경영학석사학위논문

Mutual Funds and the Asset Growth Anomaly

2015 년 2 월

서울대학교 대학원

경영학과 회계학전공

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Mutual Funds and the Asset Growth Anomaly

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Abstracts: This paper examines whether actively managed mutual funds exploit the asset growth anomaly in the U.S. stock market. Using data on mutual funds' stock holdings and fund returns for the period of 1985 - 2012, I find that mutual funds do not generally trade on and profit from the asset growth signal. Few mutual funds persistently invest in low growth stocks and enjoy higher fund returns. I further explore possible explanations why mutual funds do not trade on the asset growth anomaly. Higher return volatilities or idiosyncratic risks do not appear to explain why actively managed mutual funds do not trade on the asset growth anomaly. Analysts' more favorable recommendations toward high growth stocks hinder mutual funds from implementing the strategy. Overall, the findings shed light on our understanding of the persistence of the asset growth anomaly.

Keywords: Asset growth anomaly, Mutual funds, Analyst recommendation

Student number: 2014-20472

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1. Introduction

Since Cooper et al. (2008) first documented the phenomenon that firms with high total asset growth rate subsequently experience lower stock returns, many researchers extensively examined the causes underneath the phenomenon (Cooper et al. 2008, Li and Zhang 2010, Watanabe et al. 2013). Another group of papers provided evidence that the negative relation between total asset growth rate and subsequent stock returns holds in many countries (Gray and Johnson 2011, Watanabe et al. 2013, Yao et al. 2011). These papers examine the overall phenomenon related with the asset growth anomaly; however, they do not investigate specific investors' investment on the anomaly. In this paper, I focus on mutual funds, a group of investment professionals, and examine whether mutual funds trades on and profit from the asset growth signal. By doing so, I seek to shed light on an unexplored issue in the literature. Considering that asset growth is a strong predictor of future stock returns, it is likely that investors understand and trade on the signal, which is simply measured as total asset growth rate. In particular, investment professionals, who are able to attract talented investment managers, are expected to apply sophisticated investment strategies and thus more likely to profit from the asset growth signal. Nevertheless, few studies provide evidence to assess whether institutional investors exploit the asset growth anomaly.

I utilize the stock holdings and actual returns of mutual funds to address my research question. As sophisticated investors, mutual funds are arguably better at processing value-relevant signals (Cullen et al. 2010). While Fodor et al. (2009) recently document evidence that hedge funds, another group of institutional investors, exploit the asset growth anomaly, I am not aware of any research that examines whether mutual funds implement strategies based on asset growth signals. In light of the considerable differences between mutual funds and hedge funds in terms of regulations and the characteristics of investor who contribute their money to these funds, we cannot draw a clear inference on mutual funds' investment from the results on hedge funds. For instance, it is relatively unusual for mutual funds to short sell, while it is common for hedge funds to use short selling strategies (Chen et al. 2013). Also, mutual fund investors are short-term oriented compared with hedge fund investors. Thus, the test for mutual funds' trades on the asset growth anomaly provides insights on the cross-sectional variation of trading strategies among various institutional investors. I use an index based on the stock holdings to examine how mutual funds incorporate asset growth signals into their investments and implement trading accordingly. To the extent that the asset growth anomaly is exploitable and mutual funds are sophisticated enough to trade on the signal, I expect that mutual funds will take long (short) positions in low (high) growth stocks, which are undervalued (overvalued) in the market.

However, there are several reasons to believe that mutual funds do not use or fail to use the asset growth signals. Implementing anomaly-based strategies is often economically unviable in practice due to a high level of transaction costs or idiosyncratic risks involved in implementing such strategies. To trade stocks in extreme deciles, investors often need to undertake undiversifiable risks to a large extent. In addition, the fact that analysts fail to interpret asset growth signals properly (Lipson et al. 2010) and mutual funds show a tendency to rely on analysts in making their investment decisions (Brown et al. 2009, Frey and Herst 2013) can be another possible reason explaining why mutual funds fail to implement investment strategies based on asset growth signals. Moreover, mutual funds show biases in their investment. Specifically, their stock holdings are concentrated around stocks with high media coverage (Fang et al. 2010, Pool et al. 2012). Considering the above-mentioned aspects of mutual funds' behaviors, it is likely that mutual funds may miss profitable investment opportunities that arise from the anomalous phenomenon in the market. Thus, it is an empirical question whether mutual funds trade on and profit from asset growth signals.

To carry out the test, I first identify mutual funds that adopt active investment strategies and allocate most of their assets into stocks. By using Thomson Reuters Mutual Fund Holdings database for the period 1985 – 2012, I find evidence that most mutual funds do not use the asset growth anomaly. Only a small group of mutual funds appear to make use of the asset growth anomaly by taking sufficient long positions in low growth stocks, which are currently undervalued and expected to have higher stock returns subsequently. Further analyses indicate that these funds tend to hold smaller number of stocks and their total net assets are also smaller than median funds. On average, they hold 49 stocks in their portfolio and their market value amounts to 868.09 million dollars. These mutual funds tend to remain in the lowest growth decile persistently over time, which I interpret as evidence that they are intentionally pursing the asset growth anomaly strategy.

It is a puzzling result that mutual funds do not incorporate asset growth signals, because doing so proves to be a profitable strategy. Hence, I explore possible explanations why mutual funds do not use asset growth signals in their investment. I examine whether the asset growth strategy involves a high level of transaction costs or idiosyncratic risks and find that mutual funds in extreme deciles are not necessarily associated with higher return volatilities and idiosyncratic risks at the fund-level. This result implies that market frictions are less likely to be the reason mutual funds fail to use the asset growth anomaly.

This result is in contrast with the evidence that mutual funds' failure to use the accrual anomaly is at least partly attributable to return volatilities and idiosyncratic risks (Ali et al. 2008). Next, I examine the association between asset growth strategy and analyst recommendations to find out evidence for another argument that may explain the result. I find that analysts' recommendations tend to be more favorable toward stocks held by mutual funds in relatively high growth deciles. That is, mutual funds following the asset growth anomaly strategy need to invest in stocks that receive relatively less favorable recommendations from analysts. This evidence suggests that mutual funds' failure of using asset growth signals is in part attributable to that analysts' recommendation. Overall, these findings shed light on the understanding why the asset growth anomaly may persist in the market.

This paper contributes to the literature in several aspects. First, my analysis is the first to test the connection between the asset growth anomaly and mutual funds. I provide the initial evidence that mutual funds do not use asset growth signals in their investment decisions. Our results also contrast with the evidence from hedge funds, which are able to exploit the asset growth anomaly (Fodor et al. 2009). Second, I also extend the literature by providing an explanation why sophisticated market participants fail to respond to anomalous phenomenon (Ali et al. 2000, Ali et al. 2008, Lev and Nissim 2006). The influence of analysts, rather than transaction costs or idiosyncratic risk, seems to steer mutual funds away from engaging in the asset growth strategy. Our results suggest that mutual funds contribute to the persistence of the asset anomaly, adding to the debate surrounding the causes of the asset anomaly (Cooper et al. 2008, Li and Zhang 2010, Watanabe et al. 2013). Considering the growing attention to the asset growth anomaly literature, my findings should be of interest to academics since this paper provides a better understanding of the asset growth anomaly and mutual funds' behavior. It should be also of interest to analysts and investors who rely on asset growth signals in making their economic decisions.

The remainder of this paper is organized as follows. Section 2 reviews related literatures on the asset growth anomaly and mutual funds and develop testable hypotheses. In Section 3, I describe data and research design. Specifically, I carefully summarize the procedures for data treatment and the identification of mutual funds with a specific investment strategy. Section 4 shows the results of my analyses, and Section 5 concludes.

