance improvement for the NOA anomaly is 0.53%, 0.89%, and 1.23%, respectively, for the lowest, medium, and highest idiosyncratic volatility (information uncertainty).

Table X reports similar results using firm age as the proxy for information uncertainty.

The younger the firm, the higher the information uncertainty. In general, youngest firms have the strongest performance for both the original anomalies and MA enhanced anomalies. However, the performance of the MA enhanced anomalies are more responsive to the level of information uncertainty, and thus the younger the firms are, i.e., the higher the information uncertainty is, the higher the performance improvement is for the MA enhanced anomalies. For example, the NOA anomaly produces a Fama-French five-factor alpha of 1.00%, 0.76%, and 0.61% per month, respectively, for the youngest firms to the oldest firms, while the MA enhanced NOA anomaly provides a Fama-French five-factor alpha of 2.07%, 1.82%, and 0.98% per month, respectively, for the youngest firms to the oldest firms. Therefore, the performance improvement is 1.08%, 1.06%, and 0.36% per month, respectively, for the youngest firms to the oldest firms.

Finally, Table XI reports the results using the number of analyst following as a proxy for information uncertainty. Firms covered by fewer analyst tend to have more information uncertainty. The results are again similar to the results using either idiosyncratic volatility or firm age and support the positive relation between the performance improvement and information uncertainty. For example, the Fama-French five-factor alpha of the original NOA anomaly is 0.82%, 0.98%, and 0.71% per month, respectively, for firms with the fewest number of analyst following to firms with the highest number of analyst following. Similarly, the Fama-French five-factor alpha of the MA enhanced NOA anomaly is 2.05%, 1.73%, and 1.47% per month, respectively, for firms with the fewest number of analyst following to firms with the highest number of analyst following. Thus the performance improvement due to MA filtering is 1.24%, 0.76%, and 0.76% per month across the three groups of firms.

B Information content of MA filter

The MA filter uses only the market price information to select stocks. Presumably, there should be no significant differences between stocks kept in and stock dropped out of the extreme decile portfolios in firm fundamentals and other market characteristics. In this section, we explore whether the stocks deleted by the MA filter are different from the stocks remained in the portfolios.

Table XII reports the Fama-MacBeth regression results using the accrual anomaly as

an example, other anomalies yield similar and sometimes more significant results.[6] We use a dummy variable to denote the stocks dropped out of the extreme decile portfolios, and therefore the intercepts represent the summary statistics of stocks kept in the portfolios, and the coefficients on the dummy variable represent the differences between stocks dropped and stocks kept. Panel A shows the differences in firm fundamental variables (accounting variables used to construct the anomalies excluding accrual), and Panel B shows the differences in the firm market characteristics. In Panel A, out of the seven accounting variables, four of them have significant coefficients on the dummy variable. For Decile Low (Decile 10), the stocks dropped have higher book-to-market ratio, lower asset growth, lower net stock issue, and net operating asset. It seems consistent with that stocks dropped from Decile Low have higher returns because stocks with higher BM, lower AG, lower NS, and lower NOA tend to have higher returns. Similarly, for Decile High (Decile 1), the stocks dropped have lower book-to-market ratio, lower gross profitability, higher asset growth and net operating asset. Again, it seems consistent with that stocks dropped from Decile High have lower returns.

In Panel B, we observe similar patterns, but the differences are all highly significant as measured by the highly significant coefficients on the dummy variable. Stocks dropped from Decile Low have higher momentum returns, lower idiosyncratic volatility, and lower analyst forecast dispersion, are also more liquid (lower Amihud measure, proportional bid-ask spread, and %Zero, and higher trading volume). On the other hand, stocks dropped from Decile High have lower momentum returns, higher idiosyncratic volatility, and higher analyst forecast dispersion, and are also less liquid (higher Amihud measure, proportional bid-ask spread, and %Zero, and lower trading volume). Again, these characteristics are consistent with that stocks dropped from Decile Low have higher returns and stocks dropped from Decile High have lower returns.[7]

[6]For example, for the BM anomaly, all but one market variable and all the accounting variables are significant for Decile High and only three accounting variables are insignificant for Decile Low.

[7]Future returns are positively related to momentum returns, but are negatively related to idiosyncratic volatility (Ang, Hodrick, Xing, and Zhang, 2006, 2009), and analyst earnings forecast dispersion (Diether, Malloy, and Scherbina, 2002). For liquidity measures, Although Amihud and Mendelson (1986) find a positive relation between the bid-ask spread and future returns, many subsequent studies find a negative relation. Examples are Eleswarapu and Reinganum (1993), Brennan and Subrahmanyam (1996), Chen and Kan (1996), and Easely, Hvidkjaer, and O'Hara (2002).

VI Market Characteristics

In this section, We examine the performance improvement of the MA enhanced anomalies under different market conditions. We first explore the impact of investors' sentiment, and then examine the impact of the market volatility.

A Sentiment

Stambaugh et al. (2012) find that the performance of the original anomalies is stronger when investors' sentiment is high. In Table XIII, we examine the performance improvement of the MA filter during periods of high and low sentiment. In Panel A, all the original anomalies except for BM perform better during periods of high sentiment. Although the majority of the anomalies are significant in both high and low sentiment periods, some anomalies such as investment and gross profit anomalies are significant only during high sentiment periods. In contrast, all the MA enhanced anomalies have significant abnormal returns in both high and low sentiment periods as shown in Panel B. in addition, all anomalies perform much better during high sentiment periods than low sentiment periods except for BM and AG, both of which perform better when sentiment is low. The performance improvement, however, is not consistently higher during the periods of high sentiment.

B Market Volatility

Finally, Table XIV reports the performance improvement of the MA filter during periods of high and low market volatility. In Panel A, except for BM and GP, the original anomalies do not seem to be much affected by the market volatility. For example, for the composite portfolio of the anomalies, the Fama-French five-factor alpha is 0.43% per month when the market volatility is low and is 0.37% per month when the market volatility is high. In contrast, all but GP anomaly have higher alphas for the enhanced anomalies when the market volatility is low than when the market volatility is high. As a result, for all anomalies, the performance improvement is much higher during the low volatility periods than during the high volatility periods.

VII Robustness

In this section, we examine the robustness of the performance improvement generated by the MA filter in several dimensions. We first examine whether or to what extent the performance improvement is robust to alternative specifications of the MA filter. We further explore whether the performance improvement is robust to value-weighting. Finally, we report results using the alternative multifactor asset pricing models.

A Alternative specifications

Thus far in the previous analysis, we use 50-day and 200-day to represent the short trend signal and long trend signal. We choose these two MAs because they are most commonly used in practice. In this subsection, we explore the robustness of performance improvement by changing the specifications of the MA signals. Since the 200-day moving average has been widely used for decades in investment letters, trading softwares, and newspapers (such as Investor Business Daily) to measure long-term trends, we consider only alternative lags for the short-term trend.

Table XV provides the evidence of the robustness to alternative specifications of the short-term trend signal using the composite anomaly as the eexample. We use alternative lags of 5-, 20-, and 100-day. First of all, all the specifications produce significant Fama-French five-factor alphas that are significantly higher than the original composite anomaly. Secondly, the performance improvement increases as the short-term lag increases. For example, with a short-term trend specification of 5-day, the MA enhanced anomaly yields an abnormal return of 0.99% per month relative to Fama-French five-factor model, while the original anomaly only yields 0.39% per month. Therefore the increase in performance is about 150% ($0.59/0.39 = 1.51$). For the specification of 100-day, the Fama-French five-factor alpha for the enhanced anomaly is 1.25%, more than tripling that of the original anomaly.

B Value-weighting

In this subsection we explore the performance improvement of value-weighted anomalies. Table XVI delivers the robustness results. As shown in Panel A, not surprisingly the value-weighted anomalies yield smaller Fama-French five-factor alphas than the corresponding

equal-weighted anomalies reported in Table IV. More anomalies (four out of eight) are now insignificant. The composite portfolio of all anomalies is still significant, but the alpha is only 0.24% per month. In sharp contrast, all except for BM anomaly are still significant after MA filtering, and the magnitude of alphas is rather large, although not as large as those of the equal-weighted anomalies. As a result, in terms of percentage improvement, value-weighting seems to produce even higher performance increase. For example, the original AG anomaly has an insignificant alpha of -0.17% per month, so the performance improvement is 1.06% per month, which is about 623% increase in performance.

C Alternative asset-pricing models

In this subsection, we use two alternative asset-pricing models to estimate the risk-adjusted abnormal returns for the anomalies. Table XVII presents the Carhart (1997) four-factor alpha for the original anomalies and MA enhanced anomalies. Compared to the Fama-French three-factor alphas in Table III, the Carhart four-factor alphas are a bit smaller for the original anomalies, but are substantially smaller for the MA enhanced anomalies, reduced by 50-60 bps. This is expected because the purpose of MA filter is to drop stocks whose price trends start to reverse. Nevertheless, the performance improvement after adjusting for momentum is still large and significant. For example, the Carhart alpha for the composite portfolio increases from 0.50% to 1.00% after MA filtering. Similarly, the performance improvement is mostly contributed by the short leg.

Table XVIII presents the abnormal returns adjusted by the four-factor model of Hou et al. (2015). Compared to the Fama-French five-factor alphas in Table IV, the four-factor alphas are slightly smaller for the original anomalies, but are substantially smaller for the MA enhanced anomalies. For example, the four-factor alpha of the composite portfolio increases from 0.33% to 0.77% after MA filtering, an increase of 0.43% per month. In contrast, the five-factor alpha of the composite portfolio increases from 0.39% to 1.25% after MA filtering, an increase of 0.86% per month as reported in Table IV. Again, risk-adjustment, although substantially reduces the abnormal returns, does not eliminate the performance improvement; all but BM have significant performance improvement.

VIII Conclusion

Many anomalies are constructed based low frequency information, such as annual attributes or data available only infrequently. The anomaly portfolios are then assumed to be held at the same low frequency. This completely ignores higher frequency information, such as the monthly performance of the stocks in the anomalous portfolios. In this paper, we provide a simple strategy to incorporate the higher frequency information. We find that there is significant economic value of doing so. For eight major anomalies, we find that the enhanced anomalies can double the average returns while having similar or lower risks. The results are robust to a number of controls.

While our study here focuses on those original anomalies that are balanced annually, the same idea may be applied to typical monthly anomalies such as the momentum. Moreover, the same approach may be adapted to study anomalies in other asset classes, such as commodities and foreign exchange rates. These are interesting topics for future research.

Appendices

A Construction of Anomalies

This appendix presents how we construct the eight accounting variable-based anomalies that we examine in the paper. In June of each year t, we rank all stocks based on their accounting variables for the fiscal year ending in calendar year $t-1$. All stocks are assigned into one of the deciles. Monthly returns of each portfolio from July of year t to June of year $t+1$ are calculated as the equal-weighted averages of returns on individual stocks in the portfolio. The portfolios are rebalanced at the June of year $t+1$. We delete stocks whose prices are less than \$5 at the time of portfolio formation. Variables definitions are as follows.

1. Book-to-market ratio (BM). Book equity is stockholders book equity, plus balance sheet deferred taxes (Compustat item ITCB) and investment tax credit (TXDB) if available, minus the book value of preferred stock. We employ tiered definitions largely consistent with those used by Davis, Fama, and French (2000), Novy-Marx (2013) and Hou et al. (2015) to construct stockholders equity and book value of preferred stock. Stockholders equity is as given in Compustat (SEQ) if available, or else common equity (CEQ) plus the book value of preferred stock, or else total assets minus total liabilities (AT - LT). Book value of preferred stock is redemption value (PSTKRV) if available, or else liquidating value (PSTKL) if available, or else par value (PSTK). Book-to-market ratio at year $t-1$ is computed as book equity for the fiscal year ending in calendar year $t-1$ divided by the market capitalization at the end of December of $t-1$. Stocks with missing book values or negative book-values are deleted.

2. Gross Profit to Asset (GP). Following Novy-Marx (2013), we measure gross profits-to-assets at year $t-1$ as gross profit at year $t-1$ (Compustat item GP) divided by total assets at year $t-1$ (AT).

3. Operating Profit (OP). Following Fama and French (2015), we measure operating profit at year $t-1$ as year $t-1$ gross profit (Compustat item GP), minus selling, general, and administrative expenses (XSGA) if available, minus interest expense (XINT) if available, all divided by year $t-1$ book equity. Stocks with missing book value or negative book-value are deleted.

