The Asset Growth Effect in Stock Returns

Michael J. Cooper
University of Utah and Goldman Sachs

Huseyin Gulen
Purdue University

Michael J. Schill*
University of Virginia

January 2009

ABSTRACT

We document a strong negative relationship between the growth of total firm assets and subsequent firm stock returns using a broad sample of U.S. stocks. Over the past 40 years, low asset growth stocks have maintained a return premium of 20% per year over high asset growth stocks. The asset growth return premium begins in January following the measurement year and persists for up to five years. The firm asset growth rate maintains an economically and statistically important ability to forecast returns in both large capitalization and small capitalization stocks. In the cross-section of stock returns, the asset growth rate maintains large explanatory power with respect to other previously documented determinants of the cross-section of returns (i.e., size, prior returns, book-to-market ratios). We conclude that risk-based explanations have some difficulty in explaining such a large and consistent return premium.

*Corresponding author. Darden School of Business, Box 6550, University of Virginia, Charlottesville, VA 22906, Email: schill@virginia.edu.

1. Introduction

Suppose that on June 30th of each year from 1968 to 2006 an investor sorted U.S. stocks into ten equal portfolios based on the past year's percentage change in total corporate assets. If the investor bought the stocks with the highest past growth in assets, the mean annual portfolio return over the 39 year period would have been just 4%. If, alternatively, the investor bought the stocks with the lowest past growth in assets, the mean annual portfolio return would have been 26%. The investor in the low growth stocks would have achieved a 22% return premium by simply sorting stocks on one of the most available pieces of business data—the growth in the book value of assets. Cooper, Gulen, and Schill (2008) refer to this empirical fact as the "asset growth effect."[1]

In this article, we review and document ongoing evidence for a strong asset growth effect in U.S. stock returns and update the results for Cooper, Gulen, and Schill. We find that on a risk-adjusted basis, low asset growth stocks generate equal-weighted monthly returns that are 1.1% higher than high asset growth stocks (0.7% higher for value-weighted returns). The effect is consistent over time with the returns of low asset growth stocks exceeding those of high asset growth stocks in 90% (equal weighted) and 72% (value weighted) of the calendar years in the sample. Despite a return differential that is larger among small capitalization stocks, we show that the effect is still economically and statistically large among large capitalization stocks. The monthly difference in returns between low growth and high growth stocks is 0.63% for large capitalization stocks. Although our work focuses on returns over a one-year horizon, we show that the effect persists for up to five years. Over a five year horizon, the return difference for low growth and high growth stocks is 91% on an equal-weighted basis and 50% on a value-weighted basis. The asset growth effect maintains a seasonal component with the effect being strongest in the month of January. Lastly we test the ability of firm asset growth to explain the cross-section of returns in a regression format. We find a strong and significant negative relationship with subsequent returns and historical firm asset growth. We show that a firm's growth rate in assets is

[1] A growing number of papers observe a similar negative relationship between various measures of firm asset growth and subsequent stock returns (see Fairfield, Whisenant, and Yohn, 2003; Titman, Wei, and Xie, 2004; and Broussard, Michayluk, and Neely, 2005; Anderson and Garcia-Feijoo, 2006; Polk and Sapienza, 2008; Lyandres, Sun, and Zhang, 2008; Xing, 2008). Chen, Yao, Yu, and Zhang (2008) document that the asset growth effect also exists across a wide cross-section of Pacific-Basin markets. We also reference the large literature on the relationship between corporate expansion and contraction events and subsequent returns and measures of firm asset growth events. See Fama and French (1998) for a partial review of this literature.

at least as powerful in explaining returns as other well known effects such as size, book-to-market, and return momentum and reversals.

There is some theoretical work that predicts a negative correlation between asset investment and subsequent returns (see Cochrane, 1991, 1996; Berk, Green, and Naik 1999; Gomes, Kogan, and Zhang, 2003; and Li, Livdan, Zhang, 2008). We discuss the reconciliation of the asset growth effect with risk-based explanations. We find little support that risk-based compensation provides a full explanation of the effect. In particular, the magnitude of the return premium appears too great to be justified by a compensation for risk. To illustrate, consider the simple example reported at the beginning of this introduction. In this empirical example, we must first accept that firms in the high growth group earn equilibrium returns of only 4%. The annualized return on U.S. Treasury bills (as reported by Ibbotson and Associates) was 6% over the same July 1968 to June 2007 sample period. Thus to accept a risk-based explanation, we must accept that a sample of small capitalization, rapid growth firms maintain risk levels such that a negative risk premium is warranted in equilibrium. Second, we must accept that the sample of low growth firms are of sufficiently greater risk as to justify their equilibrium returns of 26%. This 22% return premium seems difficult to justify with a risk-based explanation. Over the sample period there appears to be very little risk in the investor holding low asset growth stocks as they almost always outperform the high growth stocks (only 10% of the annual low-growth-minus-high-growth return spreads are negative and then by only a modest amount).