2. Literature Review and Hypotheses

2.1. Asset Growth Anomaly

There are many forms of growth anomalies documented in prior studies. Of the papers that examine the asset side of financial statements, Sloan (1996) focuses on accrual part of earnings and reports that investors fixate on earnings. As a result, high accrual stocks entail low stock returns in the subsequent period. Fairfield et al. (2003) extend the scope of analysis into net operating assets and decompose net operating assets into accruals and long-term net operating assets. Both components are negatively associated with subsequent stock returns in their study. Titman et al. (2004) examine capital expenditure from the statement of cash flows and find a negative relation between capital investments and subsequent stock returns. As an extension of this stream of research, Cooper et al. (2008) suggest a comprehensive measure of asset growth defined with total assets. Subsequent studies adopt this definition of asset growth and consistently report a negative relation between total asset growth and future stock returns (e.g., Gray and Johnson 2011, Lam and Wei 2011, Watanabe et al. 2013).

Some of the asset growth anomaly literature debates whether the observed phenomenon is a reflection of rational expectations or the mispricing. Li and Zhang (2010) attempt to explain the asset growth anomaly based on q-theory. They postulate that, as firms invest more, the incremental return from the investment decreases. The decreasing returns from investment lead to a negative relation between subsequent stock returns and investment, which is captured by the growth in total assets. Although Wu et al. (2010) find that q-theory explains the accrual anomaly, the results of Li and Zhang (2010) provide only weak evidence of q-theory in explaining the asset growth anomaly. There also exist several studies negating the risk-based explanation for the asset growth anomaly. For example, Cooper et al. (2008) suggest that the asset growth anomaly is caused by the initial overreaction of investors to changes in asset expansions. In other words, investors falsely believe that firms growing fast in the recent period would continue to have prospective business conditions and earn superior returns in the future. This extrapolation bias of investors likely contributes to subsequent low stock returns for firms with high growth. In an international setting, Watanabe et al. (2013) find that the asset growth anomaly is salient in countries with a high level of market efficiency proxies but not necessarily with a high level of limit to arbitrage proxies.[1] Their results indicate that the asset growth anomaly is more likely to be a result of the mispricing. Although prior studies extensively examines the sources of the asset growth anomaly, we know little about whether specific group of investors such as mutual funds exploit the

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[1] Lam and Wei (2011) report that both risk-based explanations and behavioral explanations account for asset growth anomaly to a similar extent in the U.S. market.

arbitrage opportunities arising from asset growth signals.

2.2. Mutual Funds

Whether institutional investors are aware of and make use of anomalies is a persistently examined topic in the accounting and finance literature. Regarding the post earnings announcement drift anomaly, at least certain types of institutional investors appear to exploit arbitrage opportunities that arise from the anomaly (Bartov et al. 2000, Ke and Ramalingegowda 2005). The empirical evidence on institutional investors' use of the accrual anomaly is mixed. Collins et al. (2003) provide evidence that institutional investors mitigate the negative relation between accruals and future stock returns. However, Ali et al. (2000) find that the naïve investor hypothesis does not explain the accrual anomaly. They provide evidence that high institutional ownership does not significantly reduce the return predictive power of accruals. Several studies indicate that institutional investors do not fully arbitrage away the accrual anomaly due to the unfavorable characteristics associated with high accrual stocks (Ali et al. 2008, Lev and Nissim 2006). These unfavorable characteristics include small firm size, high volatility of stock returns, and high transaction costs. Meanwhile, little evidence is advanced for the role of institutional investors in reducing the asset growth anomaly. Fodor et al. (2009) is one of the few papers that provide the evidence on institutional investors' use of the asset growth anomaly. They find that hedge funds are able to exploit the asset growth anomaly. However, it is unknown to date whether mutual funds are able to profit from the asset growth anomaly. Considering the substantial difference between mutual funds and hedge funds, we cannot simply draw a direct inference from the results on hedge funds' use of the asset growth anomaly. For one thing, mutual funds tend to be restrictive in their ability to take short positions, which can potentially reduce the amount of arbitrage profits from trading on asset growth rates (Chen et al. 2013). In addition, the investors who contribute their money to mutual funds are relatively short-term oriented compared with those who contribute to hedge funds. Hence, mutual fund investors may consider it unattractive to follow strategies that require a long period of time to make profit, even though the strategies pay off eventually. By examining the existence of mutual funds that pursue the asset growth anomaly, I try to fill the void in the literature. Because mutual funds manage a huge volume of assets[2], whether they are able to arbitrage from the asset growth anomaly could provide an important implication for market participants.

There are possibly two conflicting predictions on mutual funds' use of the asset growth anomaly. On one hand, mutual funds may take advantage of the

[2] According to ICI (Investment Company Institute), in 2011, more than 14,000 U.S. mutual funds exist and their assets amount to 13 trillion dollars.

cross-sectional relation between total asset growth rates and subsequent stock returns. Institutional investors, including mutual funds, are often regarded as sophisticated investors. They are managed by competent professionals who are able to analyze fundamental signals from financial statements. Since asset growth rates are readily available from financial statements, mutual funds are likely to detect the arbitrage chances from the asset growth anomaly. Prior literatures often use institutional ownership as a proxy for the degree of investors' sophistication (e.g., Bartov et al. 2000, Collins et al. 2003). The findings in the prior literatures that anomalous stock returns dissipate under the presence of institutional investors are consistent with the notion that institutions possess superior ability to assess accounting information and execute transactions accordingly.

On the other hand, it is also likely that mutual funds do not use the asset growth anomaly as a part of their investment strategy. If a high level of transaction costs or arbitrage risks accompany in implementing the strategy, mutual funds may not engage in asset growth based investment. Prior research suggests that trading stocks based on anomaly related signals is not easy, since such investment strategies require purchasing and selling stocks with unfavorable conditions such as small firm size, low stock price, and high volatilities. For example, stocks in extreme accruals deciles are associated with higher transaction costs or idiosyncratic volatilities (Collins et al. 2003, Mashruwala et al. 2006). Implementing the post-earnings announcement strategy entails similar problems, which prevents investors from taking advantage of the arbitrage opportunities (Mendelhall 2004, Ng et al. 2008). Similarly, mutual funds engaging in asset growth strategy likely suffer from a high level of transaction costs or idiosyncratic risks compared with other funds not following such a strategy.

Mutual funds may not be able to use the asset growth signals in their investment due to the analysts' influence. Mutual funds heavily rely on the information provided by analysts when they make their investment decisions. For instance, Brown et al. (2009) show that mutual funds exhibit a herding behavior as a result of following analyst recommendation revisions. Lipson et al. (2011) show that the asset growth anomaly is positively associated with analyst optimism. Thus, mutual funds' reliance on analysts implies that their investment decisions could be biased as well.[3] In other words, mutual funds following more favorable analyst opinions on high growth stocks are likely to include more of higher growth stocks into their portfolio. If analysts provide optimistically biased information on high growth stocks and pessimistically biased information to low

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[3] In untabulated results, I also find that one-year and two-year ahead analyst earnings forecasts are positively associated with asset growth rates, where asset growth rates are measured as total growth rates and components of total growth rates.

growth stocks, mutual funds, which are one of the heavy users of analyst information, are expected to take positions accordingly. In this case, mutual funds make investment positions that are just opposite to the positions making use of the asset growth anomaly. The aforementioned discussion leads to the following hypothesis.

H1: Mutual funds do not use the asset growth anomaly

3. Research Design

3.1. Data

The initial sample consists of the CRSP/Compustat Universe spanning 1985 through 2012. This dataset enables me to define asset growth rates and relevant variables used to conduct the stock-level analyses. I include only non-financial firms listed on NYSE, AMEX, and NASDAQ into the CRSP/Compustat Universe. I transform the stock-level variables into the fund-level by using appropriate weights and averaging the values. The proper treatment of delisting returns is important in anomaly research (Beaver et al. 2007, Shumway and Warther 1999) including the asset growth anomaly research (Fu 2011). Therefore, I adjust monthly returns with CRSP delisting returns and if such delisting returns are missing, I designate specific values to delisting events. Specifically, I designate -30% if the delisting is related with performance, and zero otherwise (Shumway 1997). Asset growth rate is measured at the end of June as the percentage change in total assets from the fiscal year that ends in calendar year t-2 to the fiscal year that ends in calendar year t-1 (Cooper et al 2008). Portfolios are formed at the end of June and maintained for one year and then rebalanced, when I allocate stocks into decile groups depending on asset growth rates.