4. Asset Growth (AG). Following Cooper et al. (2008), we compute asset growth at year $t-1$ as total assets (AT) for the fiscal year ending in calendar year $t-1$ divided by total assets for the fiscal year ending in calendar year $t-2$, minus one.

5. Investments (IK). Following Xing (2008), we measure investment growth for year $t-1$ as the growth rate in capital expenditure (CAPX) from the fiscal year ending in calendar year $t-2$ to the fiscal year ending in $t-1$.

6. Net Stock Issue (NS). Following Fama and French (2008), we compute net stock issue at year $t-1$, as the split-adjusted shares outstanding for fiscal year ending in calendar year $t-1$ divided by the split-adjusted shares outstanding for fiscal year ending in calendar year $t-2$, minus one. The split-adjusted shares outstanding are calculated as shares outstanding (CSHO) times the adjustment factor (AJEX).

7. Accrual (AC). Accruals at year $t-1$ are defined following Fama and French (2008), as the change in operating working capital per split-adjusted share from $t-2$ to $t-1$ divided by book equity per split-adjusted share at $t-1$. Operating working capital is computed as current assets (ACT) minus cash and short-term investments (CHE), minus, the difference of current liability (LCT) and debt in current liabilities (DLC) if available.

8. Net Operating Assets (NOA). Following Hirshleifer et al. (2004), we define net operating assets (NOA) at year $t-1$, as operating assets minus operating liabilities at year $t-1$ scaled by total assets at year $t-2$ (Compustat item AT). Operating assets are total assets (AT) minus cash and short-term investment (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 book value of preferred stocks as described in the definition of book equity (zero if missing), and minus common equity (CEQ).

References

Amihud, Yakov, 2002, Illiquidity and stock returns: Cross-section and time-series effects, *Journal of Financial Markets* 5, 31–56.

Amihud, Yakov and Haim Mendelson, 1986, Asset pricing and the bid-ask spread, *Journal of Financial Economics* 17, 223–249.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2006, The cross-section of volatility and expected returns, *Journal of Finance* 61, 259–299.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2009, High idiosyncratic volatility and low returns: International and further U.S. evidence, *Journal of Financial Economics* 91, 1–23.

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer, 2015, X-CAPM: An Extrapolative Capital Asset Pricing Model, *Journal of Financial Economics* 115, 1–24.

Brennan, Michael J. and Avanidhar Subrahmanyam, 1996, Market microstructure and asset pricing: On the compensation for illiquidity in stock returns, *Journal of Financial Economics* 41, 441–464.

Brock, William, Josef Lakonishok, and Blake LeBaron, 1992, Simple technical trading rules and the stochastic properties of stock returns, *Journal of Finance* 47, 1731–1764.

Carhart, Mark M., 1997, On persistence in mutual fund performance, *Journal of Finance* 52, 57–82.

Chen, N. and R. Kan, 1996, Expected returns and the bid-ask spread, in K. Saitou and K. Kubota, eds.: *Modern Portfolio Theory and Applications* (Gakujutsu Shuppan Center, Osaka, Japan).

Cooper, Michael J., Huseyin Gulen, and Michael J. Schill, 2008, Asset growth and the cross-section of stock returns, *Journal of Finance* 63, 1609–1651.

Davis, James L., Eugene F. Fama, and Kenneth R. French, 2000, Characteristics, covariances, and average returns: 1929 to 1997, *Journal of Finance* 55, 389–406.

Diether, Karl B., Christopher J. Malloy, and Anna Scherbina, 2002, Differences of opinion and the cross section of stock returns, *Journal of Finance* 57, 2113–2141.

Easely, D., S. Hvidkjaer, and M. O'Hara, 2002, Is information risk a determinant of asset returns? *Journal of Finance* 57, 2185–2221.

Eleswarapu, Venkat. and Marc Reinganum, 1993, The seasonal behavior of the liquidity premium in asset pricing, *Journal of Financial Economics* 34, 373–386.

Fama, Eugene F. and Kenneth R. French, 1996, Multifactor explanations of asset pricing anomalies, *Journal of Finance* 51, 55–84.

Fama, Eugene F. and Kenneth R. French, 2008, Dissecting anomalies, *Journal of Finance* 63, 1653–1678.

Fama, Eugene F. and Kenneth R. French, 2015, A five-factor asset pricing model, *Journal of Financial Economics* 116, 1–22.

Han, Yufeng, Ke Yang, and Guofu Zhou, 2013, A new anomaly: The cross-sectional profitability of technical analysis, *Journal of Financial and Quantitative Analysis* 48, 1433–1461.

Han, Yufeng, Guofu Zhou, and Yingzi Zhu, 2014, A trend factor: Using information over trading horizons, Unpublished working paper, University of Colorado Denver, Washington University in St. Louis, and Tsinghua University.

Hirshleifer, David, Kewei Hou, Siew Hong Teoh, and Yinglei Zhang, 2004, Do investors overvalue firms with bloated balance sheets? *Journal of Accounting and Economics* 38, 297–331.

Hou, Kewei, Chen Xue, and Lu Zhang, 2015, Digesting anomalies: An investment approach, *Review of Financial Studies* 28, 650–705.

Jegadeesh, Narasimhan, 1990, Evidence of predictable behavior of security returns, *Journal of Finance* 45, 881–898.

Lesmond, David A., Joseph P. Ogden, and Charles Trzcinka, 1999a, A new estimate of transaction costs, *Review of Financial Studies* 5, 1113–1141.

Lesmond, David A., J. P. Ogden, and C. A. Trzcinka, 1999b, A new estimate of transaction costs, *Review of Financial Studies* 12, 1113–1141.

Lintner, John, 1965, The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, *Review of Economic Studies* 47, 13–37.

Lo, Andrew W., Harry Mamaysky, and Jiang Wang, 2000, Foundations of technical analysis: Computational algorithms, statistical inference, and empirical implementation, *Journal of Finance* 55, 1705–1770.

Loughran, Tim and Jay R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50, pp. 23–51.

Moskowitz, Tobias J., Yao Hua Ooi, and Lasse Heje Pedersen, 2012, Time series momentum, *Journal of Financial Economics* 104, 228–250.

Neely, Christopher J., David E. Rapach, Jun Tu, and Guofu Zhou, 2014, Forecasting the equity risk premium: The role of technical indicators, *Management Science* 60, 1772–1791.

Newey, Whitney K. and Kenneth D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703–708.

Novy-Marx, Robert, 2013, The other side of value: The gross profitability premium, *Journal of Financial Economics* 108, 1–28.

Ritter, Jay R., 1991, The long-run performance of initial public offerings, *Journal of Finance* 46, 3–27.

Sharpe, William F., 1964, Capital asset prices: a theory of market equilibrium under conditions of risk, *Journal of Finance* 19, 425–442.

Sloan, Richard G., 1996, Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review* 71, 289–315.

Stambaugh, Robert F., Jianfeng Yu, and Yu Yuan, 2012, The short of it: Investor sentiment and anomalies, *Journal of Financial Economics* 104, 288–302.

Xing, Yuhang, 2008, Interpreting the value effect through the q-theory: An empirical investigation, *Review of Financial Studies* 21, 1767–1795.

Zhu, Yingzi and Guofu Zhou, 2009, Technical analysis: An asset allocation perspective on the use of moving averages, *Journal of Financial Economics* 92, 519–544.

Table I
Performance Improvement by MA Filter

This table reports the performance improvement using the moving average (MA) filter of prices, which is the cross over of MA(50) and MA(200) of prices. Each month, stocks with MA(50) exceeding MA(200) are dropped in the decile portfolio Low (short leg), whereas stocks with MA(200) exceeding MA(50) are dropped in the decile portfolio High (long leg). The portfolio High-Low is the spread portfolio. Panel A, B, and C report the performance of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. For each panel, we report the average return, standard deviation, and Sharpe ratio. In Panel C, we also report the percentage of performance improvement. The average returns and standard deviations are in percentage. Significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**			
Variable	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Increase
Book-To-Market										
Low	0.86***	7.23	0.06	0.43	7.89	-0.00	0.43***	2.36	0.18	50.0
	(2.83)			(1.29)			(4.37)			
High	1.45***	6.02	0.17	1.59***	5.81	0.20	0.14	2.77	0.05	9.66
	(5.74)			(6.51)			(1.19)			
High-Low	0.59***	3.90	0.15	1.16***	5.58	0.21	0.57***	4.00	0.14	96.6
	(3.61)			(4.98)			(3.41)			
Gross Profit										
Low	0.74***	6.24	0.05	0.10	7.32	-0.04	0.64***	2.93	0.22	86.5
	(2.86)			(0.32)			(5.23)			
High	1.42***	6.46	0.15	1.64***	6.15	0.20	0.22***	2.20	0.10	15.5
	(5.28)			(6.43)			(2.44)			
High-Low	0.68***	3.20	0.21	1.52***	5.22	0.29	0.86***	4.14	0.21	126.5
	(5.10)			(7.01)			(4.99)			
Operating Profit										
Low	0.83**	8.18	0.05	0.23	8.73	-0.02	0.59***	2.71	0.22	71.1
	(2.43)			(0.62)			(5.22)			
High	1.25***	6.38	0.13	1.55***	6.00	0.19	0.29***	2.44	0.12	23.2
	(4.69)			(6.16)			(2.82)			
High-Low	0.42**	4.40	0.10	1.30***	6.05	0.21	0.88***	4.00	0.22	209.5
	(2.27)			(5.11)			(5.26)			
Asset Growth										
Low	0.59*	7.65	0.02	-0.23	8.31	-0.08	0.81***	2.25	0.36	137.3
	(1.85)			(-0.66)			(8.57)			
High	1.29***	7.09	0.12	1.39***	6.65	0.14	0.13	2.82	0.04	10.1
	(4.36)			(4.98)			(1.07)			
High-Low	0.70***	2.90	0.24	1.63***	5.07	0.32	0.94***	4.15	0.23	134.3
	(5.75)			(7.67)			(5.39)			

	Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement			
Variable	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Increase
Investment										
Low	0.80***	7.31	0.05	0.14	8.21	-0.04	0.64***	2.57	0.25	80.0
	(2.60)			(0.39)			(5.94)			
High	1.37***	6.70	0.14	1.65***	6.46	0.19	0.28***	2.62	0.11	20.4
	(4.88)			(6.10)			(2.56)			
High-Low	0.57***	2.41	0.24	1.49***	4.95	0.30	0.92***	4.15	0.22	161.4
	(5.68)			(7.14)			(5.29)			
Net Stock Issue										
Low	0.58**	7.01	0.02	-0.00	7.78	-0.06	0.59***	2.20	0.27	101.7
	(1.98)			(-0.01)			(6.35)			
High	1.61***	5.59	0.21	1.75***	5.43	0.24	0.14	2.23	0.06	8.70
	(6.86)			(7.68)			(1.50)			
High-Low	1.02***	3.27	0.31	1.75***	5.31	0.33	0.73***	3.53	0.21	71.6
	(7.48)			(7.87)			(4.91)			
Accrual										
Low	0.83***	7.52	0.05	0.19	8.06	-0.03	0.63***	2.06	0.30	75.9
	(2.63)			(0.55)			(7.25)			
High	1.23***	7.03	0.11	1.48***	6.63	0.16	0.30***	2.85	0.11	24.4
	(4.18)			(5.32)			(2.51)			
High-Low	0.40***	2.27	0.18	1.34***	4.76	0.28	0.93***	4.00	0.23	232.5
	(4.22)			(6.68)			(5.55)			
Net Operating Asset										
Low	0.61**	7.18	0.03	-0.14	7.89	-0.07	0.73***	2.29	0.32	119.7
	(2.04)			(-0.42)			(7.55)			
High	1.33***	5.82	0.16	1.43***	5.75	0.17	0.15	2.40	0.06	11.3
	(5.47)			(5.90)			(1.46)			
High-Low	0.72***	3.31	0.22	1.64***	5.51	0.30	0.89***	3.79	0.23	123.6
	(5.20)			(7.03)			(5.56)			
Composite										
Low	0.73***	7.10	0.04	0.09	7.68	-0.04	0.63***	1.76	0.36	86.3
	(2.46)			(0.27)			(8.55)			
High	1.37***	6.18	0.15	1.56***	5.70	0.20	0.21***	1.98	0.10	15.3
	(5.29)			(6.52)			(2.49)			
High-Low	0.64***	1.77	0.36	1.47***	4.13	0.36	0.84***	3.28	0.26	131.2
	(8.58)			(8.50)			(6.10)			