The paper proceeds as follows. It reviews the economic magnitude of the asset growth effect in Section 2, examines cross-sectional relationships in Section 3, and discusses explanations for the effect in Section 4. Section 5 provides concluding remarks.

2. The returns to asset growth portfolios

2.1. Asset growth portfolios

As our sample, we use all non-financial U.S. stocks listed on NYSE, Amex, and NASDAQ with available stock return and total assets data on the CRSP monthly stock return files and the Compustat annual industrial files from 1968 through 2007. To mitigate backfilling biases (Fama and French, 1993), we require that a firm be listed on Compustat for two years before it is included in the data set. We sort the sample at the end of June in each year into ten equal groups based on the percentage change in total assets for the previous year. To be more specific, we sort stocks in year t+1 based on the asset growth rate in year t defined as

$$\text{Asset growth (t)} = (\text{Total assets (t)} - \text{Total assets (t-1)}) / \text{Total assets (t-1)}). \qquad (1)$$

We require that the total asset value used to sort the stocks be at the latest as of the end of December of the previous year. For example, to form the portfolio in June of 2005 we use the growth rate based on the total assets reported as of December of 2003 and 2004. If the firm maintained a fiscal year of March, we use the total assets reported as of March 2003 and 2004. This approach, following Fama and French (1992), assures that the data used in portfolio formation is publicly available as of the sorting period. Table 1 provides summary statistics for the sample of firms based on the asset growth groups. The statistics reported are time-series averages of annual median values. The median annual growth rate differs quite strikingly across portfolios. The asset growth rate varies from an average median value of -22% for the low growth group to 83% for the high growth group. Firms in the extreme growth groups tend to be smaller than those with less changes in total assets. Firms in both the high and low growth groups are relatively small with a median assets and market capitalization of $26 million and $25 million, respectively, for the low growth group and $81 million and $121 million, respectively for the high growth group. It is important to note that dollar values may appear small as they are median current values and have not been adjusted for inflation over the sample period. The values compare to $196 million and $162 million in assets and market capitalization, respectively, for firms with median asset growth rates. High growth firms are historically more profitable than low growth firms with return on assets (ROA) of -3% for the low growth firms and 21% for the high growth firms. We define ROA as earnings before interest, taxes, depreciation, and amortization (EBITDA) divided by the same year total assets. In unreported tests, we find that the gap in ROA substantially narrows in subsequent years.

2.2. Returns at a one-year horizon

Over the 39 years in our sample, we form both equal-weighted and value weighted asset growth portfolios as of the last trading day in June of each year, hold the portfolio for one year, and then rebalance the portfolio the next June. We report the mean portfolio returns in Table 2. During the first year after portfolio formation (July to June of the following year), we observe a negative monotonic relationship between the asset growth rate and the portfolio returns. On an equal weighting, the low growth monthly portfolio return is 1.94%, whereas the return of the high growth portfolio is only 0.35%. A strategy that is long the low growth stocks and short the high growth stocks generates a zero investment return of 1.59% per month. On a value weighting, the spread between low growth and high growth returns is 1.05% per month. Both values are highly statistically significant.

To adjust the portfolio returns for variation in risk, we regress the monthly portfolio returns on the Fama and French (1993) factors and report the intercept (alpha) value. These adjusted returns continue to show statistically important differences in returns across asset growth portfolios. The returns continue to be monotonically related to asset growth rates and the difference in returns maintains its economic and statistical significance. The risk-adjusted spread between low and high growth stocks is 1.48% per month for the equal-weighted portfolios and 0.70% per month for the value-weighted portfolios.