I decompose total asset growth into four components, following the procedures in Cooper et al. (2008). Total assets are separated into cash, non-cash current assets, fixed assets, and other assets. To equate total asset growth rate with the sum of growth rates in components, all growth variables are scaled by lagged total assets. For instance, growth in cash component is defined as the change in cash divided by lagged total assets.[4] I impose the restriction that all observations should have non-missing values for all growth variables. All growth variables are winsorized at 0.5% and 99.5% to mitigate the effect of firms with excess growth rates. Our final sample consists of 116,096 firm-year observations for the CRSP/Compustat Universe for the period 1985 – 2012. Table 1 presents pooled descriptive statistics at the stock- and the fund-level. In Panel A of Table 1, the mean value of total asset growth rates (25.6%) equals the sum of growth rates in asset components, consistent with the way used to scale growth variables. Analysts issue favorable opinions (strong buy: 1 or buy: 2) for more than 75% of the stocks in the sample, showing the analysts' prevalent optimistic bias.

3.2. Identification of Actively Managed Mutual Funds

It is important to identify mutual funds that are potentially able to adopt the asset growth anomaly. I focus on actively managed equity-oriented mutual

[4] Alternatively, growth rate of components can be defined as change in components divided by lagged value of components. When I follow this procedure, the results are not materially changed.

funds from CRSP Survivor-bias-free Mutual Fund database (hereafter, the CRSP Mutual Fund data). By the definition of actively managed funds, I exclude index funds, since they have a passive investment style and are unlikely to change stock positions frequently enough to pursue certain investment strategies based on fundamentals (Ke and Ramlingegowda 2005). I additionally require that funds invest at least 80 percent of their assets in common stocks so that I can exclude funds that mostly invest their money into other assets such as bonds and commodities. This restriction is necessary because I examine an anomalous phenomenon in the stock market. In this process, I used several mutual funds identifiers such as Lipper objective code (*Lipper_class*), strategic insights objective code (*si_ojb_cd*), Wiesenberger objective code (*Wbrger_ojb_cd*), and policy code (*policy*) in this order, if the former identification codes are missing.[5] The resulting mutual funds are the sample base of several prior studies that examine mutual funds (Ali et al. 2008, Kacperczyk et al. 2008, Pool et al. 2012).

I then use Thomson Reuters Mutual Fund Holdings database, also referred to as CDS/Spectrum s12 (hereafter, TR Mutual Fund data). Note that this database is survivor-bias-free and reports mutual fund holdings information starting from 1980. The inputs to this database mostly consist of the mandatory Securities and Exchange Commission (SEC) filings made by mutual funds on a

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[5] Detailed explanation of mutual fund selection procedures are provided in Kacperczyk et al. (2008).

quarterly basis, except for Jan. 1985 – Feb. 2003 period, when filings were required on a semiannual basis.[6] Another important variable obtained TR Mutual Fund data is investment objective code (*ioc*), which indicates the investment strategy used by mutual funds. I use this code to further restrict the sample to those with Aggressive Growth (*wficn* = 2), Growth (*wficn* = 3), and Growth and Income (*wficn* = 4), ruling out funds that do not satisfy the definition of actively managed mutual funds.

I use *wficn* to merge CRSP Mutual Fund data with TR Mutual Fund data. *Wficn* is a permanent mutual fund identifier available from Mutual Fund Links (hereafter, MFLINK). Using this identifier is superior to using *crsp_fundno* and *fundno*, which are available from CRSP Mutual Fund data and TR Mutual Fund data, respectively. The permanent identifier, *wficn*, is not re-used over time and maintained over the life of each fund. Moreover, only one *wficn* is designated to mutual funds that are identical in asset allocations but different only in class. This way of designation is aligned with the way I treat such mutual funds.

I use June-end stock holdings information reported between the period 1985 - 2012. The final sample contains 2,784 funds and 21,345 fund-year observations in the dataset. Even though stock holdings information is available

[6] Thomson Reuters supplements their database by directly contacting to institutions that manage mutual funds. Also, there are cases when mutual funds report their quarterly holdings voluntarily during Jan. 1985 – Feb. 2003 period.

from the beginning of the year 1980, I exclude the early observations (1980 – 1984) because the number of funds that report holdings information is small. The above-mentioned procedure summarizes the steps I used to identify a group of mutual funds that are pertinent to my research.[7]

Table 1, Panel B contains several fund-level characteristics. Total net assets, turnover ratio, churn rate, expense ratio, the number of stocks, and fund age are available from CRSP Mutual Fund data. Turnover ratio is defined as the minimum of aggregate sales or purchases of securities divided by average 12-month total net assets. Because mutual funds do not always report their turnover ratio every quarter, I calculate churn rate following the procedures in Gaspar et al. (2005) to supplement mutual funds' portfolio turnover information. Churn rate shows how often the mutual fund managers rotate the positions of all stocks. Expense ratio is directly available from the database and defined as the percentage of invested money charged by fund managers. I designate size, book-to-market, and momentum scores to each fund. The breakpoints for size deciles are based only on stocks listed in NYSE and AMEX. The breakpoints for book-to-market and momentum deciles are based on all stocks in listed in NYSE, AMEX, and NASDAQ. The mean (median) value of size score is 8.636 (9.193), indicating mutual funds' preference toward large stocks. Mutual fund tend to

[7] In the remaining part of this paper, I use the term mutual funds to indicate the U.S.-based mutual funds that actively invest in stocks.

include an increasing number of stocks into their portfolio and their coverage amounts to 70.23% for the whole sample period. They hold net assets equivalent to 1370 million dollars on average, although their asset size varies greatly across mutual funds. The empirical proxies for transaction costs (turnover ratio, churn rate, and expense ratio) have positive correlations with each other (untabulated).

3.3. Identification of Mutual Funds Trading on Asset Growth

Among the funds that are classified as actively managed equity-oriented U.S. mutual funds, I attempt to identify funds that pursue the asset growth anomaly strategy. This strategy is equivalent to taking long positions in low growth stocks and, if possible, short positions in high growth stocks. I focus on the long position of mutual funds, since the dataset used in this paper does not allow me to examine the short positions of mutual funds and it is relatively rare for mutual funds to short sell. I construct a proxy for the overall degree of asset growth level of stocks owned by mutual funds. This measure enables me to examine whether a mutual fund has stock holdings inclined to low asset growth deciles. Following the method used in Grinblatt et al. (1995) and Ali et al. (2008), I define asset growth investing measure as the weighted average of individual stock's asset growth rank, where the weight is the market value of individual stocks within a mutual fund scaled by the total market value of a mutual fund.

The equation (1) shows how the total asset growth investing measure (hereafter, *TIM*) is constructed.

$$TIM_{jt} = \sum_{i=1}^{N} w_{ijt} * Rank\ of\ ASSETG_{it} \qquad (1)$$

, where i, j, and t denote an individual stock, a mutual fund, and year, respectively. The weight w_{ijt} is defined as $\frac{n_{ijt}p_{it}}{\sum_{i=1}^{N} n_{ijt}p_{it}}$. N is the total number of stocks owned by a mutual fund, n is the number of shares owned by a mutual fund for each stock, and p is the stock price at quarter-end.