Table II
Performance Improvement by MA Filter using CAPM Alpha

This table reports the performance improvement using the moving average (MA) filter of CAPM alphas, which is the cross over of MA(2) and MA(12) of alphas. The CAPM alphas are estimated using past returns of rolling 60 months. MA(2) and MA(12) are two-month and twelve-month moving average of alphas. Each month, stocks with MA(2) exceeding MA(12) are dropped in the decile portfolio Low (short leg), whereas stocks with MA(12) exceeding MA(2) are dropped in the decile portfolio High (long leg). Panel A, B, and C report the performance of the original anomalies, enhanced anomalies, and the difference between the enhanced and original anomalies, respectively. For each panel, we report the average return, standard deviation, and Sharpe ratio. In Panel C, we also report the percentage of performance improvement. The average returns and standard deviations are in percentage. Significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: Alpha Enhanced**			**Panle C: Improvement**			
Variable	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Increase
					Book-To-Market					
Low	0.86***	7.23	0.06	0.72**	7.60	0.04	0.14***	1.34	0.11	16.3
	(2.83)			(2.25)			(2.55)			
High	1.45***	6.02	0.17	1.59***	5.89	0.19	0.14**	1.72	0.08	9.66
	(5.74)			(6.37)			(1.97)			
High-Low	0.59***	3.90	0.15	0.87***	4.69	0.19	0.29***	2.52	0.11	49.2
	(3.61)			(4.41)			(2.72)			
					Gross Profit					
Low	0.74***	6.24	0.05	0.50*	6.64	0.01	0.24***	1.46	0.16	32.4
	(2.86)			(1.83)			(3.89)			
High	1.42***	6.46	0.15	1.72***	6.23	0.21	0.29***	1.99	0.15	20.4
	(5.28)			(6.60)			(3.51)			
High-Low	0.68***	3.20	0.21	1.23***	4.18	0.30	0.53***	2.80	0.19	77.9
	(5.10)			(7.05)			(4.55)			
					Operating Profit					
Low	0.83**	8.18	0.05	0.64*	8.66	0.02	0.20**	2.40	0.08	24.1
	(2.43)			(1.75)			(1.96)			
High	1.25***	6.38	0.13	1.61***	6.22	0.19	0.35***	1.90	0.18	28.0
	(4.69)			(6.12)			(4.36)			
High-Low	0.42**	4.40	0.10	0.99***	5.75	0.17	0.55***	3.47	0.16	131.0
	(2.27)			(4.05)			(3.76)			
					Asset Growth					
Low	0.59*	7.65	0.02	0.32	8.07	-0.01	0.28***	1.28	0.22	47.5
	(1.85)			(0.94)			(5.17)			
High	1.29***	7.09	0.12	1.53***	7.04	0.16	0.25***	1.96	0.13	19.4
	(4.36)			(5.15)			(2.96)			
High-Low	0.70***	2.90	0.24	1.22***	4.29	0.28	0.53***	2.78	0.19	75.7
	(5.75)			(6.73)			(4.50)			

	Panel A: Original			Panel B: Alpha Enhanced			Panle C: Improvement			
Variable	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Avg Ret	Std Dev	Sharpe	Increase
Investment										
Low	0.80***	7.31	0.05	0.51	8.04	0.01	0.28***	2.34	0.12	35.0
	(2.60)			(1.52)			(2.88)			
High	1.37***	6.70	0.14	1.61***	6.71	0.17	0.24***	2.05	0.12	17.5
	(4.88)			(5.67)			(2.73)			
High-Low	0.57***	2.41	0.24	1.10***	4.28	0.26	0.52***	3.41	0.15	91.2
	(5.68)			(6.05)			(3.64)			
Net Stock Issue										
Low	0.58**	7.01	0.02	0.35	7.53	-0.01	0.23***	1.44	0.16	39.7
	(1.98)			(1.11)			(3.85)			
High	1.61***	5.59	0.21	1.83***	5.60	0.25	0.21***	1.58	0.13	13.0
	(6.86)			(7.73)			(3.16)			
High-Low	1.02***	3.27	0.31	1.49***	4.60	0.32	0.45***	2.56	0.17	44.1
	(7.48)			(7.64)			(4.13)			
Accrual										
Low	0.83***	7.52	0.05	0.50	7.93	0.01	0.33***	1.51	0.22	39.8
	(2.63)			(1.50)			(5.25)			
High	1.23***	7.03	0.11	1.58***	7.02	0.16	0.33***	2.25	0.15	26.8
	(4.18)			(5.31)			(3.44)			
High-Low	0.40***	2.27	0.18	1.09***	4.07	0.27	0.67***	3.20	0.21	167.5
	(4.22)			(6.33)			(4.92)			
Net Operating Asset										
Low	0.61**	7.18	0.03	0.33	7.72	-0.01	0.28***	1.58	0.18	45.9
	(2.04)			(1.02)			(4.27)			
High	1.33***	5.82	0.16	1.56***	6.28	0.18	0.22**	2.32	0.09	16.5
	(5.47)			(5.86)			(2.23)			
High-Low	0.72***	3.31	0.22	1.24***	5.10	0.24	0.51***	3.15	0.16	70.8
	(5.20)			(5.73)			(3.81)			
Composite										
Low	0.73***	7.10	0.04	0.48	7.51	0.01	0.25***	1.17	0.21	34.2
	(2.46)			(1.54)			(5.08)			
High	1.37***	6.18	0.15	1.60***	5.97	0.20	0.25***	1.36	0.18	18.2
	(5.29)			(6.40)			(4.41)			
High-Low	0.64***	1.77	0.36	1.13***	3.36	0.34	0.50***	2.36	0.21	78.1
	(8.58)			(8.05)			(5.05)			

Table III
Fama-French 3-Factor Alpha

This table reports the improvement in Fama-French three-factor alpha using the moving average (MA) filter of prices, which is the cross over of MA(50) and MA(200) of prices. Each month, stocks with MA(50) exceeding MA(200) are dropped in the decile portfolio Low (short leg), whereas stocks with MA(200) exceeding MA(50) are dropped in the decile portfolio High (long leg). The portfolio High-Low is the spread portfolio. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	-0.18**	0.16	0.33**	-0.67***	0.40***	1.07***	0.49***	0.25**	0.74***
	(-2.05)	(1.52)	(2.41)	(-4.60)	(3.05)	(5.19)	(4.61)	(2.15)	(4.21)
Gross Profit	-0.35***	0.29***	0.64***	-1.01***	0.63***	1.64***	0.65***	0.35***	1.00***
	(-3.38)	(3.22)	(4.44)	(-5.83)	(6.55)	(8.05)	(5.01)	(3.86)	(5.86)
Operating Profit	-0.38***	0.05	0.43**	-1.02***	0.50***	1.51***	0.64***	0.44***	1.08***
	(-2.76)	(0.55)	(2.36)	(-5.86)	(4.54)	(7.21)	(5.78)	(4.63)	(7.07)
Asset Growth	-0.59***	-0.02	0.58***	-1.48***	0.26**	1.73***	0.88***	0.27***	1.16***
	(-4.95)	(-0.17)	(4.15)	(-8.88)	(2.04)	(7.77)	(9.62)	(2.93)	(7.83)
Investment	-0.39***	0.14*	0.52***	-1.10***	0.53***	1.63***	0.71***	0.39***	1.11***
	(-3.80)	(1.76)	(5.28)	(-7.62)	(4.85)	(8.91)	(6.98)	(4.08)	(6.98)
Net Stock Issue	-0.59***	0.38***	0.97***	-1.22***	0.64***	1.86***	0.63***	0.26***	0.89***
	(-6.02)	(4.05)	(8.23)	(-8.45)	(5.32)	(9.73)	(6.84)	(3.25)	(6.50)
Accrual	-0.48***	-0.01	0.48***	-1.17***	0.41***	1.58***	0.69***	0.42***	1.10***
	(-4.15)	(-0.09)	(4.61)	(-7.95)	(3.36)	(8.24)	(8.73)	(3.99)	(7.10)
Net Operating Asset	-0.67***	0.19*	0.86***	-1.48***	0.44***	1.92***	0.81***	0.25***	1.06***
	(-4.98)	(1.78)	(5.25)	(-8.96)	(3.38)	(7.84)	(8.51)	(2.95)	(7.07)
Composite	-0.45***	0.15***	0.60***	-1.14***	0.47***	1.61***	0.68***	0.33***	1.01***
	(-5.59)	(2.45)	(9.25)	(-9.14)	(6.44)	(10.6)	(9.15)	(4.66)	(7.94)

Table IV
Fama-French 5-Factor Alpha

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices, which is the cross over of MA(50) and MA(200) of prices. Each month, stocks with MA(50) exceeding MA(200) are dropped in the decile portfolio Low (short leg), whereas stocks with MA(200) exceeding MA(50) are dropped in the decile portfolio High (long leg). The portfolio High-Low is the spread portfolio. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	-0.01	0.18	0.19	-0.45***	0.31**	0.76***	0.44***	0.13	0.57***
	(-0.12)	(1.53)	(1.43)	(-2.60)	(2.14)	(3.19)	(3.54)	(0.86)	(2.49)
Gross Profit	-0.05	0.23**	0.27**	-0.61***	0.54***	1.15***	0.56***	0.32***	0.88***
	(-0.42)	(2.18)	(2.18)	(-2.79)	(5.36)	(4.65)	(3.62)	(2.67)	(3.80)
Operating Profit	0.01	-0.09	-0.10	-0.59***	0.29***	0.89***	0.61***	0.38***	0.99***
	(0.11)	(-0.97)	(-0.75)	(-2.93)	(2.83)	(3.85)	(4.59)	(3.32)	(4.97)
Asset Growth	-0.39***	0.07	0.47***	-1.19***	0.23*	1.42***	0.80***	0.15	0.95***
	(-2.68)	(0.72)	(3.47)	(-5.26)	(1.76)	(4.67)	(7.46)	(1.07)	(4.30)
Investment	-0.21*	0.17*	0.38***	-0.83***	0.45***	1.28***	0.62***	0.28**	0.90***
	(-1.79)	(1.90)	(3.77)	(-4.15)	(3.86)	(4.86)	(5.14)	(2.03)	(3.94)
Net Stock Issue	-0.37***	0.25***	0.63***	-0.95***	0.43***	1.38***	0.57***	0.18*	0.75***
	(-2.90)	(2.92)	(5.32)	(-4.54)	(3.93)	(5.59)	(5.14)	(1.91)	(4.25)
Accrual	-0.41***	0.08	0.49***	-1.02***	0.39***	1.41***	0.61***	0.31**	0.92***
	(-2.87)	(0.70)	(4.83)	(-5.07)	(2.96)	(5.43)	(6.42)	(2.12)	(4.23)
Net Operating Asset	-0.55***	0.26**	0.80***	-1.25***	0.44***	1.69***	0.70***	0.19	0.89***
	(-3.65)	(2.27)	(4.82)	(-5.92)	(3.03)	(5.28)	(6.67)	(1.40)	(4.20)
Composite	-0.24**	0.15**	0.39***	-0.87***	0.38***	1.25***	0.61***	0.24**	0.86***
	(-2.33)	(1.97)	(6.46)	(-4.79)	(4.79)	(5.58)	(6.37)	(2.24)	(4.48)

Table V
Turnover Rate

This table reports the trading turnover rates of the original anomalies (Panel A) and the MA enhanced anomalies (Panel B). For Panel B, we also report the percentage of retained stocks after MA filtering. The sample period is from July 1965 to December 2013.