In Table 3 we report individual annual returns for the low and high asset growth portfolios returns for each year from 1968 to 2006. We observe that the return premium of low growth stocks over high growth stocks is remarkably persistent over time. Of the 39 years in the sample period, there are only 4 years in the equal-weighted results for which the returns of the low growth stocks do not exceed those of the high growth stocks, and then by a relatively small margin (-8% return in 2004). The most positive return for the low growth less high growth portfolios is 1999 with 120% return. For the value-weighted portfolio, the frequency of negative returns is greater at 11 times or 28% of the sample years (vs. 10% for the equal-weighted portfolio) with the largest negative return being -14% in 1990 and 1994. The year 2002 is associated with the highest value-weighted spread at 44%. The table suggests that the downside risk associated with the asset growth effect in returns was relatively modest.

By comparing the results of the equal-weighted and value-weighted portfolios we observe that the asset growth effect is more important for small capitalization stocks. To compare our results across capitalization levels, we report capitalization-segmented portfolios returns. To do this, we sort firms into three size groups using the 30^{th} and 70^{th} NYSE market equity percentiles in June of the sorting year. For each capitalization group (small, medium, and large) we then assign firms to one of ten deciles based on annual asset growth rates, and form equal-weighted and value-weighted portfolios for the next 12 months. We report these results in Table 4. In Panel A, we present equal-weighted portfolio three-factor alphas separately for small firms, medium firms, and large firms. In Panel B, we present value-weighted portfolio results. When we examine the robustness of the asset growth-sorted portfolios to firm size, we see that the pricing errors are the greatest for the smaller-sized firms (the average monthly alpha spread between high and low growth equal-weighted small firms is 1.63% (*t*-statistic = 8.96) and for the value-weighted small portfolios the alpha spread is 1.03% (*t*-statistic = 6.18)). For the medium size group, the average monthly alpha spread between high and low growth equal-weighted firms is 0.40% (*t*-statistic = 2.04) and for the value-weighted portfolios the alpha spread is 0.37% (*t*-statistic = 1.79). For the large size group, the average monthly alpha spread between high and low growth equal-weighted firms is 0.63% (*t*-statistic = 2.54) and for the value-weighted portfolios the alpha spread is 0.63% (*t*-statistic = 2.54). The asset growth effect is present across all size groups.

2.3. Returns at a five-year horizon

To this point we have only focused on returns at a one-year horizon following the June sorting date. In this section we examine the long-run return effects of sorting on asset growth. We examine the average raw returns to the growth-sorted portfolios in event time for five years following the date of portfolio formation. In Table 5, we report the mean raw returns for the extreme low growth and high growth portfolios on an equal-weighted (Panel A) and value-weighted (Panel B) basis. We observe that on an equal-weighted basis, the premium of low growth returns over high growth returns persists for at least five years. The monthly return premium for Years 1 through 5 are 1.59%, 0.78%, 0.44%, 0.41%, and 0.26%, respectively. All of these positive differences in returns is statically significant. If we cumulate the returns over the full five years, the return premium is 91% with a highly significant t-statistic of 9.63. On a value-weighted basis, the differential in returns is statistically significant for Years 1 through 3 with low growth less high growth return premium of 1.05%, 0.68%, and 0.53%, respectively. The cumulative return differential over the five-year horizon is 50%.

In Figure 1 we report the mean returns over the five-year horizon for all ten asset growth portfolios and include portfolio returns for the five years prior to portfolio formation. Here we observe a clear return reversal in returns at the time of sorting. High asset growth firms with associated high past returns tend to maintain low subsequent returns and low asset growth firms with low past returns tend to experience high subsequent returns. This reversal in returns is monotonic across growth rate and is almost completely symmetrical in the equal-weighted portfolios. Figure 1 indicates that the extreme portfolio results presented in Table 5 are simple extensions of what is happening at all levels of asset growth rates.

Cooper, Gulen, and Schill (2008) perform a number of robustness tests on the asset growth effect. They find that the effect persists when one excludes stocks priced below $5 per share and stocks with fiscal year-end total assets less than $10M in assets. They also find that the results are similar if one omits those firms that have experienced an equity offering or acquisition around the portfolio formation year. Thus, the asset growth effect is not simply due to poor returns for firms following such events as equity offerings or corporate takeovers. They also observe that most compnents of the balance sheet contribute to asset growth effects in returns. They observe negative correlation with such individual balance sheet components as current assets; property, plant and equipment; intangible assets; current liabilities; total debt; and total equity. We conclude that firm asset growth rates are a strong predictor of future returns.