TIM_{jt} means the weighted average of asset growth rank of N different stocks owned by a mutual fund j at the June-end in year t. This variable takes a value between 1 and 10, and the smaller this variable, the more a mutual fund pursues asset growth anomaly strategy by taking long positions in low growth stocks. To the extent that mutual funds are able to exploit the asset growth anomaly, I expect mutual funds to have lower asset growth rates at the fund level. Following Ali et al. (2008), I set up median funds with mutual funds whose asset growth investing measure falls between 45 and 55 percentile annually. This group of mutual funds represent serve as a benchmark to evaluate whether specific mutual funds follow the asset growth anomaly strategy.

4. Results

4.1. Asset Growth Anomaly and Mutual Funds

I first test the cross-sectional relation between asset growth rates and subsequent stocks returns. Stocks are annually sorted into decile portfolios based on their asset growth rate. Table 2 summarizes the descriptive statistics by the stock-level asset growth decile and provide the relevant information to ascertain the cross-sectional relation between asset growth rates and one-year ahead stock returns suggested by Cooper et al. (2008). Panel A of Table 2 is based on all stocks in the CRSP/Compustat Universe. Consistent with the asset growth anomaly, stocks with high (low) asset growth have relatively low (high) stock returns in the subsequent period. The raw returns during the subsequent one-year period show a decreasing pattern as asset growth rate increases. Additionally, Fama-French 3-factor alpha (Fama and French 1993) and DGTW stock returns (Daniel et al. 1997) also indicate almost monotonically decreasing patterns for high growth stocks, adding robustness to the results. The hedge returns are significantly positive for raw returns, DGTW returns, and Fama-French 3-factor alpha. These results confirm the cross-sectional relation between asset growth rates and future returns. When I conduct the same test based on a subset of stocks held by mutual funds, the results are qualitatively similar. The raw returns, DGTW returns, and Fama-French 3-factor alpha all indicate decreasing patterns as the asset growth rate of stocks increases. Compared with the results based on all stocks in the CRSP/Compustat Universe, the stocks held by mutual funds show a higher level of returns across asset growth deciles. This result suggests that mutual funds generally hold stocks generating higher returns, partly providing evidence for the superior stock picking ability of mutual funds. Note that the stock returns in Panel B do not consider fund fees that mutual funds charge to investors.

Table 2 also reports market capitalization, return volatility, and idiosyncratic volatility of stocks in each decile. The stocks in extreme deciles have smaller market capitalization than stocks in the middle decile portfolios. Return volatility and idiosyncratic volatility are greater for stocks in the highest and lowest growth deciles than for those in the other deciles. These results imply that trading stocks in extreme deciles could be potentially risky, consistent with the findings in prior studies that executing accrual anomaly strategy is not easily implementable for risk-averse arbitrageurs due to the high idiosyncratic risk associated with stocks in extreme deciles (Mashruwala et al. 2006). The stocks held by mutual funds also reveal that stocks in extreme deciles are relatively small and have higher return volatilities and idiosyncratic risks. Consistent with the findings at the institution-level (Ferreira and Matos 2008, Gompers and

Metrick 2001), I find that mutual funds also tend to hold stocks with relatively bigger market capitalization. They also prefer stocks with smaller return volatilities and idiosyncratic volatilities. The stock holdings of mutual funds are inclined to stocks in middle deciles rather than in extreme deciles, which imply that mutual funds hesitate to hold stocks with higher idiosyncratic risks.

4.2. Existence of Mutual Funds Exploiting Asset Growth

In this section, I examine whether mutual funds perceive the asset growth anomaly as a source of a profitable investment strategy. A possible investment strategy that one can develop from the observed cross-sectional relation between asset growth and subsequent stock returns is to take long positions in low growth stocks, which are undervalued. Although positively significant hedge returns imply an arbitrage opportunity, mutual funds in general may decide not to pursue the asset growth anomaly due to transaction costs or arbitrage risks. Asset growth investing measure (*TIM*) of 5.500 indicates an indifferent preference toward high and low growth stocks. The mutual funds with 5.500 asset growth investing measure have a balanced position in terms of the asset growth of stocks they possess. Table 3 reports that mutual funds have asset growth investing measures ranging from 4.785 to 8.000. In addition, median funds have asset growth investing of 6.260, which means that median mutual funds in terms of the asset growth rate tend to own more of high growth stocks than low growth stocks. More than 80% of mutual funds in the sample prefer to include high growth stocks rather than low growth stocks. Considering that I examine only the long positions of mutual funds, it is necessary to hold low growth stocks, which are undervalued, for the implementation of asset growth anomaly strategy. As a result, the results are more consistent with the view that mutual funds do not generally use asset growth anomaly strategy.

However, it is still possible that only a subset of mutual funds pursue the asset growth anomaly as their main investing strategy. Mutual funds in lowest asset growth decile (*TIM* = 1) have asset growth investing measure that is significantly smaller than median mutual funds (t-statistic = -5.04) and the midpoint of the asset growth range (t-statistic = -13.32), providing preliminary evidence that they are pursuing the asset growth anomaly strategy. A caveat here is that one cannot tell whether these funds in lowest asset growth intentionally pursue the asset growth anomaly or not. One possibility is that they happen to possess such positions in pursuit of other anomaly-based strategies, if their value relevant signals are strongly associated with the total asset growth rates. For mutual funds in each decile, I calculate the scores of well-known cross-sectional return predictors such as size, book-to-market, and momentum. Indeed, the asset growth anomaly strategy is seemingly similar to the strategies that pursue value stocks (i.e., contrarian strategy), considering asset growth investing measure being positively associated with momentum scores. To mitigate these concerns, I further test whether the mutual funds in the lowest growth decile persistently invest in low growth stocks. Also, I examine mutual funds' stock holdings to tell whether they genuinely invest in stocks as suggested by the asset growth anomaly.

Table 4 documents the results for the persistence of mutual funds' asset growth investing measures. If mutual funds do not, in fact, follow the asset growth anomaly strategy, they would move to other groups after portfolio formation. In light of this idea, I analyze the change of asset growth investing measure of mutual funds that fall into the lowest asset growth in year t over the next five-year of investment horizon. Panel A of Table 4 shows that 44.4% of these funds remain in the lowest asset growth one year later. The percentage of mutual funds that remain in the lowest asset growth continue to decrease; however, even 5 years later, more than 30% of these funds remain in the lowest asset growth. In addition, the funds that moved to other deciles tend to remain in relatively low deciles. Panel B of Table 4 reports the mean and median of asset growth investing measures over 10-year horizons. The statistics show mean-reverting characteristics of asset growth measures. Mutual funds in extreme deciles tend to move toward median funds. However, I find a high level of persistence of mutual funds in terms of asset growth measure. In the second column, I confirm that average mutual funds in the lowest asset growth tend to remain in relatively low decile groups over a long period of time. The median growth investing measures increases by just 1.0 even after five years of the portfolio formation. Therefore, the mutual funds in the lowest asset growth in year *t* seem to intentionally take long positions in low asset growth stocks to benefit from the asset growth anomaly. To sum up, even though mutual funds in general do not exhibit a tendency to favor low growth stocks, there is a group of funds that aim to earn profits from exploiting the asset growth anomaly.

To further examine whether these mutual funds actually pursue asset growth anomaly strategy, I focus on the stock holdings of mutual funds across growth deciles. Mutual funds are annually classified into decile groups based on their fund-level asset growth rates. Within each decile, stocks are sorted into decile groups based on their stock-level asset growth rates. Table 5 shows the relative proportion of stocks in different asset growth deciles. Mutual funds in the lowest asset growth (*TIM* = 1) have stock holdings inclined toward low growth stocks. These funds own stocks in asset growth decile 4 the most with 20.65% of managed assets. Mutual funds in other deciles have incrementally more stocks holdings in higher asset growth deciles, consistent with the way I sort mutual funds. Mutual funds in the highest asset growth (*TIM* = 10) have more than a quarter of their stock holdings in asset growth decile 10. The last column of Table 5 also shows the statistical difference in stock holdings between funds in the lowest asset growth and median funds. Through asset growth decile 1 to 5, mutual funds in the lowest asset growth have statistically more stock holdings than median funds. However, for the rest of deciles, median funds have more stock holdings than mutual funds in the lowest asset growth. As expected, the stock holdings of mutual funds in the lowest asset growth are statistically different from the holdings of median funds. I also need to note that even the mutual funds in the lowest asset growth do not hold low growth stocks in a monotonically increasing way. For extremely low growth rate stocks, the mutual funds in the lowest asset growth have limited stock holdings, even though their stock holdings are significantly greater than median mutual funds. Combining the results so far, I find that there are only a small number of mutual funds that possess low growth stocks. However, they seem to implement the strategy to a moderate extent.