Anomaly	Decile	**Panel A: Original**		**Panel B: MA Enhanced**		
		Rebalance Month	Other Months	Rebalance Month	Other Months	Retained
Book-To-Market	Low	49.6	0.27	59.7	15.8	48.3
	High	59.1	0.39	69.6	13.5	59.9
Gross Profit	Low	40.1	0.36	61.5	17.0	45.7
	High	32.1	0.35	39.0	14.8	57.0
Operating Profit	Low	63.6	0.41	66.9	16.6	49.8
	High	45.7	0.32	53.4	14.7	57.4
Asset Growth	Low	87.6	0.41	99.3	16.0	55.7
	High	82.1	0.35	84.0	14.4	50.8
Investment	Low	100.2	0.37	108.0	14.8	56.4
	High	100.4	0.33	103.5	15.1	49.7
Net Stock Issue	Low	76.6	0.41	82.5	13.4	62.0
	High	84.9	0.29	88.9	15.7	48.5
Accrual	Low	91.2	0.43	102.8	14.4	56.1
	High	84.0	0.37	85.0	15.1	50.0
Net Operating Asset	Low	38.0	0.32	46.0	14.3	59.4
	High	73.3	0.34	76.4	15.1	49.3

Table VI
Different Liquidity Groups of Percentage of Zero Returns

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for stocks with different percentage of zero returns. Stocks are further divided into three groups (Low, 2, High) by their percentage of zero returns. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	%Zero	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Low	0.12	0.11	-0.00	-0.60***	0.21	0.80**	0.71***	0.09	0.81**
		(0.95)	(0.67)	(-0.01)	(-2.78)	(0.76)	(2.43)	(3.15)	(0.38)	(2.26)
	2	-0.11	0.08	0.19	-0.69***	0.39**	1.08***	0.57***	0.32**	0.89***
		(-0.85)	(0.46)	(1.03)	(-2.91)	(2.02)	(3.59)	(3.21)	(1.99)	(3.34)
	High	-0.19	0.37**	0.56***	-0.27	0.54***	0.81***	0.08	0.17	0.25
		(-1.20)	(2.09)	(2.99)	(-1.16)	(3.33)	(2.80)	(0.64)	(0.95)	(1.00)
Gross Profit	Low	0.14	0.26**	0.11	-0.67**	0.76***	1.43***	0.82***	0.50***	1.31***
		(0.88)	(2.17)	(0.62)	(-2.15)	(4.30)	(4.13)	(2.86)	(3.29)	(3.93)
	2	0.00	0.18	0.18	-0.77***	0.64***	1.41***	0.77***	0.46***	1.23***
		(0.01)	(1.40)	(0.97)	(-2.63)	(4.16)	(4.32)	(3.35)	(2.78)	(4.02)
	High	-0.08	0.28*	0.36**	-0.43	0.54***	0.97***	0.35*	0.25*	0.60**
		(-0.50)	(1.84)	(2.09)	(-1.52)	(4.05)	(3.10)	(1.81)	(1.86)	(2.19)
Operating Profit	Low	0.08	-0.09	-0.17	-0.74**	0.35*	1.09***	0.81***	0.45***	1.26***
		(0.41)	(-0.77)	(-0.83)	(-2.35)	(1.68)	(3.08)	(3.22)	(2.46)	(3.98)
	2	-0.11	-0.15	-0.03	-0.66**	0.23*	0.89**	0.54***	0.38***	0.92***
		(-0.55)	(-1.24)	(-0.15)	(-1.94)	(1.81)	(2.42)	(2.46)	(2.52)	(3.19)
	High	0.07	-0.21	-0.29	-0.35	0.15	0.50	0.42**	0.36**	0.78***
		(0.40)	(-1.49)	(-1.50)	(-1.33)	(0.92)	(1.58)	(2.21)	(2.09)	(2.86)
Asset Growth	Low	-0.22	-0.00	0.22	-1.55***	0.30	1.85***	1.33***	0.30*	1.63***
		(-1.39)	(-0.01)	(1.26)	(-5.52)	(1.47)	(4.85)	(6.34)	(1.69)	(5.25)
	2	-0.62***	-0.07	0.55***	-1.50***	-0.00	1.50***	0.89***	0.07	0.95***
		(-3.66)	(-0.46)	(3.09)	(-5.78)	(-0.01)	(4.07)	(5.77)	(0.30)	(3.06)
	High	-0.52***	0.27	0.79***	-1.09***	0.48***	1.57***	0.56***	0.22	0.78***
		(-2.50)	(1.50)	(4.02)	(-3.86)	(2.86)	(4.82)	(4.21)	(1.19)	(3.10)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	%Zero	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Low	-0.14	0.30**	0.43***	-0.85***	0.61***	1.46***	0.71***	0.31*	1.02***
		(-0.93)	(2.19)	(2.58)	(-3.21)	(3.27)	(4.21)	(3.67)	(1.80)	(3.32)
	2	-0.35**	0.08	0.42***	-1.27***	0.68***	1.95***	0.92***	0.61***	1.53***
		(-2.32)	(0.54)	(2.47)	(-4.96)	(3.59)	(5.71)	(4.96)	(3.16)	(4.94)
	High	-0.30*	0.09	0.39***	-0.74***	0.16	0.90***	0.44***	0.07	0.51*
		(-1.74)	(0.60)	(2.58)	(-2.99)	(0.73)	(2.58)	(3.30)	(0.27)	(1.66)
Net Stock Issue	Low	-0.26	0.09	0.35	-1.32***	0.29	1.60***	1.06***	0.19	1.25***
		(-1.35)	(0.71)	(1.55)	(-4.78)	(1.38)	(4.13)	(5.51)	(1.30)	(4.48)
	2	-0.49***	0.36**	0.84***	-0.93***	0.54***	1.46***	0.44***	0.18	0.62***
		(-3.07)	(2.40)	(5.46)	(-3.44)	(2.92)	(4.85)	(2.53)	(1.20)	(2.55)
	High	-0.37**	0.35**	0.71***	-0.72***	0.49**	1.20***	0.35**	0.14	0.49
		(-1.96)	(2.40)	(4.21)	(-2.57)	(2.39)	(3.37)	(2.17)	(0.61)	(1.60)
Accrual	Low	-0.47***	0.20	0.67***	-1.36***	0.56***	1.92***	0.89***	0.36**	1.25***
		(-2.79)	(1.19)	(3.83)	(-5.21)	(2.80)	(5.64)	(4.18)	(2.23)	(4.38)
	2	-0.57***	-0.05	0.52***	-1.24***	0.41	1.64***	0.67***	0.45	1.12***
		(-2.99)	(-0.33)	(3.40)	(-4.82)	(1.45)	(3.96)	(4.03)	(1.49)	(2.97)
	High	-0.49***	0.18	0.67***	-0.76***	0.46***	1.23***	0.27*	0.29	0.56**
		(-2.46)	(0.97)	(4.45)	(-2.60)	(2.59)	(3.97)	(1.84)	(1.50)	(2.19)
Net Operating Asset	Low	-0.67***	0.31**	0.99***	-1.63***	0.52**	2.15***	0.96***	0.21	1.16***
		(-3.65)	(2.05)	(3.95)	(-6.80)	(2.19)	(5.43)	(5.56)	(1.12)	(4.13)
	2	-0.73***	0.25*	0.98***	-1.48***	0.30	1.78***	0.75***	0.05	0.80***
		(-3.48)	(1.66)	(4.47)	(-5.24)	(1.58)	(4.35)	(4.13)	(0.23)	(2.71)
	High	-0.54***	0.28*	0.82***	-1.03***	0.57***	1.59***	0.49***	0.28**	0.77***
		(-2.79)	(1.67)	(4.31)	(-3.91)	(2.78)	(4.61)	(3.57)	(1.94)	(3.42)

Table VII
Different Liquidity Groups of Bid-Ask Spread

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for stocks with different bid-ask spread. Stocks are further divided into three groups (Low, 2, High) by their bid-ask spread. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Spread	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Low	0.56***	0.15	-0.41*	0.02	0.25	0.23	0.54***	0.10	0.64**
		(3.73)	(0.93)	(-1.76)	(0.11)	(1.27)	(0.73)	(2.76)	(0.60)	(2.22)
	2	0.03	-0.06	-0.09	-0.53*	0.19	0.72*	0.56**	0.24	0.81**
		(0.20)	(-0.26)	(-0.38)	(-1.63)	(0.76)	(1.81)	(2.39)	(1.02)	(2.09)
	High	-0.32	0.24	0.56**	-0.39	0.27	0.66	0.07	0.03	0.10
		(-1.18)	(0.92)	(2.17)	(-1.05)	(0.93)	(1.56)	(0.40)	(0.12)	(0.32)
Gross Profit	Low	0.22	0.36***	0.14	-0.73**	0.52***	1.25***	0.95***	0.16	1.11***
		(1.28)	(3.05)	(0.64)	(-2.24)	(2.64)	(3.15)	(2.86)	(1.12)	(2.80)
	2	-0.36	0.17	0.53**	-1.01***	0.30*	1.31***	0.65**	0.12	0.77**
		(-1.41)	(0.95)	(2.24)	(-2.68)	(1.74)	(3.29)	(2.43)	(0.66)	(2.13)
	High	-0.34	-0.12	0.22	-0.78*	0.30	1.08**	0.44*	0.42	0.86**
		(-1.03)	(-0.46)	(0.81)	(-1.71)	(1.29)	(2.22)	(1.74)	(1.62)	(2.13)
Operating Profit	Low	0.00	0.18	0.17	-0.98***	0.31**	1.29***	0.99***	0.13	1.12***
		(0.03)	(1.45)	(0.92)	(-2.74)	(1.94)	(3.19)	(3.04)	(1.06)	(2.85)
	2	-0.30	-0.08	0.22	-0.62*	0.20	0.81**	0.31	0.28*	0.59*
		(-1.46)	(-0.56)	(0.98)	(-1.84)	(1.19)	(2.05)	(1.39)	(1.68)	(1.77)
	High	-0.32	-0.11	0.21	-0.79*	0.35**	1.14***	0.47**	0.46*	0.92***
		(-0.94)	(-0.46)	(0.78)	(-1.82)	(2.25)	(2.69)	(2.36)	(1.89)	(2.92)
Asset Growth	Low	-0.09	0.34**	0.43**	-1.06***	0.45*	1.51***	0.98***	0.10	1.08***
		(-0.64)	(2.34)	(2.35)	(-3.66)	(1.83)	(3.37)	(4.28)	(0.51)	(2.99)
	2	-0.59**	-0.12	0.47**	-1.38***	0.10	1.48***	0.79***	0.22	1.01***
		(-2.41)	(-0.62)	(2.03)	(-3.98)	(0.42)	(2.96)	(4.42)	(0.73)	(2.59)
	High	-0.90***	-0.08	0.82***	-1.39***	-0.01	1.38***	0.49***	0.07	0.56
		(-2.60)	(-0.27)	(2.92)	(-3.38)	(-0.02)	(3.08)	(3.37)	(0.25)	(1.61)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Spread	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Low	0.14	0.31**	0.17	-0.75***	0.45	1.20***	0.89***	0.14	1.03***
		(0.92)	(2.27)	(1.06)	(-2.73)	(1.53)	(2.79)	(3.64)	(0.55)	(2.47)
	2	-0.52***	-0.09	0.43	-1.51***	0.11	1.62***	0.99***	0.20	1.19***
		(-2.70)	(-0.42)	(1.62)	(-4.72)	(0.45)	(3.79)	(4.39)	(0.79)	(2.95)
	High	-0.40	0.09	0.49**	-0.79**	0.46***	1.25***	0.39***	0.37	0.76**
		(-1.35)	(0.39)	(2.30)	(-2.25)	(2.45)	(3.23)	(2.54)	(1.48)	(2.38)
Net Stock Issue	Low	-0.11	0.04	0.15	-0.89***	-0.07	0.82**	0.77***	-0.11	0.67***
		(-0.76)	(0.26)	(0.85)	(-2.95)	(-0.30)	(2.33)	(3.51)	(-0.91)	(2.47)
	2	-0.70***	-0.10	0.61**	-1.07***	0.01	1.07***	0.36**	0.10	0.47
		(-3.48)	(-0.45)	(2.43)	(-3.46)	(0.02)	(2.61)	(1.93)	(0.49)	(1.44)
	High	-0.68**	0.24	0.92***	-1.27***	0.15	1.42***	0.59***	-0.09	0.50
		(-2.20)	(1.07)	(3.36)	(-3.18)	(0.54)	(3.08)	(3.89)	(-0.37)	(1.52)
Accrual	Low	-0.05	0.39***	0.45**	-0.74**	0.31	1.05***	0.68***	-0.09	0.60**
		(-0.28)	(2.51)	(2.04)	(-2.27)	(1.35)	(2.48)	(3.39)	(-0.47)	(2.03)
	2	-0.68***	-0.23	0.44**	-1.16***	0.05	1.21***	0.48**	0.28	0.76*
		(-2.89)	(-1.16)	(2.25)	(-3.04)	(0.18)	(2.68)	(2.02)	(0.97)	(1.84)
	High	-0.64**	-0.26	0.38	-1.35***	0.19	1.55***	0.71***	0.46	1.17***
		(-1.96)	(-0.75)	(1.17)	(-3.45)	(0.78)	(3.54)	(3.84)	(1.50)	(3.20)
Net Operating Asset	Low	-0.43**	0.46***	0.90***	-1.23***	0.86***	2.09***	0.79***	0.40**	1.19***
		(-2.35)	(3.19)	(3.37)	(-4.47)	(3.10)	(4.36)	(4.56)	(2.00)	(4.12)
	2	-0.82***	0.23	1.04***	-1.52***	0.63**	2.15***	0.71***	0.41	1.11***
		(-3.38)	(1.21)	(4.65)	(-4.66)	(2.40)	(4.15)	(4.33)	(1.34)	(2.80)
	High	-0.88***	0.06	0.93***	-1.41***	0.15	1.57***	0.54***	0.10	0.63**
		(-2.85)	(0.21)	(3.14)	(-3.70)	(0.67)	(3.56)	(3.39)	(0.45)	(2.23)