3. Cross-sectional tests

In this section we perform cross-sectional regressions of annual firm stock returns on asset growth and other firm characteristics. We seek to determine if the asset growth effect is merely a manifestation of other important determinants of the cross-section of returns. We compete asset growth with a base set of control variables that include firm book-to-market equity, market capitalization, 6-month lagged returns, and 36-month lagged returns (Fama and French (1992), Jegadeesh and Titman (1993), and DeBondt and Thaler (1985)).[2] To mitigate the potential effects of possible microstructure biases emanating from the use of CRSP monthly closing prices, we use geometrically compounded annual firm returns (instead of the typical monthly returns) as the dependent variable in the cross-sectional regressions. To be included in any regression, firms must have nonmissing data for the following variables in our base model: book-to-market equity, capitalization, 6-month lagged returns, asset growth, and lagged asset growth. Since the asset growth value is already lagged one year, the lagged asset growth value is actually lagged two years.

[2] Consistent with the measurement of the asset growth rate, we form all of our accounting variables at the end of June in year *t*, using accounting information from fiscal year-end *t*-1 from Compustat. For price-scaled or market value-scaled accounting ratios, such as book-to-market (BM), we use price or market value from December of year *t*-1. For firm capitalization, we use the market value of the firm's equity from CRSP at the end of June of year *t*. For lagged return measures, Past 6 month returns and Past 36 month returns, we calculate the holding period return from the last 6 months and 36 months, respectively, ending in June of year *t*. All of the variables are updated annually, at the end of June each year.

In these tests, we exclude all firms with negative book value in year *t*-1. In addition to the full sample test, we also perform these regressions on our small, medium, and large size-sorted groups. The standard errors from the regressions are adjusted for autocorrelation in the beta estimates following Cooper, Gulen, and Schill (2008)

We report these results in Table 6. In the first model, we report the results of the regression for the full sample. We observe that the explanatory power of asset growth is not subsumed by the other determinants of the cross-section. The t-statistic for asset growth is -6.07. In comparison, the t-statistics for the book-to-market ratio, capitalization, and past 6- and 36-months returns is 3.38, -1.41, 0.95, and 0.44. Even the twice lagged asset growth measure maintains important explanatory power in the regression with a t-statistic of -2.83. The strongly statistically negative correlation between asset growth and subsequent returns in these tests is consistent with the observed return behavior in the tests based on asset growth rate sorts presented in Section 2. Table 6 also confirms the capitalization-based tests presented in table 4. The asset growth rate maintains important explanatory power across all three capitalization levels. The coefficients (t-statistics) for the small cap, medium cap, and large cap sub-samples are respectively, -0.07 (-5.19), -0.07 (-4.30), and -0.05 (-3.59). As none of the other variables maintains statistical significance across all sub-samples, the asset growth rate appears to be at least as important as any of the other prevailing firm characteristics in explaining returns.

Cooper, Gulen, and Schill (2008) and Lipson, Mortal and Schill (2009) examine how the asset growth rate compares in explaining returns with a variety of other measures of firm growth. They test a host of related measures that have all been shown to have explanatory power, including accruals (Sloan, 1996; Hirshleifer, Hou, Teoh, and Zhang, 2004; and Zhang, 2006), capital investment (Titman, Wei, and Xie, 2004; Anderson and Garcia-Feijoo, 2006; Polk and Sapienza, 2009; and Xing, 2008), inventory and fixed capital growth (Lyandres, Sun, and Zhang, 2008), and growth rates in sales (Lakonishok, Shleifer, and Vishny, 1994). Cooper, Gulen, and Schill (2008) and Lipson, Mortal and Schill (2009) both find that the simple total asset growth rate maintains superior ability in explaining returns to any of the other measures.

4. What explains the asset growth effect?

A variety of papers suggest that the return premium achieved by low asset growth stocks is consistent with compensation for risk (see Cochrane, 1991, 1996; Berk, Green, and Naik 1999;

Gomes, Kogan, and Zhang, 2003; and Li, Livdan, Zhang, 2008). One argument made is that firms maintain a mix of growth options and assets in place, and growth options are inherently more risky than assets in place. As firms exercise growth options, the asset mix of the firm becomes less risky as assets in place displace growth options. The systematic reduction in risk following the exercise of growth options induces a negative correlation between investment and subsequent returns. Another risk-based argument for the growth-return relationship arises in the q-theory framework (Tobin, 1969; Yoshikawa, 1980) if firms experience adjustment costs to investment. In this model, investment expands as required returns decline.