Mutual funds may not use the asset growth signals in their investments, if implementing the strategy is associated with inferior fund performance. To investigate whether few mutual funds use the asset growth signal due to inferior fund performance, I examine fund returns, because how much returns funds can earn is a critical issue in evaluating their performance. In Table 6, I present annualized fund returns across decile portfolios. I calculate funds returns by compounding the monthly fund returns provided in the CRSP Mutual Fund data and deducting the actual fund fees from the monthly fund returns. The mutual fund returns show monotonically decreasing patterns as funds hold more of high growth stocks. Not only raw returns but also fund characteristic based DGTW returns and 3-Factor alpha consistently show evidence that fund returns are positively associated with the overall growth rate of stocks held by mutual funds. The lowest asset growth mutual funds earn significantly higher returns, compared with median funds and the highest asset growth funds. Based on the results in Table 6, it is not obvious why mutual funds do not use asset growth signals, since owning more of high low growth stocks lead to superior fund performance.

4.3. Possible Explanations for Mutual Funds' Not Using Asset Growth

In this section, I examine possible explanations why mutual funds fail to consider asset growth signals in making their investment decisions. To evaluate the argument that mutual funds fail to do so because of adverse conditions associated with the stocks in the extreme deciles, I calculate return volatilities and idiosyncratic risks at the fund-level. Table 7 reports that, contrary to the findings in Table 2 at the stock-level, mutual funds that invest in low growth stocks do not significantly suffer from return volatilities and idiosyncratic risks. Specifically, the return volatility in the lowest asset growth is rather significantly smaller than that of median funds (t-statistic = -2.26) and the funds in the highest asset growth (t-statistic = -1.95). Idiosyncratic risks, defined as the standard deviation of residuals from Fama-French factor models, are not significantly greater for funds in the low growth decile. In fact, the idiosyncratic risks of the lowest asset growth funds are insignificantly greater than those of median funds, while the idiosyncratic risks of the lowest asset growth are significantly different from those for the highest asset growth. The results indicate that higher volatilities and idiosyncratic risks hinder mutual funds from implanting the investment strategy based on the anomaly.

I also examine the possibility that mutual funds suffer from higher transaction costs or administrative costs when they implement asset growth strategies. To this end, I calculate turnover ratio, churn rate, and expense ratio. Turnover ratio is defined as the minimum of aggregate sales or purchases of securities divided by average 12-month total net assets. Because not all mutual funds report turnover ratio in their fillings, I supplement the turnover information by calculating churn rate in Gasper et al. (2005). This measure shows how often mutual fund managers change the positions of all stocks. Expense ratio is the percentage of fees that mutual funds charge to investors who contribute their money to these funds. The fund fees include the costs incurred in operating mutual funds for a certain period of time. In Panel B of Table 7, turnover ratio shows that mutual funds in the lowest asset growth decile have statistically lower turnover ratio compared with median funds or funds in the highest asset growth decile. The findings based on churn rate provide similar inferences. The churn rate of the lowest asset growth is higher than that of decile 2 and 3. However, compared with median funds or the highest asset growth funds, mutual funds pursuing asset growth strategies do not encounter higher churn rates. Rather, the churn rate of the lowest asset growth is statistically smaller than that of the highest asset growth. This result contradicts the prediction that implementing asset growth strategy requires a frequent rotation of stocks, incurring higher transaction costs. I also examine the expense ratio, which includes operational, marketing, and management fees. Assuming that management fees increase as fund managers trade stocks more frequently, turnover ratio is expected to be positively associated with transaction costs. I find that turnover ratio is not significantly greater for the lowest asset growth funds, implying that transaction costs are less likely to be the reasons for mutual funds' failure to use the asset growth signals. Overall, the idiosyncratic risks and transactions costs are less likely to be the underlying reasons for mutual funds' not using asset growth signals.

To gain further insights into mutual funds' failure to use the signal, I examine whether mutual funds fail to use asset growth signals in their investment decisions due to the biased investment recommendations issued by analysts. To the extent that analysts provide more favorable investment recommendations for high growth stocks, mutual funds may be less likely to pursue asset growth strategy, which involves purchasing low growth stocks. Prior studies provide evidence that mutual funds tend to follow analyst opinions (e.g., Brown et al. 2009, Costello and Hall 2010, Cullen et al. 2010) and analysts are optimistically biased for growth stocks (Lipson et al. 2011). To examine the impact of analyst opinions on mutual funds' investment decisions, I use analyst recommendations from I/B/E/S and relate it to the asset growth anomaly. Analyst recommendations ranging from 1 (Strong buy) to 5 (Strong sell) at 4-month after the end of a prior fiscal year end are computed across the growth deciles. Table 8 documents a significantly negative relation between fund-level asset growth deciles and analysts' recommendations. Irrespective of the weighting method that I use to calculate fund-level recommendations, the difference in analyst recommendations between the lowest asset growth and the median funds are positive and statistically significant. Analysts' recommendations increase monotonically as mutual funds' asset growth decile increases, consistent with mutual funds failing to use asset growth signals due to analysts' influence. To wrap up, it is plausible that mutual funds do not pursue asset growth strategies, which mandates mutual funds to steer away from the analysts' investment guidance and to invest in low growth stocks that receive less favorable recommendations from analysts.

5. Conclusion

This paper examines whether mutual funds exploit asset growth signals. Using data on stock holdings and monthly returns of mutual funds, I show that mutual funds do not properly use the arbitrage opportunities that asset growth anomaly generates. However, a segment of mutual funds that persistently invest in low growth stocks earn higher fund returns even after considering the fund fees. Next, I examine why mutual funds do not trade on the asset growth anomaly strategy, which prove to be highly profitable. I find that analysts' influence on mutual funds seems to steer mutual funds away from the asset growth anomaly strategy. Although I do not find any evidence that idiosyncratic risks or transaction costs prevent mutual funds from trading on asset growth signals, it is possible that unidentified factors may also explain why mutual funds do not use the asset growth anomaly.

I contribute to the literature by documenting the initial evidence that mutual funds do not use asset growth signals in their investment decisions, which is in a stark contrast with hedge funds' use of the signals. My findings suggest that there exists a varying degree of sophistication among institutional investors in terms of utilizing anomalies. Although mutual funds recently try to mimic hedge funds' investment strategies, they seem to be less sophisticated than hedge funds in using asset growth signals. Further, the fact that a large group of institutional investors do not use the asset growth signals may lead to the continuation of the anomaly, although this paper does not provide direct evidence whether the asset growth anomaly arises from the mispricing or not.