Table VIII
Different Liquidity Groups of Amihud Measure

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for stocks with different Amihud measure. Stocks are further divided into three groups (Low, 2, High) by their Amihud measure. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Amihud	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Low	0.18*	0.12	-0.06	-0.33*	0.04	0.37	0.51***	-0.08	0.43
		(1.71)	(0.72)	(-0.32)	(-1.67)	(0.15)	(1.08)	(3.01)	(-0.32)	(1.32)
	2	0.04	0.17	0.13	-0.59**	0.58***	1.17***	0.63***	0.41***	1.04***
		(0.34)	(1.01)	(0.65)	(-2.35)	(3.16)	(4.21)	(3.09)	(2.55)	(3.65)
	High	-0.33***	0.12	0.45**	-0.62***	0.16	0.78***	0.29**	0.04	0.33
		(-2.47)	(0.72)	(2.38)	(-2.88)	(0.83)	(2.56)	(2.18)	(0.26)	(1.53)
Gross Profit	Low	0.26*	0.23*	-0.03	-0.32	0.48***	0.80***	0.58***	0.25*	0.83***
		(1.73)	(1.71)	(-0.17)	(-1.28)	(2.71)	(2.46)	(2.76)	(1.63)	(2.69)
	2	0.05	0.10	0.05	-0.44	0.28**	0.73**	0.49***	0.18	0.67**
		(0.30)	(0.76)	(0.30)	(-1.62)	(1.99)	(2.32)	(2.81)	(1.12)	(2.43)
	High	-0.38**	0.17	0.54***	-0.98***	0.65***	1.63***	0.61***	0.48***	1.09***
		(-2.33)	(1.16)	(3.16)	(-3.71)	(4.16)	(5.43)	(3.05)	(3.20)	(4.26)
Operating Profit	Low	0.21	-0.03	-0.25	-0.53*	0.12	0.64*	0.74***	0.15	0.89***
		(1.20)	(-0.31)	(-1.27)	(-1.70)	(0.84)	(1.86)	(3.31)	(1.16)	(3.06)
	2	-0.01	-0.22**	-0.21	-0.50**	0.32	0.82**	0.49**	0.54**	1.03***
		(-0.08)	(-2.00)	(-1.09)	(-1.98)	(1.23)	(2.21)	(2.43)	(1.98)	(2.95)
	High	-0.25*	-0.26*	-0.01	-0.60***	0.29**	0.90***	0.36**	0.55***	0.91***
		(-1.79)	(-1.84)	(-0.06)	(-2.54)	(2.39)	(3.28)	(2.18)	(3.83)	(3.96)
Asset Growth	Low	-0.31**	0.08	0.39**	-1.35***	0.15	1.50***	1.04***	0.07	1.11***
		(-1.92)	(0.57)	(2.06)	(-5.16)	(0.78)	(4.26)	(6.27)	(0.44)	(4.32)
	2	-0.47***	-0.09	0.38**	-1.16***	0.06	1.22***	0.69***	0.15	0.84***
		(-2.62)	(-0.64)	(2.01)	(-4.19)	(0.35)	(3.05)	(4.48)	(0.69)	(2.62)
	High	-0.65***	0.12	0.77***	-1.61***	0.42**	2.03***	0.96***	0.30**	1.26***
		(-3.70)	(0.81)	(4.53)	(-6.46)	(2.43)	(6.87)	(6.58)	(1.95)	(5.65)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Amihud	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Low	-0.18	0.24*	0.42***	-1.06***	0.26	1.32***	0.88***	0.02	0.90***
		(-1.16)	(1.79)	(2.56)	(-3.77)	(1.26)	(3.36)	(4.87)	(0.09)	(2.89)
	2	-0.21	0.08	0.29*	-0.79***	0.49***	1.27***	0.58***	0.41**	0.99***
		(-1.34)	(0.59)	(1.67)	(-3.17)	(2.62)	(3.66)	(3.09)	(2.09)	(3.29)
	High	-0.35**	0.03	0.38***	-0.93***	0.54***	1.47***	0.58***	0.51***	1.09***
		(-2.31)	(0.23)	(2.59)	(-4.23)	(3.46)	(5.64)	(3.28)	(3.10)	(4.12)
Net Stock Issue	Low	-0.30**	0.14	0.44***	-0.87***	0.14	1.01***	0.57***	-0.00	0.56***
		(-2.01)	(1.32)	(2.73)	(-3.24)	(1.14)	(3.24)	(3.25)	(-0.04)	(2.44)
	2	-0.32**	0.27**	0.58***	-0.96***	0.49***	1.45***	0.64***	0.22*	0.87***
		(-1.99)	(2.18)	(3.38)	(-3.88)	(3.02)	(4.73)	(4.19)	(1.77)	(3.89)
	High	-0.58***	0.21	0.79***	-1.25***	0.49***	1.73***	0.67***	0.28**	0.95***
		(-3.71)	(1.57)	(4.78)	(-5.26)	(3.17)	(5.79)	(3.72)	(1.98)	(3.76)
Accrual	Low	-0.26*	0.00	0.26*	-0.94***	-0.03	0.91***	0.68***	-0.04	0.65**
		(-1.68)	(0.00)	(1.73)	(-3.78)	(-0.17)	(2.65)	(3.90)	(-0.17)	(2.05)
	2	-0.43***	-0.01	0.43***	-1.12***	0.35**	1.47***	0.69***	0.35*	1.04***
		(-2.48)	(-0.04)	(2.62)	(-4.19)	(1.96)	(4.33)	(3.93)	(1.87)	(3.52)
	High	-0.72***	-0.03	0.69***	-1.31***	0.36*	1.67***	0.59***	0.39**	0.98***
		(-4.03)	(-0.19)	(4.84)	(-5.57)	(1.81)	(5.76)	(4.22)	(2.02)	(3.89)
Net Operating Asset	Low	-0.52***	0.32**	0.84***	-1.47***	0.41*	1.88***	0.95***	0.09	1.04***
		(-3.18)	(2.13)	(3.89)	(-5.51)	(1.83)	(4.74)	(5.73)	(0.53)	(3.86)
	2	-0.54***	0.27*	0.81***	-1.09***	0.38*	1.47***	0.55***	0.11	0.66**
		(-3.00)	(1.71)	(3.90)	(-4.24)	(1.78)	(3.55)	(3.26)	(0.51)	(2.14)
	High	-0.66***	0.00	0.66***	-1.35***	0.27	1.62***	0.69***	0.27*	0.96***
		(-3.84)	(0.02)	(3.32)	(-6.21)	(1.21)	(5.01)	(6.13)	(1.68)	(4.44)

Table IX
Different Information Uncertainty Groups of Idiosyncratic Volatility

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for stocks with different idiosyncratic volatility. Stocks are further divided into three groups (Low, 2, High) by their idiosyncratic volatility. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Idio. Vol.	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Low	0.10	0.38***	0.28*	-0.32**	0.43***	0.75***	0.42***	0.05	0.46***
		(1.18)	(2.85)	(1.79)	(-2.10)	(2.99)	(3.46)	(2.82)	(0.51)	(2.50)
	2	0.24***	0.27**	0.03	-0.12	0.39	0.52	0.36**	0.12	0.48
		(2.58)	(2.08)	(0.21)	(-0.65)	(1.56)	(1.62)	(2.27)	(0.46)	(1.47)
	High	-0.41**	-0.12	0.29	-0.96***	0.19	1.15***	0.54***	0.31	0.86***
		(-2.23)	(-0.59)	(1.29)	(-3.11)	(0.97)	(3.04)	(2.88)	(1.57)	(2.67)
Gross Profit	Low	-0.03	0.33***	0.36**	-0.22	0.61***	0.83***	0.19	0.28***	0.47**
		(-0.26)	(3.68)	(2.34)	(-1.14)	(4.95)	(3.36)	(1.20)	(3.16)	(2.41)
	2	0.17	0.50***	0.33**	-0.42	0.67***	1.10***	0.59***	0.18	0.77***
		(1.16)	(4.14)	(1.93)	(-1.51)	(4.45)	(3.35)	(2.83)	(1.15)	(2.62)
	High	-0.24	-0.12	0.11	-1.15***	0.38***	1.53***	0.92***	0.50***	1.42***
		(-1.15)	(-0.71)	(0.58)	(-3.60)	(2.62)	(4.52)	(3.84)	(2.66)	(4.12)
Operating Profit	Low	0.18*	0.11	-0.07	-0.34*	0.23*	0.56***	0.52***	0.11	0.64***
		(1.79)	(1.27)	(-0.58)	(-1.76)	(1.88)	(2.52)	(3.22)	(1.17)	(3.14)
	2	0.27**	0.04	-0.24	-0.18	0.14	0.32	0.45***	0.11	0.56**
		(1.96)	(0.36)	(-1.49)	(-0.79)	(1.04)	(1.17)	(2.48)	(0.89)	(2.41)
	High	-0.46**	-0.44***	0.02	-1.23***	0.48***	1.71***	0.77***	0.92***	1.68***
		(-2.12)	(-2.66)	(0.10)	(-3.79)	(2.75)	(4.86)	(3.97)	(3.96)	(5.30)
Asset Growth	Low	-0.01	0.10	0.11	-0.82***	0.20	1.02***	0.81***	0.09	0.91***
		(-0.10)	(0.83)	(0.88)	(-4.25)	(1.45)	(4.25)	(5.46)	(0.97)	(4.56)
	2	-0.27*	0.37***	0.63***	-1.11***	0.43**	1.54***	0.84***	0.07	0.90***
		(-1.79)	(2.98)	(3.67)	(-4.91)	(2.10)	(4.09)	(6.50)	(0.32)	(3.18)
	High	-0.93***	-0.24	0.70***	-1.79***	0.06	1.85***	0.85***	0.30	1.15***
		(-3.80)	(-1.21)	(3.27)	(-5.25)	(0.26)	(4.19)	(5.60)	(1.16)	(3.42)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Idio. Vol.	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Low	-0.08	0.18*	0.26***	-0.41**	0.30***	0.71***	0.34**	0.11	0.45**
		(-0.84)	(1.82)	(2.56)	(-2.06)	(2.50)	(3.23)	(2.08)	(1.29)	(2.22)
	2	0.05	0.22**	0.17	-0.62***	0.47***	1.09***	0.67***	0.25*	0.92***
		(0.29)	(2.24)	(1.04)	(-2.55)	(3.00)	(3.24)	(4.27)	(1.62)	(3.44)
	High	-0.66***	0.10	0.76***	-1.50***	0.62***	2.13***	0.84***	0.53**	1.37***
		(-3.24)	(0.51)	(3.86)	(-4.93)	(2.80)	(5.07)	(5.04)	(1.95)	(3.87)
Net Stock Issue	Low	-0.18	0.21**	0.39***	-0.48***	0.28***	0.76***	0.31**	0.07	0.38**
		(-1.59)	(2.38)	(3.43)	(-2.58)	(2.50)	(3.95)	(2.21)	(0.92)	(2.23)
	2	-0.13	0.32***	0.45***	-0.86***	0.42***	1.28***	0.72***	0.10	0.82***
		(-0.92)	(2.91)	(2.70)	(-3.57)	(2.83)	(4.22)	(4.70)	(0.95)	(3.84)
	High	-0.85***	0.16	1.01***	-1.53***	0.47***	1.99***	0.68***	0.31	0.99***
		(-4.16)	(1.01)	(5.02)	(-5.15)	(2.65)	(5.31)	(4.30)	(1.45)	(3.28)
Accrual	Low	-0.14	0.05	0.19	-0.57***	0.26*	0.84***	0.43***	0.21*	0.65***
		(-1.11)	(0.48)	(1.51)	(-3.19)	(1.72)	(4.21)	(3.50)	(1.65)	(3.31)
	2	-0.22	0.37***	0.59***	-0.71***	0.44***	1.15***	0.48***	0.07	0.55**
		(-1.32)	(2.64)	(3.45)	(-3.03)	(2.82)	(3.75)	(3.65)	(0.43)	(2.24)
	High	-0.92***	-0.28	0.64***	-1.81***	0.35	2.16***	0.90***	0.63**	1.52***
		(-4.38)	(-1.36)	(3.61)	(-5.64)	(1.36)	(4.83)	(4.72)	(2.26)	(3.90)
Net Operating Asset	Low	-0.26**	0.08	0.35***	-0.68***	0.20	0.88***	0.41***	0.12	0.53***
		(-2.29)	(0.72)	(2.61)	(-3.74)	(1.28)	(3.66)	(3.18)	(1.24)	(2.97)
	2	-0.37**	0.40***	0.77***	-1.11***	0.55**	1.65***	0.73***	0.15	0.89***
		(-2.30)	(3.14)	(3.90)	(-4.86)	(2.42)	(4.14)	(4.24)	(0.78)	(2.80)
	High	-1.07***	0.20	1.27***	-1.97***	0.53**	2.50***	0.89***	0.33	1.23***
		(-4.39)	(1.18)	(5.11)	(-6.13)	(2.19)	(5.15)	(5.92)	(1.38)	(3.82)