By definition, risk-based explanations assert that the relationship between abnormal returns and asset growth rates should disappear once proper risk adjustments are made. For the practitioner, such risk adjustments may be empirically difficult to implement. There is expanding empirical support for such risk-based explanations. Lyandres, Sun, and Zhang (2008) create an investment factor (long in low-investment stocks and short in high-investment stocks) and use that factor to explain the abnormal returns to firms expanding due to stock and equity issuance. They conclude that their evidence lends support to the theoretical predictions of the risk-based theories. Li, Li, and Zhang (2008) use proxies for the cost of external finance to find that the asset growth and other effects are larger for firms with greater costs of external finance consistent with risk-based theories of asset growth effects. Anderson and Garcia-Feijoo (2006) show that after controlling for growth in capital expenditures, the book-to-market effect is substantially diminished. Their interpretation of this result, consistent with theoretical work by Berk, Green and Naik (1999), is that the book-to-market effect is driven by changes in risk. In particular, firms with high book-to-market ratios are making investments in relatively low risk projects, and this change in asset composition implies a reduction in risk and, therefore, lower future returns. Xing (2008) also shows that asset growth effect diminishes the book-to-market effect and attributes the result to implications of q-theory.

One important problem with the above empirical findings is that they are all also consistent with systematic mispricing across asset growth as a firm characteristic (see Daniel and Titman, 1997). Thus, we are unable to discriminate whether the return premium for low growth stocks is due to systematic variation in risk or the return reversal caused by systematic over capitalization of high growth stocks and undercapitalization of low growth stocks. Cooper, Gulen, and Schill (2008) and Lipson, Mortal and Schill (2009) provide some evidence that attempts to discriminate between risk-based and mispricing based explanations. They conclude that the asset growth effect is not fully explained by variations in risk.

One way to interpret the evidence is to put the onus of justification on the systematic risk-based explanation. We present a number of empirical facts below. Reconciliation of the asset growth effect with risk-based explanations requires accepting these empirical facts in a risk-based context.

1. Small-cap, rapidly expanding firms are as risky if not less risky than that of Treasury bills. The evidence suggests that high growth firms maintain a zero to negative return premium over Treasury bills over the sample period.

2. Rational investors require a massive 20% return premium for holding the risk associated with low growth firms. The risk aversion required seems particularly large given the infrequency of downside return outcomes over the sample period.

3. Standard risk-based models (e.g., CAPM, Fama-French) are unable to explain the effect. This evidence includes time-varying tests (Cooper, Gulen, and Schill, 2008; Lipson, Mortal, and Schill, 2009).

4. Following portfolio formation, subsequent stock returns on earnings announcement days average 0.27% for low growth firms and -0.10% for high growth firms (Cooper, Gulen, and Schill, 2008). While this result is fully consistent with the market being systematically positively surprised for low growth firms and negatively surprised for high growth firms, it is unclear how a risk-based story reconciles this fact.

5. The time-varying component of the asset growth effect is lower during periods of greater investor scrutiny and higher following periods of buoyant market returns (Cooper, Gulen, and Schill, 2008).

6. The asset growth effect is correlated with proxies for costs of arbitrage, including measures of bid-ask spread, price impact, and idiosyncratic volatility (Lipson, Mortal, and Schill (2009). There is no asset growth effect among stocks with little idiosyncratic risk. Although the correlation of arbitrage returns with arbitrage costs explains how a return anomaly can persist in equilibrium (Pontiff, 2006), it is unclear why a risk-based argument would explain such correlation structure.

We conclude that the empirical facts are difficult to reconcile with traditional risk-based explanations, and rather that the effect is at least partially due to the systematic market mispricing of growing businesses. We postulate that the source of the mispricing is due to the extrapolation of past gains to growth, such as suggested by Lakonishok, Shliefer, and Vishny (1994) and Polk and Sapienza (2009), or the under reaction to empire building as suggested by Titman, Wei, and Xie (2004). We assert that the one- to five-year asset growth effect is tied to systematic movement of securities back to unbiased values over this period.