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Appendix A
Definitions of variables

Variable	Definition
ASSETG	= asset growth rate, defined as annual change in total assets divided by lagged total assets, using annual Compustat AT.
CASHG	= cash growth rate, defined as annual change in cash (annual Compustat CHE) divided by lagged total assets.
NACTG	= non-cash current asset growth rate, defined as annual change in non-cash current asset (annual Compustat ACT – annual Compustat CHE) divided by lagged total assets.
PPEG	= PP&E growth rate, defined as annual change in PP&E (annual Compustat PPENT) divided by lagged total assets.
OTHERAG	= other asset growth rate, defined as annual change in other assets (annual Compustat AT - annual Compustat ACT - annual Compustat PPENT) divided by lagged total assets.
RAWRET	= raw stock returns over the period from July in year t to June in year t+1.
DGTWRET	= portfolio-level stock returns adjusted for size, book-to-market, and momentum characteristics (Daniel et al. 1997).
SIZE	= firm size, defined as market capitalization of stocks at the December-end in year t-1. Market capitalization is again defined as the stock price times the number of outstanding shares.
RETVOL	= return volatility, defined as annualized standard deviation of stock returns over the period from July in year t to June in year t+1.
IDVOL	= idiosyncratic risk, defined as annualized standard deviation of stock return residuals from Fama-French 3-factor model.
REC	= consensus analyst recommendations from I/B/E/S Summary Statistics File. This variable has integer values ranging from 1 (Strong buy) to 5 (Strong sell). Analyst recommendation s at 4-month after the end of a prior fiscal year and are matched with accounting information of current period.
TIM	= asset growth investing measure, defined as the weighted average of individual stock's asset growth rank, where the weight is the market value of individual stocks within a mutual fund over the total market value of a mutual fund. $$TIM_{jt} = \sum_{i=1}^{N} w_{ijt} * Rank\ of\ ASSETG_{it}$$, where *i*, *j*, and *t* denote an individual stock, a mutual fund, and year, respectively. *N* is the number of stocks owned by a mutual fund, and n is the number of shares owned by a mutual fund for each stock, and p is the stock price. The weight w_{ijt} is defined as $\frac{n_{ijt}p_{it}}{\sum_{i=1}^{N} n_{ijt}p_{it}}$.
CR	= churn rate of mutual funds, following the definition in Gaspar et al. (2005). This variables indicates how often mutual funds managers rotate the positions of all stocks.

$$\mathrm{CR}_{j,t} = \frac{\sum_{i \in Q} \left| n_{i,j,t} P_{i,t} - n_{i,j,t-1} P_{j,t-1} - n_{i,j,t-1} \Delta P_{j,t} \right|}{\sum_{i \in Q} \frac{n_{i,j,t} P_{i,t} + n_{i,j,t-1} P_{i,t-1}}{2}}$$

, where *i*, *j*, and *t* denote an individual stock, a mutual fund, and year, respectively. *n* is the number of stocks of firm *i* held by a mutual fund *j* in period *t*.

TABLE 1
Descriptive Statistics

Panel A. Stock-level variables

Variable	Mean	Standard deviation	P10	Q1	Median	Q3	P90
ASSETG	0.256	0.893	-0.192	-0.042	0.067	0.236	0.671
CASHG	0.076	0.472	-0.124	-0.030	0.001	0.048	0.196
NACTG	0.057	0.189	-0.072	-0.014	0.019	0.082	0.205
PPEG	0.051	0.189	-0.042	-0.011	0.010	0.056	0.160
OTHERAG	0.052	0.242	-0.047	-0.010	0.003	0.039	0.152
RAWRET	0.119	0.854	-0.543	-0.270	0.018	0.321	0.759
DGTWRET	0.019	0.581	-0.574	-0.257	-0.003	0.258	0.607
SIZE	1,961.21	10,967.67	7.71	27.04	131.84	706.73	2,973.34
RETVOL	0.162	0.323	0.059	0.086	0.130	0.197	0.290
IDVOL	0.499	0.432	0.171	0.255	0.394	0.612	0.917
REC	2.169	0.654	1.330	1.750	2.100	2.600	3.000

Panel B. Fund-level characteristics

	Mean	Standard deviation	P10	Q1	Median	Q3	P90
Total net assets	1370.09	5781.38	17.20	59.88	219.00	801.70	2502.60
Turnover ratio (%)	82.20%	108.40%	14.00%	30.00%	60.00%	106.00%	169.00%
Churn rate (%)	20.89%	18.68%	4.83%	9.17%	16.34%	26.83%	40.93%
Expense ratio (%)	1.30%	1.40%	0.70%	0.90%	1.20%	1.50%	1.90%
# Stocks	113.54	209.06	29.00	43.00	66.00	104.00	198.00
Fund age (year)	13.32	6.37	5.00	9.00	13.00	18.00	23.00
Size score	8.636	1.440	6.514	7.844	9.193	9.740	9.901
Book-to-market score	4.096	1.461	2.460	3.086	3.896	4.866	5.867
Momentum score	7.218	1.206	5.638	6.413	7.267	8.066	8.722

Table 1 reports descriptive statistics at stock- and fund-levels. Panel A shows descriptive statistics of variables defined at stock-level. The definitions of variables are summarized in Appendix A. The number of firm-year observations in the CRSP/Compustat Universe is 115,271. *SIZE* is expressed in million dollars. Panel B presents fund-level characteristics at the end of June each year. The number of funds is 2,784 and the number of fund-year observations is 21,345. Total net assets, turnover ratio, expense ratio, the number of stocks, and fund age are obtained from CRSP Mutual Funds database. Total net asset means the market value of net assets held by mutual funds, reported in millions of dollars. Turnover ratio is defined as the minimum of aggregate sales or purchases of securities divided by average 12-month total net assets. Expense ratio is the amount of money paid by investors out of their invested money for the operation of funds. Churn rate, defined as in Gaspar et al. (2005), shows how often mutual fund managers rotate the positions of all stocks. Size, book-to-market, and momentum scores are calculated in 1 – 10 scale. The breakpoints for size deciles are based only listed in NYSE and AMEX, and the breakpoints for book-to-market and momentum deciles are based on all stocks listed in NYSE, AMEX, and NASDAQ. Total net assets are expressed in million dollars.

TABLE 2
Stock Returns across Asset Growth Deciles

Panel A. All stocks in the CRSP/Compustat Universe

ASSETG deciles	N	*RAWRET*	*DGTWRET*	3-factor alpha	*SIZE*	*RETVOL*	*IDVOL*
1	437	0.1887	0.0941	0.0747	442	0.8252	0.7619
2	438	0.1925	0.0485	0.0824	952	0.6586	0.5718
3	438	0.1667	0.0401	0.0420	1,905	0.5076	0.4583
4	438	0.1586	0.0336	0.0402	2,481	0.4434	0.3960
5	438	0.1423	0.0205	0.0289	2,835	0.4188	0.3703
6	438	0.1421	0.0191	0.0242	2,946	0.4241	0.3739
7	438	0.1285	0.0149	0.0116	3,268	0.4446	0.3924
8	438	0.1088	-0.0001	-0.0072	2,511	0.4784	0.4200
9	438	0.0743	-0.0230	-0.0433	2,191	0.5330	0.4714
10	438	0.0121	-0.0686	-0.1132	1,463	0.6419	0.5688
1-10		0.1766	0.1627	0.1879			
(t-statistics)		(2.61)	(6.31)	(3.69)			

Panel B. Stocks held by mutual funds

ASSETG deciles	N	*RAWRET*	*DGTWRET*	3-factor alpha	*SIZE*	*RETVOL*	*IDVOL*
1	211	0.2500	0.1126	0.0818	605	0.7202	0.6521
2	264	0.1989	0.0504	0.0518	1,109	0.5668	0.5058
3	302	0.1797	0.0343	0.0351	2,070	0.4636	0.4065
4	317	0.1661	0.0298	0.0374	2,828	0.4115	0.3599
5	322	0.1559	0.0238	0.0281	3,008	0.3979	0.3455
6	324	0.1490	0.0161	0.0218	3,269	0.4028	0.3465
7	327	0.1383	0.0115	0.0114	3,096	0.4239	0.3660
8	325	0.1244	0.0045	0.0003	2,603	0.4607	0.3965
9	315	0.0989	-0.0132	-0.0294	2,419	0.5081	0.4388
10	290	0.0516	-0.0495	-0.0776	1,674	0.6030	0.5219
1-10		0.1984	0.1620	0.1594			
(t-statistics)		(3.54)	(5.40)	(2.05)			

Table 2 shows stock returns, along with firm characteristics, for different asset growth deciles. Stock returns and firm characteristics are first calculated each year, and then averaged over the sample period. Panel A reports one-year ahead raw returns, DGTW returns, and Fama-French 3-factor alphas based on all stocks in the CRSP/Comustat Universe. I also report market capitalizations, return volatilities, and idiosyncratic risks. Panel B is based on stocks covered held by mutual funds, out of the firm-year observations included in the CRSP/Compustat Universe. The definitions of returns and firm characteristics are summarized in Appendix A.