Table X
Different Information Uncertainty Groups of Firm Age

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for stocks with different firm age. Stocks are further divided into three groups (Low, 2, High) by their firm age. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Firm Age	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Young	0.04	0.05	0.01	-0.50*	0.21	0.71**	0.54***	0.17	0.71***
		(0.27)	(0.25)	(0.03)	(-1.92)	(1.18)	(2.36)	(3.37)	(1.34)	(3.10)
	2	-0.06	0.17	0.23	-0.38**	0.40**	0.78***	0.32**	0.23	0.54*
		(-0.59)	(1.11)	(1.33)	(-1.92)	(2.04)	(2.65)	(2.02)	(1.12)	(1.85)
	Old	0.02	0.19	0.18	-0.33**	0.15	0.49*	0.35***	-0.04	0.31
		(0.15)	(1.32)	(0.89)	(-2.08)	(0.85)	(1.90)	(2.47)	(-0.19)	(1.20)
Gross Profit	Young	-0.07	0.23	0.30	-0.99***	0.50***	1.49***	0.92***	0.27*	1.18***
		(-0.35)	(1.48)	(1.45)	(-2.80)	(2.95)	(3.92)	(3.47)	(1.70)	(3.47)
	2	-0.07	0.34***	0.41**	-0.80***	0.65***	1.45***	0.73***	0.31**	1.04***
		(-0.50)	(2.46)	(2.27)	(-3.15)	(4.73)	(5.12)	(3.74)	(2.37)	(3.98)
	Old	0.04	0.10	0.07	-0.19	0.38***	0.58*	0.23	0.28**	0.51*
		(0.28)	(0.90)	(0.41)	(-0.80)	(2.91)	(1.91)	(1.14)	(2.03)	(1.83)
Operating Profit	Young	0.05	-0.40***	-0.45**	-1.07***	0.16	1.23***	1.12***	0.56***	1.67***
		(0.27)	(-2.95)	(-2.41)	(-3.32)	(0.99)	(3.56)	(5.15)	(3.36)	(5.61)
	2	-0.10	0.02	0.12	-0.52**	0.33***	0.85***	0.42**	0.31**	0.73***
		(-0.65)	(0.17)	(0.67)	(-2.15)	(2.52)	(3.01)	(2.30)	(2.28)	(3.00)
	Old	-0.07	0.02	0.09	-0.25	0.15	0.40	0.18	0.14	0.32
		(-0.44)	(0.17)	(0.54)	(-0.89)	(1.11)	(1.26)	(1.03)	(1.04)	(1.28)
Asset Growth	Young	-0.53***	0.11	0.64***	-1.44***	0.13	1.57***	0.91***	0.02	0.93***
		(-2.77)	(0.75)	(2.96)	(-5.00)	(0.67)	(4.23)	(5.58)	(0.11)	(3.32)
	2	-0.35**	0.00	0.35*	-1.26***	0.44**	1.69***	0.91***	0.43**	1.34***
		(-2.18)	(0.00)	(1.91)	(-5.21)	(2.25)	(4.80)	(6.45)	(2.31)	(4.87)
	Old	-0.43***	-0.04	0.39***	-1.00***	0.03	1.03***	0.56***	0.08	0.64***
		(-2.89)	(-0.37)	(2.61)	(-4.08)	(0.25)	(3.43)	(4.19)	(0.51)	(2.66)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Firm Age	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Young	-0.37**	0.15	0.52***	-1.30***	0.63***	1.93***	0.93***	0.48**	1.41***
		(-2.00)	(1.14)	(2.89)	(-4.48)	(3.46)	(5.32)	(4.72)	(2.40)	(4.90)
	2	-0.21	0.22*	0.42***	-0.74***	0.43***	1.16***	0.53***	0.21	0.74***
		(-1.41)	(1.69)	(2.78)	(-3.25)	(2.75)	(3.99)	(3.41)	(1.30)	(2.77)
	Old	-0.20*	0.08	0.28**	-0.66***	0.23	0.90***	0.46***	0.15	0.61**
		(-1.79)	(0.77)	(2.25)	(-3.30)	(1.08)	(2.72)	(3.08)	(0.68)	(1.99)
Net Stock Issue	Young	-0.56***	0.07	0.63***	-1.32***	0.24	1.57***	0.76***	0.18	0.94***
		(-3.20)	(0.53)	(3.58)	(-5.26)	(1.58)	(5.14)	(5.15)	(1.30)	(4.34)
	2	-0.36**	0.35***	0.71***	-1.02***	0.47***	1.49***	0.66***	0.12	0.78***
		(-2.21)	(3.30)	(4.22)	(-3.98)	(2.95)	(4.47)	(3.96)	(0.89)	(3.11)
	Old	-0.30**	0.24***	0.54***	-0.54**	0.43***	0.97***	0.24	0.19*	0.43**
		(-2.20)	(2.46)	(4.01)	(-2.30)	(3.74)	(3.74)	(1.57)	(1.78)	(2.14)
Accrual	Young	-0.42**	0.28	0.70***	-1.15***	0.57***	1.72***	0.73***	0.29	1.02***
		(-2.27)	(1.61)	(3.78)	(-4.15)	(2.69)	(4.65)	(4.49)	(1.35)	(3.33)
	2	-0.52***	0.14	0.66***	-1.01***	0.59***	1.60***	0.49***	0.45***	0.93***
		(-2.87)	(0.81)	(3.86)	(-4.11)	(3.02)	(5.25)	(3.46)	(2.63)	(3.85)
	Old	-0.28**	-0.13	0.15	-0.97***	-0.02	0.95***	0.69***	0.11	0.79***
		(-1.94)	(-0.96)	(1.19)	(-4.21)	(-0.14)	(3.56)	(4.84)	(0.62)	(3.13)
Net Operating Asset	Young	-0.64***	0.36***	1.00***	-1.39***	0.68***	2.07***	0.75***	0.33**	1.08***
		(-3.32)	(2.82)	(4.17)	(-5.11)	(3.66)	(5.13)	(4.08)	(1.99)	(3.94)
	2	-0.57***	0.20	0.76***	-1.38***	0.44**	1.82***	0.81***	0.25	1.06***
		(-3.04)	(1.11)	(3.54)	(-5.69)	(2.06)	(5.28)	(6.01)	(1.60)	(4.68)
	Old	-0.49***	0.12	0.61***	-0.88***	0.09	0.98***	0.39***	-0.03	0.36
		(-3.36)	(0.85)	(3.30)	(-3.98)	(0.55)	(3.03)	(2.76)	(-0.17)	(1.47)

Table XI
Different Information Uncertainty Groups of Analyst Following

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for stocks with different analyst following. Stocks are further divided into three groups (Low, 2, High) by their analyst following. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Analyst Follow	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Few	-0.37**	0.29	0.66***	-0.96***	0.40**	1.36***	0.59***	0.11	0.70***
		(-2.04)	(1.57)	(3.26)	(-3.30)	(2.12)	(3.87)	(3.42)	(0.64)	(2.48)
	2	0.07	0.17	0.10	-0.34*	0.37**	0.71***	0.40***	0.20	0.60**
		(0.63)	(1.29)	(0.63)	(-1.65)	(2.23)	(2.61)	(2.68)	(1.22)	(2.37)
	More	0.30**	-0.09	-0.39**	-0.00	-0.04	-0.04	0.30*	0.05	0.35
		(2.31)	(-0.65)	(-1.97)	(-0.01)	(-0.28)	(-0.14)	(1.89)	(0.26)	(1.20)
Gross Profit	Few	-0.40**	0.23	0.63***	-1.34***	0.56***	1.89***	0.93***	0.33**	1.26***
		(-1.94)	(1.56)	(3.38)	(-3.87)	(3.84)	(5.40)	(3.69)	(2.14)	(3.85)
	2	0.01	0.24*	0.23	-0.38*	0.56***	0.94***	0.39**	0.32**	0.71***
		(0.12)	(1.90)	(1.47)	(-1.74)	(4.22)	(3.54)	(2.30)	(2.16)	(2.67)
	More	0.31*	0.22	-0.08	-0.43	0.32**	0.76**	0.74***	0.10	0.84***
		(1.68)	(1.62)	(-0.42)	(-1.36)	(2.17)	(1.98)	(2.89)	(0.75)	(2.52)
Operating Profit	Few	-0.49**	-0.03	0.47**	-1.17***	0.48***	1.65***	0.68***	0.50***	1.18***
		(-2.32)	(-0.17)	(2.35)	(-3.60)	(3.53)	(4.48)	(3.48)	(2.71)	(3.94)
	2	-0.01	-0.06	-0.05	-0.54**	0.27**	0.81***	0.53***	0.33***	0.86***
		(-0.04)	(-0.52)	(-0.27)	(-2.29)	(2.03)	(2.97)	(3.21)	(2.54)	(3.68)
	More	0.19	-0.07	-0.26*	-0.42	-0.02	0.40	0.61***	0.05	0.66***
		(1.24)	(-0.80)	(-1.73)	(-1.59)	(-0.15)	(1.38)	(3.30)	(0.42)	(2.64)
Asset Growth	Few	-0.75***	0.02	0.77***	-1.62***	0.27	1.89***	0.87***	0.25	1.13***
		(-3.08)	(0.09)	(3.49)	(-5.35)	(1.54)	(5.16)	(7.15)	(1.27)	(4.25)
	2	-0.49***	0.07	0.56***	-1.26***	0.26	1.51***	0.76***	0.19	0.95***
		(-3.18)	(0.61)	(3.22)	(-5.06)	(1.52)	(4.37)	(5.82)	(1.11)	(3.71)
	More	-0.04	0.01	0.05	-0.74***	0.10	0.84**	0.70***	0.09	0.79***
		(-0.22)	(0.07)	(0.27)	(-2.74)	(0.50)	(2.14)	(5.14)	(0.41)	(2.65)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Analyst Follow	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Few	-0.50***	0.15	0.65***	-1.31***	0.69***	2.00***	0.81***	0.54***	1.34***
		(-2.88)	(0.88)	(3.95)	(-5.02)	(3.90)	(6.05)	(5.68)	(2.69)	(4.66)
	2	-0.26**	0.11	0.36***	-0.89***	0.39***	1.28***	0.64***	0.28**	0.92***
		(-1.96)	(1.01)	(2.46)	(-4.11)	(2.86)	(4.65)	(3.88)	(2.15)	(3.91)
	More	0.04	0.07	0.03	-0.52*	0.16	0.67*	0.56***	0.08	0.64**
		(0.24)	(0.58)	(0.27)	(-1.87)	(0.75)	(1.78)	(3.52)	(0.36)	(1.94)
Net Stock Issue	Few	-0.80***	0.43***	1.22***	-1.54***	0.55***	2.09***	0.74***	0.12	0.87***
		(-3.78)	(2.55)	(6.05)	(-4.82)	(3.45)	(5.92)	(4.55)	(0.80)	(3.48)
	2	-0.34***	0.14	0.48***	-0.97***	0.38***	1.35***	0.63***	0.24**	0.87***
		(-2.62)	(1.55)	(3.59)	(-4.56)	(2.99)	(5.09)	(4.80)	(2.22)	(4.37)
	More	-0.15	0.17*	0.31**	-0.48*	0.16	0.64**	0.33**	-0.01	0.33
		(-0.96)	(1.82)	(2.15)	(-1.82)	(1.32)	(2.10)	(2.06)	(-0.05)	(1.57)
Accrual	Few	-0.67***	-0.03	0.65***	-1.31***	0.51**	1.81***	0.63***	0.54**	1.17***
		(-2.87)	(-0.14)	(3.30)	(-4.18)	(2.26)	(4.69)	(4.20)	(2.33)	(3.65)
	2	-0.47***	0.06	0.53***	-0.95***	0.36**	1.31***	0.48***	0.30*	0.78***
		(-3.06)	(0.41)	(3.65)	(-4.16)	(2.30)	(4.52)	(3.39)	(1.77)	(3.05)
	More	-0.16	0.04	0.20	-0.82***	0.13	0.95***	0.65***	0.09	0.74***
		(-1.03)	(0.28)	(1.45)	(-3.08)	(0.84)	(2.88)	(4.52)	(0.53)	(2.72)
Net Operating Asset	Few	-0.73***	0.09	0.82***	-1.62***	0.43***	2.05***	0.89***	0.34**	1.24***
		(-3.26)	(0.54)	(3.73)	(-5.96)	(2.49)	(5.91)	(7.22)	(2.25)	(5.57)
	2	-0.69***	0.28**	0.98***	-1.38***	0.35**	1.73***	0.69***	0.07	0.76***
		(-4.86)	(2.18)	(5.23)	(-6.30)	(2.00)	(4.98)	(5.33)	(0.46)	(3.05)
	More	-0.25	0.46***	0.71***	-0.88***	0.59***	1.47***	0.64***	0.13	0.76***
		(-1.40)	(2.98)	(2.96)	(-3.41)	(2.66)	(3.59)	(4.78)	(0.76)	(3.12)