To examine the timing of how prices are updated before and after the sorting period, we examine return behavior before and after sorting on a monthly rather than annual basis. To do this, we plot the mean equal-weighted monthly return to the low growth less the high growth portfolio over the months before and after the sorting period. The event period window begins 24 months prior to the sorting month (June) and ends 36 months after the sorting month. We plot the monthly mean values in Figure 2. The plot suggests that the transition of return reversal observed in Figure 1 is a sudden effect that begins in the month of January (relative month -6) of the sorting year. By waiting until June to form the portfolios, the asset growth arbitrageur misses very large returns that are available beginning in January. Figure 2 provides a better understanding of the annual returns plotted in Figure 1. In Figure 1, the Year -1 return appears quite similar across the asset growth deciles. This is because the year -1 return, as we define it, mixes six months of the return of the sorting year with six months of the return of the year before sorting. If we adjusted the sorting month to the end of December (rather than June), the returns disparity would be much greater in Year -1 of Figure 1. Moreover, the Year 1 returns reported throughout the paper would also be substantially higher. Since the total asset data is likely to not be available at the end of December, it is not clear when the execution of any trading strategy becomes completely feasible. The arbitrage incentive, however, is clear: the arbitrageur benefits by executing the asset growth trade as early in the sorting year as possible.

Figure 2 also reveals a curious January seasonal in the low-minus-high growth returns. Relative months -18, -6, +7, +19, and +31 all correspond to the month of January. It is obvious from Figure 2 that each of these months is associated with a large positive return relative to the other neighboring months. We suspect that this seasonal effect provides additional indications for future work on the explanations for the asset growth effect.

5. Conclusion

In this paper we use a broad sample of U.S. stocks to document a strong negative relationship between growth in the total assets of a business and its subsequent stock returns. The effect is both large in statistical and economic importance. We find that the asset growth effect dominates a collection of other common effects in stock returns. We conclude that traditional risk-based explanations have some difficulty in explaining such a large and consistent return premium. Still, with a return premium of 20% per year, the asset growth effect deserves investor attention.

References

Anderson, C., and L. Garcia-Feijoo, 2006, Empirical evidence on capital investment, growth options, and security returns, *Journal of Finance* 61, 171-194.

Berk, J., R. Green, and V. Naik, 1999, Optimal investment, growth options, and security returns, *Journal of Finance* 54, 1153-1608.

Broussard, J. P., D. Michayluk, and W. Neely, 2005, The role of growth in long-term investment returns, *Journal of Applied Business Research* 21, 93-104.

Chen, S., T. Yao, T. Yu, and Je. Zhang, 2008, Asset Growth and Stock Returns: Evidence from the Pacific-Basin Stock Markets, Working paper University of Rhode Island.

Cochrane, J., 1991, Production-based asset pricing and the link between stock returns and economic fluctuations, *Journal of Finance* 46, 209-237.

Cochrane, J., 1996, A cross-sectional test of an investment-based asset pricing model, *Journal of Political Economy* 104, 572-621.

Cooper, M., H. Gulen, and M. Schill, 2008, Asset growth and the cross-section of stock returns, *Journal of Finance* 68, 1609-1651.

Daniel, K., and S. Titman, 1997, Evidence on the characteristics of cross-sectional variation in stock returns, *Journal of Finance* 52, 1-33.

DeBondt, W., and R. Thaler, 1985, Does the market overreact? *Journal of Finance* 40, 793-805.

Fairfield, P., S. Whisenant, and T. Yohn, 2003, Accrued earnings and growth: Implications for future profitability and market mispricing, *The Accounting Review* 78, 353-371.

Fama, E., and K. French, 1992, The cross-section of expected stock returns, *Journal of Finance* 47, 427-465.

Fama, E., and K. French, 1993, Common risk factors in returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.

Fama, E., 1998, Market Efficiency, Long-Term Returns and Behavioural Finance, *Journal of Financial Economics* 49, 283-306.

Fama, E., and J. MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607-636.

Gomes, J., L. Kogan, and L. Zhang, 2003, Equilibrium cross-section of returns, *Journal of Political Economy* 111, 693-732.

Hirshleifer, D., K. Hou, S. H. Teoh, and Y. Zhang, 2004, Do investors overvalue firms with bloated balance sheets? *Journal of Accounting and Economics* 38, 297-331.

Jegadeesh, N., and S. Titman, 1993, Returns to buying winners and selling losers: Implications for stock market efficiency, *Journal of Finance* 48, 65-91.

Lakonishok, J., A. Shleifer, and R. Vishny, 1994, Contrarian investment, extrapolation, and risk, *Journal of Finance* 49, 1541-1578.

Li, D., E. X. N. Li, and L. Zhang, 2008, Costly external equity: Implications for asset pricing anomalies, Working paper, University of Michigan.

Li, E. X. N., D. Livdan, and L. Zhang, 2008, Anomalies, *Review of Financial Studies* Forthcoming.