TABLE 3
Examination of Mutual Funds Using Asset Growth Anomaly Strategy

TIM deciles	Total asset growth investing measure (*TIM*)	Size score	Book-to-market score	Momentum score
1	4.785	8.501	5.650	6.493
2	5.273	8.813	4.987	6.742
3	5.733	8.866	4.836	7.026
4	5.796	8.923	4.359	7.101
5	6.153	8.968	4.339	7.275
6	6.237	8.689	3.992	7.283
7	6.483	8.604	3.754	7.445
8	6.908	8.434	3.821	7.663
9	7.288	8.232	3.540	7.888
10	8.000	7.877	3.332	8.036
Median	6.260	8.851	4.283	7.315
1 – 5	-0.215			
(t-statistics)	(-5.04)			
1 – Median	-1.475	-0.351	1.367	-0.822
(t-statistics)	(-13.32)	(-3.32)	(10.49)	(-11.22)

Table 3 shows total asset growth investing measure, along with size, book-to-market, and momentum scores. The definition of the total asset growth investing measure is provided in Appendix A. Size, book-to-market, and momentum scores are calculated in 1 – 10 scale. The breakpoints for size deciles are based only on stocks listed in NYSE and AMEX, and the breakpoints for book-to-market and momentum deciles are based on all stocks listed in NYSE, AMEX, and NASDAQ. Total asset growth investing measure in decile 1 is compared decile 5 (TIM = 5.0) and also with the total asset growth investing measure of median funds.

TABLE 4
The Persistence of Mutual Funds with Asset Growth Anomaly Strategy

Panel A. Change of total asset growth investing measure of mutual funds with asset growth anomaly strategy

	Percentage of stocks in each total asset growth investing measure deciles (%)									
	1	2	3	4	5	6	7	8	9	10
Year t	100	-	-	-	-	-	-	-	-	-
Year t+1	44.42	21.57	13.22	5.65	4.56	2.76	1.67	2.31	1.16	2.70
Year t+2	39.23	21.63	11.59	6.95	6.27	3.00	3.09	3.09	1.89	3.26
Year t+3	35.43	19.80	13.27	8.32	6.41	4.39	3.15	2.59	2.92	3.71
Year t+4	32.98	20.09	12.74	7.80	6.75	5.55	6.00	3.15	2.10	2.85
Year t+5	31.31	21.41	12.12	8.69	6.87	5.45	5.66	2.63	2.63	3.23

Panel B. Average asset growth investing measure over 10-year horizons

	Mean (Median) asset growth investing measure									
	1	2	3	4	5	6	7	8	9	10
Year t-5	3.36	3.69	4.32	4.52	4.87	5.46	6.17	6.74	7.43	8.01
	(2.00)	(3.00)	(4.00)	(4.00)	(5.00)	(6.00)	(6.00)	(7.00)	(8.00)	(9.00)
Year t-4	3.30	3.51	4.20	4.51	5.03	5.59	6.09	6.70	7.53	8.12
	(2.00)	(3.00)	(4.00)	(4.00)	(5.00)	(6.00)	(7.00)	(7.00)	(8.00)	(9.00)
Year t-3	3.13	3.41	4.17	4.42	4.98	5.48	6.23	6.94	7.65	8.17
	(2.00)	(3.00)	(4.00)	(4.00)	(5.00)	(6.00)	(7.00)	(7.00)	(8.00)	(9.00)
Year t-2	2.88	3.22	4.00	4.43	5.02	5.62	6.23	7.16	7.73	8.40
	(2.00)	(3.00)	(4.00)	(4.00)	(5.00)	(6.00)	(7.00)	(8.00)	(8.00)	(9.00)
Year t-1	2.52	3.07	3.79	4.39	5.06	5.65	6.46	7.25	8.10	8.76
	(2.00)	(3.00)	(3.00)	(4.00)	(5.00)	(6.00)	(7.00)	(8.00)	(9.00)	(10.00)
Year t	**1.00**	**2.00**	**3.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**
	(1.00)	**(2.00)**	**(3.00)**	**(4.00)**	**(5.00)**	**(6.00)**	**(7.00)**	**(8.00)**	**(9.00)**	**(10.00)**
Year t+1	2.55	3.03	3.71	4.36	5.05	5.74	6.52	7.24	8.10	8.63
	(2.00)	(3.00)	(3.00)	(4.00)	(5.00)	(6.00)	(7.00)	(8.00)	(9.00)	(10.00)
Year t+2	2.82	3.26	4.03	4.59	5.07	5.81	6.46	7.16	7.68	8.37
	(2.00)	(3.00)	(4.00)	(5.00)	(5.00)	(6.00)	(7.00)	(7.00)	(8.00)	(9.00)
Year t+3	2.98	3.53	4.16	4.73	5.06	5.70	6.50	7.02	7.51	8.17
	(2.00)	(3.00)	(4.00)	(5.00)	(5.00)	(6.00)	(7.00)	(7.00)	(8.00)	(9.00)
Year t+4	3.33	3.63	4.29	4.79	4.99	5.63	6.31	6.95	7.51	8.11
	(2.00)	(3.00)	(4.00)	(4.00)	(5.00)	(6.00)	(7.00)	(8.00)	(8.00)	(9.00)
Year t+5	3.49	3.70	4.41	4.70	5.10	5.57	6.36	6.81	7.52	8.00
	(2.00)	(3.00)	(4.00)	(4.00)	(5.00)	(6.00)	(7.00)	(7.00)	(8.00)	(9.00)

Table 4 reports the persistence of mutual funds with asset growth anomaly strategies. Panel A focuses on the mutual funds with asset growth strategy in year t and shows how their stock holdings remain or move away over the next five-year horizon. I calculate the percentage of holdings each year and report the mean of the averages. Panel B shows the mean (median) of asset growth investing measures of mutual funds in year t over 10-year horizon.

TABLE 5
Stock Holdings of Mutual Funds across Asset Growth Deciles

ASSETG deciles	*TIM=1*	*TIM=2*	*TIM=3*	*TIM=4*	*TIM=5*	*TIM=6*	*TIM=7*	*TIM=8*	*TIM=9*	*TIM=10*	*Median*	*1 –Median (t-statistics)*
1	3.34%	2.39%	1.93%	1.96%	1.73%	1.66%	1.48%	1.28%	1.00%	0.67%	1.67%	1.67% (3.39)
2	9.00%	6.29%	5.07%	4.50%	4.23%	4.09%	3.25%	2.98%	2.35%	1.45%	4.16%	4.84% (6.44)
3	16.37%	13.58%	11.35%	9.72%	8.58%	7.39%	6.37%	5.20%	3.98%	2.33%	7.96%	8.42% (5.17)
4	20.65%	16.68%	14.80%	13.58%	11.87%	10.52%	9.27%	7.65%	6.01%	3.64%	10.90%	9.76% (6.32)
5	18.07%	17.39%	16.78%	15.38%	14.50%	12.90%	11.96%	10.06%	8.48%	4.96%	14.00%	4.08% (4.57)
6	12.43%	14.96%	15.83%	15.74%	15.64%	14.91%	14.56%	13.21%	11.69%	8.55%	15.62%	-3.18% (-2.67)
7	8.97%	12.78%	14.25%	15.72%	16.07%	16.57%	16.48%	16.72%	15.21%	12.68%	16.28%	-7.31% (-6.82)
8	5.56%	7.42%	9.93%	11.00%	12.86%	14.12%	15.75%	17.16%	18.08%	19.56%	13.49%	-7.93% (-7.42)
9	3.27%	5.11%	6.25%	7.98%	9.39%	11.44%	13.43%	16.19%	19.51%	25.90%	10.46%	-7.19% (-7.43)
10	5.81%	3.41%	7.26%	4.42%	8.52%	6.40%	7.44%	12.79%	16.76%	23.10%	8.85%	-3.04% (-0.68)
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

Table 5 shows the percentage of stock holdings owned by mutual funds in each fund decile. The percentage of holdings is defined annually for each mutual fund by dividing the market value of stocks in each stock decile with the market value of all stocks owned by a mutual fund. I calculate the equally-weighted average of the ratios over years and report the mean of the averages for each fund decile. The reported t-statistics are calculated by dividing differences in annual averages with the standard errors of the differences.