Table XII
Characteristics of Stocks Dropped

This table reports the differences between the stocks retained (*Kept*) and dropped after MA filter in various variables. The dummy variable represents the difference between stocks dropped and retained. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Accounting Fundamentals						
	BM	GP	OP	AG	IK	NS	NOA
	Decile Low						
Kept	0.584***	0.429***	0.519***	0.539***	2.710*	0.150***	1.068***
	(22.22)	(104.12)	(6.39)	(33.36)	(1.66)	(9.25)	(78.62)
Dummy	0.061***	0.005	-0.141	-0.069***	-1.745	-0.032*	-0.061***
	(3.63)	(0.80)	(-1.52)	(-4.93)	(-1.07)	(-1.96)	(-5.12)
	Decile High						
Kept	0.815***	0.385***	-0.142*	0.101***	0.695***	0.060***	0.612***
	(24.46)	(65.73)	(-1.92)	(11.43)	(4.47)	(3.89)	(57.31)
Dummy	-0.077***	-0.019***	0.121	0.066***	0.384	0.005	0.051***
	(-3.90)	(-2.93)	(1.57)	(5.34)	(1.09)	(0.33)	(4.82)
	Panel B: Market Attributes						
	$r_{t-13,t-2}$	IVol	Dispersion	Amihud	Spread	$\%Zero$	Volume
	Decile Low						
Kept	-0.151***	3.195***	0.379***	13.35***	0.031***	0.276***	9.291***
	(-8.95)	(45.81)	(13.00)	(16.80)	(13.32)	(27.93)	(9.06)
Dummy	0.667***	-0.593***	-0.218***	-4.342***	-0.011***	-0.043***	3.922***
	(38.33)	(-14.10)	(-7.82)	(-7.50)	(-10.40)	(-8.28)	(5.03)
	Decile High						
Kept	0.565***	2.540***	0.210***	10.32***	0.020***	0.239***	15.13***
	(18.57)	(65.17)	(15.76)	(19.56)	(13.23)	(27.30)	(5.55)
Dummy	-0.620***	0.523***	0.214***	4.801***	0.010***	0.042***	-4.599**
	(-31.07)	(12.29)	(6.51)	(6.31)	(10.23)	(8.89)	(-2.44)

Table XIII
Investor Sentiment

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices under different levels of investor sentiment, respectively. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Investor Sentiment	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Low	-0.01	0.34***	0.35**	-0.40*	0.37	0.77**	0.39**	0.03	0.42
		(-0.09)	(2.57)	(2.23)	(-1.79)	(1.51)	(2.17)	(2.20)	(0.11)	(1.23)
	High	0.02	-0.00	-0.02	-0.39	0.22	0.61*	0.40***	0.22	0.63**
		(0.10)	(-0.03)	(-0.09)	(-1.41)	(1.39)	(1.90)	(2.47)	(1.46)	(2.21)
Gross Profit	Low	0.07	0.15	0.08	-0.22	0.55***	0.77***	0.29*	0.40**	0.69***
		(0.58)	(1.26)	(0.47)	(-1.00)	(3.87)	(3.00)	(1.68)	(2.32)	(2.68)
	High	-0.19	0.35**	0.54***	-1.05***	0.58***	1.63***	0.87***	0.23	1.10***
		(-0.88)	(1.97)	(2.84)	(-2.88)	(3.99)	(4.24)	(3.65)	(1.60)	(3.14)
Operating Profit	Low	0.23*	-0.00	-0.24	-0.38*	0.37**	0.75***	0.61***	0.37**	0.99***
		(1.66)	(-0.02)	(-1.25)	(-1.89)	(2.33)	(2.99)	(3.33)	(2.05)	(3.64)
	High	-0.22	-0.14	0.09	-0.78**	0.26*	1.04***	0.56***	0.40***	0.96***
		(-1.06)	(-1.32)	(0.43)	(-2.27)	(1.89)	(2.64)	(3.12)	(2.86)	(3.47)
Asset Growth	Low	-0.18	0.21*	0.39***	-1.03***	0.43**	1.46***	0.85***	0.22	1.08***
		(-1.34)	(1.84)	(2.47)	(-4.40)	(2.36)	(4.25)	(6.14)	(1.37)	(4.46)
	High	-0.61***	-0.07	0.54***	-1.31***	-0.02	1.29***	0.70***	0.06	0.75**
		(-2.60)	(-0.42)	(2.72)	(-3.77)	(-0.10)	(2.88)	(4.79)	(0.24)	(2.16)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Investor Sentiment	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Low	-0.01	0.19**	0.20	-0.62***	0.43**	1.05***	0.61***	0.24	0.85***
		(-0.11)	(2.14)	(1.29)	(-3.04)	(2.13)	(3.42)	(3.55)	(1.43)	(3.20)
	High	-0.41**	0.16	0.57***	-1.01***	0.48***	1.49***	0.61***	0.31	0.92***
		(-2.22)	(1.00)	(4.73)	(-3.31)	(3.07)	(3.80)	(3.97)	(1.41)	(2.63)
Net Stock Issue	Low	-0.13	0.27**	0.41***	-0.83***	0.45***	1.28***	0.69***	0.18	0.87***
		(-1.18)	(2.44)	(2.84)	(-4.48)	(2.62)	(4.61)	(5.52)	(1.15)	(3.65)
	High	-0.60***	0.24**	0.84***	-1.03***	0.43***	1.46***	0.43***	0.19*	0.62***
		(-2.78)	(1.95)	(4.75)	(-2.99)	(3.29)	(3.86)	(2.58)	(1.69)	(2.56)
Accrual	Low	-0.24	0.29**	0.53***	-0.96***	0.47**	1.43***	0.72***	0.18	0.89***
		(-1.61)	(2.42)	(3.72)	(-4.37)	(2.14)	(4.16)	(5.64)	(0.91)	(3.27)
	High	-0.59***	-0.09	0.50***	-1.03***	0.33**	1.36***	0.44***	0.42**	0.86***
		(-2.54)	(-0.45)	(3.40)	(-3.17)	(2.19)	(3.73)	(3.38)	(1.97)	(2.74)
Net Operating Asset	Low	-0.27*	0.41***	0.67***	-1.02***	0.45**	1.48***	0.76***	0.05	0.81***
		(-1.67)	(2.72)	(3.14)	(-4.18)	(2.30)	(3.85)	(5.36)	(0.36)	(3.38)
	High	-0.86***	0.14	1.00***	-1.43***	0.41**	1.84***	0.57***	0.26	0.84***
		(-3.81)	(0.89)	(4.07)	(-4.60)	(2.08)	(4.04)	(4.02)	(1.33)	(2.76)
Composite	Low	-0.06	0.25***	0.32***	-0.70***	0.44***	1.13***	0.61***	0.21	0.82***
		(-0.73)	(3.11)	(4.38)	(-4.24)	(3.52)	(4.68)	(5.50)	(1.50)	(3.78)
	High	-0.43**	0.07	0.50***	-1.00***	0.33***	1.34***	0.57***	0.26*	0.83***
		(-2.39)	(0.57)	(5.01)	(-3.32)	(3.43)	(3.84)	(4.06)	(1.64)	(2.90)

Table XIV
Market Volatility

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices under different levels of market volatility, respectively. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

		Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Market Volatility	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	Low	-0.23**	0.17	0.40***	-0.90***	0.42***	1.33***	0.68***	0.26***	0.93***
		(-2.42)	(1.42)	(2.58)	(-5.25)	(3.01)	(6.25)	(4.72)	(2.56)	(5.27)
	High	0.27**	0.20	-0.07	0.05	0.15	0.10	0.22	-0.05	0.17
		(2.04)	(1.16)	(-0.35)	(0.21)	(0.68)	(0.27)	(1.32)	(-0.20)	(0.50)
Gross Profit	Low	-0.10	0.14	0.24	-0.55**	0.54***	1.09***	0.44***	0.41***	0.85***
		(-0.83)	(1.31)	(1.25)	(-2.32)	(4.97)	(3.66)	(2.50)	(4.69)	(3.86)
	High	-0.01	0.48***	0.49***	-0.62**	0.65***	1.27***	0.60***	0.17	0.78**
		(-0.08)	(3.17)	(2.97)	(-2.07)	(3.44)	(3.56)	(3.05)	(0.86)	(2.33)
Operating Profit	Low	-0.05	-0.20**	-0.15	-0.79***	0.17	0.96***	0.74***	0.37***	1.11***
		(-0.36)	(-2.10)	(-0.80)	(-3.60)	(1.36)	(4.17)	(3.52)	(3.73)	(4.85)
	High	0.16	0.13	-0.02	-0.31	0.42***	0.73**	0.47***	0.29	0.75***
		(0.84)	(0.95)	(-0.12)	(-1.04)	(2.50)	(2.04)	(3.00)	(1.50)	(2.66)
Asset Growth	Low	-0.47***	0.05	0.51***	-1.44***	0.18	1.62***	0.97***	0.14	1.11***
		(-4.48)	(0.39)	(3.75)	(-6.81)	(1.08)	(5.70)	(6.21)	(1.27)	(5.34)
	High	-0.22	0.20	0.42**	-0.83***	0.30*	1.14***	0.61***	0.10	0.71**
		(-1.01)	(1.33)	(2.22)	(-2.68)	(1.78)	(2.77)	(4.77)	(0.45)	(2.28)