Lipson, M. L., S. Mortal, and M. J. Schill, 2009, What Explains the Asset Growth Effect in Stock Returns? Evidence of Costly Arbitrage, Working paper, University of Virgina.

Lyandres, E., L. Sun, and L. Zhang, 2008, The New Issues Puzzle: Testing the Investment-Based Explanation, *Review of Financial Studies* 21, 2825-2855

Polk, C., and P. Sapienza, 2009, The Stock Market and Corporate Investment: A Test of Catering Theory**,** *Review of Financial Studies* 22, 187-217.

Pontiff, J., 2006, Costly arbitrage and the myth of idiosyncratic risk, *Journal of Accounting and Economics* 42, 35-52.

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

Titman, S., J. Wei, and F. Xie, 2004, Capital investments and stock returns, *Journal of Financial and Quantitative Analysis* 39, 677-700.

Tobin, J., 1969, A general equilibrium approach to monetary theory, *Journal of Money Credit and Banking*, 1, 15-29.

Xing, Y., 2008, Interpreting the value effect through the Q-theory: an empirical investigation, *The Review of Financial Studies*, Forthcoming.

Yoshikawa, H., 1980, On the “q” theory of investment, *American Economic Review* 70, 739-743.

Zhang, F., 2006, Accruals, investment, and the accrual anomaly, *Accounting Review* 82, 1333-1363.

Table 1
Summary statistics of asset growth portfolios

This table reports summary statistics for the firms that comprise the 10 asset growth portfolios. At the end of June of each year from 1968 to 2006, stocks are allocated into deciles based on asset growth rates defined as the percentage change in total assets from the past two fiscal years. Market capitalization is the June market value of equity. The past 36 month return is the 36-month buy and hold return ending in June. The figures reported are time series averages of yearly cross-sectional medians. The low – high growth figure represents the difference between the value for the low growth decile and that of the high growth decile. The t-statistic tests whether the low – high growth figure is different from zero. * and ** represents statistical significance at the 5% and 1% level, respectively.

Asset growth decile	Asset growth rate	Total Assets ($MM)	Market capitalization ($MM)	Past 36 months return	Return on assets
Low growth	-22.0%	26.4	24.9	-34.1%	-3.1%
2	-7.4%	67.1	49.2	-11.6%	6.5%
3	-1.3%	125.9	88.4	6.2%	10.7%
4	2.8%	173.7	128.2	19.5%	12.9%
5	6.2%	195.9	157.5	27.6%	14.3%
6	9.9%	197.8	174.2	33.5%	15.7%
7	14.5%	179.3	189.2	39.1%	17.1%
8	21.3%	137.5	164.8	48.5%	18.5%
9	34.8%	103.6	145.7	57.8%	19.9%
High growth	82.8%	81.4	121.0	71.4%	21.0%
Low - high growth	104.8%	55.0	96.1	105.5%	24.1%
t-statistic	17.86**	5.83**	5.92**	17.80**	23.13**

Table 2
Monthly returns of asset growth portfolios

This table reports the mean monthly returns for the asset growth portfolios. At the end of June of each year from 1968 to 2006, stocks are allocated into deciles based on asset growth rates defined as the percentage change in total assets from the past two fiscal years. Equal- and value-weighted portfolios are formed based on the asset growth deciles. The portfolios are held for one year, from July of the portfolio formation year to the following June. Portfolio return statistics are reported over the period of July 1968 to June of 2007. The adjusted returns are intercept values from a Fama-French three factor model. * and ** represents statistical significance at the 5% and 1% level, respectively.

	Raw returns		Adjusted returns	
	Equal weighted	Value weighted	Equal weighted	Value weighted
Low growth	1.94%	1.48%	0.64%	0.24%
2	1.79%	1.24%	0.56%	0.13%
3	1.59%	1.22%	0.34%	0.13%
4	1.48%	1.16%	0.27%	0.17%
5	1.40%	1.00%	0.22%	0.03%
6	1.32%	1.00%	0.16%	0.06%
7	1.25%	1.02%	0.09%	0.15%
8	1.20%	0.92%	0.04%	0.13%
9	0.93%	0.77%	-0.23%	-0.01%
High growth	0.35%	0.43%	-0.84%	-0.46%
Low - high growth	1.59%	1.05%	1.48%	0.70%
t-statistic	8.36**	5.04**	8.03**	3.84**

Table 3
Annual buy-and-hold returns by year

This table reports mean returns for each sorting year for the two extreme asset growth portfolios. Equal- and value-weighted portfolios are formed based on the asset growth deciles. The portfolios are held for one year, from July of the portfolio formation year to the following June. Portfolio return statistics are reported for each portfolio formation year over the period of July 1968 to June of 2007.