TABLE 6
Mutual Fund Returns across TIM Deciles

TIM Decile	Annualized fund returns after fund fees		
	Net Return	DGTW Return	3-Factor Alpha
1	0.1489	0.0225	0.0207
	(6.98)	(1.42)	(1.04)
2	0.1473	0.0213	0.0201
	(26.71)	(5.51)	(4.29)
3	0.1406	0.0164	0.0140
	(7.04)	(1.11)	(0.74)
4	0.1423	0.0177	0.0159
	(23.87)	(4.25)	(3.00)
5	0.1363	0.0134	0.0104
	(7.21)	(0.95)	(0.57)
6	0.1363	0.0136	0.0105
	(33.30)	(4.41)	(3.14)
7	0.1321	0.0106	0.0068
	(28.25)	(3.12)	(1.66)
8	0.1239	0.0046	-0.0007
	(7.48)	(0.37)	(-0.04)
9	0.1176	0.0002	-0.0067
	(7.61)	(0.02)	(-0.45)
10	0.1062	-0.0079	-0.0176
	(7.69)	(-0.76)	(-1.32)
Median	0.1350	0.0125	0.0091
	(7.28)	(0.90)	(0.52)
All Funds	0.1335	0.0114	0.0076
	(7.32)	(0.84)	(0.44)
1 - Median	0.0139	0.0111	0.0131
	(3.19)	(3.12)	(3.04)
1 – 10	0.0427	0.0304	0.0383
	(10.02)	(9.45)	(9.69)

Table 6 shows the annualized fund return net of the fund fees. I aggregate the monthly fund returns available from the database over the next one-year period. Net returns are the annualized actual fund returns minus the fund fees. I also report DGTW returns and Fama- French 3-fator alpha.

TABLE 7
Mutual Fund Characteristics across TIM Deciles

Panel A. Fund-level volatilities and asset growth investing measures

TIM Decile	Fund Return Volatility	3-Factor Idiosyncratic Volatility	4-Factor Idiosyncratic Volatility
1	0.1577	0.0177	0.0171
2	0.1547	0.0138	0.0132
3	0.1532	0.0125	0.0121
4	0.1564	0.0110	0.0105
5	0.1592	0.0125	0.0119
6	0.1633	0.0129	0.0123
7	0.1746	0.0147	0.0140
8	0.1793	0.0157	0.0150
9	0.1950	0.0176	0.0169
10	0.2219	0.0223	0.0214
Median	0.1614	0.0127	0.0122
1 – Median	-0.0037 (-2.26)	0.0050 (1.21)	0.0049 (0.98)
1 - 10	-0.0642 (-1.95)	-0.0046 (-2.00)	-0.0043 (-1.72)

Panel B. Transaction costs and asset growth investing measures

TIM Decile	Turnover ratio (%)	Churn rate	Expense ratio (%)
1	72.05%	0.1890	1.23%
2	68.08%	0.1835	1.15%
3	65.89%	0.1814	1.12%
4	69.05%	0.1916	1.09%
5	71.42%	0.1895	1.14%
6	80.74%	0.1993	1.21%
7	85.72%	0.2147	1.25%
8	92.66%	0.2261	1.31%
9	100.10%	0.2264	1.39%
10	106.10%	0.2310	1.40%
Median	76.13%	0.1876	1.17%
1 – Median	-4.08% (-0.66)	0.0014 (0.13)	0.06% (1.35)
1 - 10	-34.05% (-4.94)	-0.0420 (-3.48)	-0.17% (-3.08)

Table 7 shows the mutual fund characteristic across different fund-level asset growth deciles. Fund return volatility is the standard deviation of annualized fund return after portfolio formation. Idiosyncratic volatilities are measured as the standard deviation of residuals from the Fama-French factor models. Turnover ratio is defined as the minimum of aggregate sales or purchases of securities divided by average 12-month total net assets. Expense ratio is the amount of money paid by investors out of their invested money for the operation of funds. Churn rate, defined as in Gaspar et al. (2005), shows how often mutual fund managers rotate the positions of all stocks.

TABLE 8
Analyst Recommendations across TIM Deciles

TIM Decile	Equal-weighted		Value-weighted	
	Mean	Median	Mean	Median
1	2.3028	2.2923	2.2943	2.2853
2	2.2537	2.2374	2.2467	2.2308
3	2.2220	2.2017	2.2029	2.1824
4	2.1998	2.1830	2.1759	2.1563
5	2.1763	2.1587	2.1521	2.1342
6	2.1376	2.1148	2.1172	2.0915
7	2.1047	2.0820	2.0904	2.0668
8	2.0695	2.0437	2.0541	2.0261
9	2.0269	1.9984	2.0118	1.9805
10	1.9813	1.9494	1.9621	1.9279
Median	2.1598	2.1396	2.1367	2.1152
1 – Median	0.3215 (2.63)	0.3429 (2.72)	0.3322 (2.90)	0.3574 (3.05)
1 - 10	0.1430 (4.99)	0.1527 (5.25)	0.1576 (5.22)	0.1701 (5.60)

Table 8 shows the investment recommendations issued by analysts across different fund-level asset growth deciles. Analyst recommendations take integer values in the range of 1 (Strong buy) – 5 (Strong sell), and smaller value indicates more favorable opinions. When I aggregate analyst recommendations at each fund, I use both equal weight and value weight, where value is the holding value of an individual stock out of managed assets. I also use mean and median consensus of analyst recommendations under each weighting scheme.

국문초록

본 연구는 미국 주식시장에서 적극적 투자를 수행하는 뮤추얼펀드가 자산성장이상현상을 이용하는지 여부를 분석하였다. 1985년부터 2012년 동안 뮤추얼펀드의 주식보유현황과 펀드수익률 자료를 이용하여 연구한 결과, 대부분의 뮤추얼펀드는 자산성장률을 이용한 투자를 수행하지 않고 있었으며, 그로 인해 자산성장률을 이용하였을 때 얻을 수 있는 추가적인 수익률을 얻지 못하는 것으로 나타났다. 일부 뮤추얼펀드만이 자산성장률이 낮은 주식에 지속적으로 투자하여 높은 투자수익률을 얻고 있었다. 나아가 뮤추얼펀드가 자산성장률을 투자에 이용하지 않는 이유를 연구하였다. 주식 수익률 변동이나 비체계적 위험으로 인해 뮤추얼펀드가 자산성장이상현상을 투자에 활용하지 못한다는 증거를 발견할 수 없었다. 반면 재무분석가가 자산성장률이 높은 주식에 대해서 보다 우호적인 투자의견을 나타냄에 따라 뮤추얼펀드가 자산성장률을 투자에 이용하기 어렵게 되는 점을 발견하였다. 이러한 연구 결과는 자산성장이상현상의 지속 여부에 대한 이해를 증진한다.

주요어: 자산성장이상현상, 뮤추얼펀드, 재무분석가 투자의견
학 번: 2014-20472