		Panel A: Original			Panel B: MA Enhanced			Panle C: Improvement		
Anomaly	Market Volatility	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Investment	Low	-0.32***	0.12	0.44***	-1.05***	0.54***	1.59***	0.73***	0.42***	1.15***
		(-2.51)	(1.32)	(2.92)	(-5.17)	(4.42)	(7.07)	(3.95)	(4.36)	(5.23)
	High	-0.04	0.30**	0.34***	-0.43	0.43**	0.86**	0.39***	0.13	0.52*
		(-0.22)	(2.24)	(2.49)	(-1.56)	(2.39)	(2.33)	(2.91)	(0.61)	(1.69)
Net Stock Issue	Low	-0.32***	0.25***	0.57***	-1.04***	0.53***	1.56***	0.72***	0.27**	1.00***
		(-3.35)	(2.49)	(4.11)	(-6.21)	(2.97)	(5.96)	(5.34)	(2.24)	(4.64)
	High	-0.31	0.36***	0.67***	-0.69**	0.39***	1.07***	0.38***	0.03	0.40*
		(-1.60)	(2.82)	(3.80)	(-2.27)	(2.67)	(3.10)	(2.50)	(0.18)	(1.67)
Accrual	Low	-0.44***	0.05	0.49***	-1.12***	0.44**	1.56***	0.68***	0.38***	1.07***
		(-3.75)	(0.52)	(3.53)	(-7.29)	(2.36)	(5.85)	(4.96)	(2.60)	(4.52)
	High	-0.20	0.22	0.42***	-0.69**	0.35**	1.03***	0.49***	0.13	0.62**
		(-0.95)	(1.36)	(2.92)	(-2.33)	(2.11)	(2.75)	(3.75)	(0.59)	(2.01)
Net Operating Asset	Low	-0.56***	0.26*	0.82***	-1.47***	0.43**	1.90***	0.91***	0.17*	1.08***
		(-4.88)	(1.63)	(4.53)	(-8.49)	(2.27)	(6.25)	(6.12)	(1.84)	(5.24)
	High	-0.41*	0.31**	0.73***	-0.90***	0.38**	1.28***	0.49***	0.07	0.55**
		(-1.86)	(2.16)	(3.12)	(-3.04)	(2.01)	(2.98)	(3.68)	(0.35)	(1.96)
Composite	Low	-0.30***	0.12*	0.43***	-1.06***	0.41***	1.45***	0.73***	0.31***	1.03***
		(-4.28)	(1.82)	(6.31)	(-8.45)	(4.17)	(8.39)	(7.14)	(4.19)	(6.55)
	High	-0.09	0.28**	0.37***	-0.55**	0.38***	0.93***	0.45***	0.11	0.56**
		(-0.59)	(2.43)	(4.26)	(-2.11)	(3.12)	(2.89)	(3.75)	(0.61)	(2.06)

Table XV
Alternative Specifications of MA Filter

This table reports the improvement in Fama-French five-factor alpha using various alternative specifications of moving average (MA) filter of prices. For example, *MA(1)-MA(200)* means a specification where the short-term signal is MA(1), one-day MA, and the long-term signal is MA(200), 200-day MA. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
MA(5)-MA(200)	-0.24**	0.15**	0.39***	-0.72***	0.28***	0.99***	0.47***	0.12	0.59***
	(-2.33)	(1.97)	(6.45)	(-3.71)	(3.39)	(4.00)	(4.22)	(1.08)	(2.79)
MA(10)-MA(200)	-0.24**	0.15**	0.39***	-0.79***	0.32***	1.11***	0.54***	0.17	0.71***
	(-2.33)	(1.97)	(6.45)	(-4.10)	(4.01)	(4.57)	(4.90)	(1.50)	(3.40)
MA(20)-MA(200)	-0.24**	0.15**	0.39***	-0.84***	0.34***	1.17***	0.58***	0.19*	0.77***
	(-2.33)	(1.97)	(6.45)	(-4.42)	(4.36)	(5.00)	(5.52)	(1.69)	(3.82)
MA(100)-MA(200)	-0.24**	0.15**	0.39***	-0.83***	0.43***	1.25***	0.57***	0.28***	0.85***
	(-2.33)	(1.97)	(6.45)	(-4.47)	(4.79)	(5.66)	(5.95)	(2.58)	(4.60)

Table XVI
Value Weighted Fama-French 5-Factor Alpha

This table reports the improvement in Fama-French five-factor alpha using the moving average (MA) filter of prices for value-weighted decile portfolios. The MA filter is the cross over of MA(50) and MA(200) of prices. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	0.22**	0.17	-0.06	-0.31**	0.10	0.41	0.54***	-0.07	0.46*
	(2.40)	(1.35)	(-0.31)	(-2.13)	(0.44)	(1.55)	(3.50)	(-0.36)	(1.77)
Gross Profit	-0.04	0.61***	0.65***	-0.18	0.70***	0.88***	0.14	0.09	0.23
	(-0.35)	(3.98)	(3.71)	(-0.88)	(3.35)	(2.65)	(0.78)	(0.90)	(1.01)
Operating Profit	0.31	0.02	-0.29	-0.45**	0.10	0.55**	0.76***	0.08	0.84***
	(1.38)	(0.24)	(-1.37)	(-2.02)	(0.77)	(2.06)	(3.38)	(0.74)	(3.12)
Asset Growth	0.03	-0.13	-0.17	-0.97***	-0.07	0.89***	1.00***	0.06	1.06***
	(0.27)	(-0.93)	(-0.87)	(-4.64)	(-0.33)	(2.80)	(5.91)	(0.43)	(4.25)
Investment	0.02	0.17	0.15	-0.74***	0.32*	1.06***	0.75***	0.16	0.91***
	(0.14)	(1.52)	(1.01)	(-3.70)	(1.68)	(3.32)	(3.75)	(0.98)	(2.92)
Net Stock Issue	-0.29***	0.23**	0.51***	-0.74***	0.19	0.92***	0.45***	-0.04	0.41**
	(-2.60)	(2.27)	(3.21)	(-3.46)	(1.26)	(3.21)	(2.85)	(-0.37)	(2.10)
Accrual	-0.24*	0.33**	0.58***	-1.10***	0.38*	1.49***	0.86***	0.05	0.91***
	(-1.74)	(1.99)	(3.01)	(-5.36)	(1.75)	(4.83)	(5.29)	(0.33)	(3.71)
Net Operating Asset	-0.29**	0.27**	0.56***	-1.13***	0.31	1.44***	0.84***	0.04	0.88***
	(-2.15)	(1.95)	(2.75)	(-5.39)	(1.61)	(4.71)	(4.97)	(0.28)	(3.60)
Composite	-0.03	0.21***	0.24***	-0.70***	0.24*	0.96***	0.66***	0.05	0.71***
	(-0.39)	(2.82)	(3.44)	(-4.79)	(1.86)	(4.19)	(5.39)	(0.48)	(3.61)

Table XVII
Carhart 4-Factor Alpha

This table reports the improvement in Carhart four-factor alpha using the moving average (MA) filter of prices, which is the cross over of MA(50) and MA(200) of prices. Each month, stocks with MA(50) exceeding MA(200) are dropped in the decile portfolio Low (short leg), whereas stocks with MA(200) exceeding MA(50) are dropped in the decile portfolio High (long leg). The portfolio High-Low is the spread portfolio. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	0.24**	0.00	0.24*	0.21	-0.28**	0.50***	-0.02	0.28***	0.26*
	(2.22)	(0.01)	(1.72)	(1.55)	(-1.97)	(2.67)	(-0.20)	(2.87)	(1.67)
Gross Profit	0.44***	-0.20*	0.64***	0.51***	-0.62***	1.11***	0.07	0.41***	0.48***
	(4.81)	(-1.79)	(4.81)	(4.96)	(-3.39)	(5.88)	(0.85)	(3.30)	(3.43)
Operating Profit	0.17*	-0.21	0.38**	0.29***	-0.65***	0.91***	0.12	0.43***	0.54***
	(1.71)	(-1.45)	(2.06)	(2.82)	(-3.45)	(4.29)	(1.31)	(4.07)	(4.38)
Asset Growth	-0.35***	0.13	0.48***	-1.03***	-0.01	1.04***	0.67***	-0.09	0.58***
	(-3.49)	(1.13)	(3.98)	(-7.49)	(-0.05)	(6.31)	(7.89)	(-0.87)	(4.34)
Investment	-0.16*	0.25***	0.41***	-0.71***	0.33***	1.02***	0.54***	0.08	0.62***
	(-1.64)	(2.67)	(4.33)	(-4.98)	(3.23)	(6.77)	(5.18)	(0.92)	(4.12)
Net Stock Issue	-0.37***	0.44***	0.81***	-0.77***	0.46***	1.23***	0.40***	0.02	0.42***
	(-3.90)	(4.70)	(6.71)	(-5.70)	(4.03)	(7.97)	(4.64)	(0.22)	(3.69)
Accrual	-0.26**	0.12	0.38***	-0.78***	0.15	0.97***	0.51***	0.08	0.59***
	(-2.20)	(1.13)	(3.73)	(-5.87)	(1.21)	(6.00)	(7.49)	(0.73)	(4.40)
Net Operating Asset	-0.41***	0.28***	0.69***	-0.99***	0.15	1.23***	0.57***	-0.05	0.52***
	(-3.59)	(2.56)	(4.73)	(-7.85)	(1.12)	(6.39)	(6.69)	(-0.64)	(4.23)
Composite	-0.25***	0.26***	0.50***	-0.73***	0.26***	1.00***	0.48***	0.03	0.50***
	(-3.00)	(3.60)	(8.48)	(-6.35)	(3.90)	(9.08)	(7.25)	(0.40)	(5.27)

Table XVIII
HXZ 4-Factor Alpha

This table reports the improvement in Hou et al. (2015) four-factor alpha using the moving average (MA) filter of prices, which is the cross over of MA(50) and MA(200) of prices. Panel A, B, and C report the alphas of the original anomalies, MA enhanced anomalies, and the difference between the MA enhanced and original anomalies, respectively. Newey and West (1987) robust t-statistics are in parentheses and significance at the 1%, 5%, and 10% levels is given by an ***, and **, and an *, respectively. The sample period is from July 1965 to December 2013.

	Panel A: Original			**Panel B: MA Enhanced**			**Panle C: Improvement**		
Anomaly	Low	High	High-Low	Low	High	High-Low	Low	High	High-Low
Book-To-Market	0.22	0.15	0.07	0.19	-0.13	0.33	-0.03	0.29**	0.25
	(1.28)	(1.13)	(0.34)	(1.14)	(-0.63)	(1.22)	(-0.21)	(2.04)	(0.98)
Gross Profit	0.37**	0.03	0.35**	0.44***	-0.37	0.76***	0.06	0.38**	0.44*
	(2.31)	(0.16)	(2.22)	(3.38)	(-1.36)	(2.82)	(0.43)	(2.30)	(1.65)
Operating Profit	-0.03	0.14	-0.17	0.07	-0.33	0.38	0.10	0.45***	0.55**
	(-0.23)	(0.67)	(-0.71)	(0.76)	(-1.24)	(1.35)	(0.75)	(3.28)	(2.40)
Asset Growth	-0.24	0.21	0.46***	-0.88***	0.07	0.95***	0.62***	-0.12	0.50*
	(-1.32)	(1.43)	(2.95)	(-3.25)	(0.44)	(2.70)	(5.66)	(-0.61)	(1.81)
Investment	-0.09	0.29**	0.38***	-0.56**	0.29**	0.82***	0.46***	-0.00	0.46*
	(-0.62)	(2.02)	(3.43)	(-2.36)	(2.08)	(2.77)	(3.69)	(-0.01)	(1.72)
Net Stock Issue	-0.26	0.32***	0.58***	-0.63***	0.27***	0.90***	0.37***	-0.05	0.32*
	(-1.60)	(2.47)	(4.86)	(-2.47)	(2.56)	(3.68)	(3.15)	(-0.41)	(1.70)
Accrual	-0.23	0.18	0.41***	-0.67***	0.22	0.89***	0.41***	0.07	0.48**
	(-1.16)	(1.06)	(3.58)	(-2.56)	(1.61)	(3.07)	(4.73)	(0.38)	(2.01)
Net Operating Asset	-0.34*	0.26*	0.59***	-0.87***	0.18	1.10***	0.50***	-0.04	0.47**
	(-1.76)	(1.92)	(3.23)	(-3.58)	(1.26)	(3.36)	(5.23)	(-0.26)	(2.16)
Composite	-0.11	0.23*	0.33***	-0.55***	0.21***	0.77***	0.43***	-0.00	0.43**
	(-0.75)	(1.85)	(5.67)	(-2.44)	(2.52)	(3.16)	(4.30)	(-0.01)	(1.94)