Panel A. Equal-weighted returns

Year	Low growth	High growth	Low - high growth
1968	7%	-17%	25%
1969	-39%	-52%	12%
1970	57%	54%	3%
1971	12%	5%	6%
1972	-35%	-44%	9%
1973	1%	-17%	18%
1974	63%	34%	29%
1975	44%	25%	19%
1976	31%	16%	15%
1977	63%	39%	25%
1978	35%	22%	13%
1979	24%	19%	5%
1980	52%	50%	3%
1981	-17%	-35%	18%
1982	162%	84%	79%
1983	-23%	-36%	13%
1984	1%	0%	1%
1985	11%	19%	-7%
1986	19%	-2%	20%
1987	-10%	-20%	11%
1988	9%	-4%	13%
1989	6%	-2%	9%
1990	27%	-3%	30%
1991	72%	14%	57%
1992	42%	9%	33%
1993	0%	-13%	13%
1994	34%	12%	22%
1995	73%	19%	53%
1996	-13%	-10%	-3%
1997	19%	8%	11%
1998	29%	-6%	35%
1999	125%	5%	120%
2000	-13%	-26%	13%
2001	-2%	-45%	43%
2002	79%	17%	62%
2003	64%	34%	30%
2004	-8%	0%	-8%
2005	14%	7%	6%
2006	12%	14%	-2%
Mean (all years)	26%	4%	22%

Table 3 (Continued)
Annual buy-and-hold returns by year

Panel B. Value-weighted returns

Year	Low growth	High growth	Low - high growth
1968	1%	-18%	19%
1969	-27%	-46%	19%
1970	44%	51%	-7%
1971	7%	18%	-12%
1972	-28%	-26%	-2%
1973	10%	-14%	23%
1974	54%	30%	23%
1975	41%	16%	24%
1976	28%	-2%	31%
1977	26%	7%	19%
1978	28%	11%	17%
1979	19%	27%	-7%
1980	40%	41%	-1%
1981	-16%	-35%	20%
1982	123%	71%	52%
1983	-10%	-31%	21%
1984	10%	13%	-3%
1985	20%	18%	1%
1986	11%	10%	1%
1987	-16%	-16%	0%
1988	42%	11%	32%
1989	8%	12%	-4%
1990	-7%	6%	-14%
1991	24%	18%	5%
1992	27%	10%	16%
1993	3%	-1%	4%
1994	18%	32%	-14%
1995	45%	24%	20%
1996	22%	9%	13%
1997	31%	29%	2%
1998	12%	9%	3%
1999	33%	3%	30%
2000	0%	-38%	38%
2001	-7%	-52%	45%
2002	50%	6%	44%
2003	16%	17%	0%
2004	-10%	-6%	-4%
2005	15%	2%	13%
2006	23%	26%	-3%
Mean (all years)	18%	6%	12%

Table 4
Risk-adjusted monthly returns for low and high asset growth stocks by capitalization level

This table reports the mean monthly risk-adjusted returns for the asset growth portfolios. We sort firms into three size groups using the 30th and 70th NYSE market equity percentiles in June of the portfolio formation year. For each capitalization group (small, medium, and large) we then assign firms to one of ten deciles based on annual asset growth rates, and form equal-weighted and value-weighted portfolios for the next 12 months. For each capitalization level, equal- and value-weighted portfolios are formed based on the asset growth deciles. The portfolios are held for one year, from July of the portfolio formation year to the following June. Portfolio return statistics are reported over the period of July 1968 to June of 2007. The adjusted returns are intercept values from a Fama-French three factor model. * and ** represents statistical significance at the 5% and 1% level, respectively.

Panel A. Equal-weighted mean returns

Sample	Low growth	High growth	Low-high growth	t-stat
Small size	0.69%	-0.94%	1.63%	8.96**
Medium size	-0.15%	-0.56%	0.40%	2.04*
Large size	0.27%	-0.36%	0.63%	2.54**

Panel B. Value-weighted mean returns

Sample	Low growth	High growth	Low-high growth	t-stat
Small size	-0.02%	-1.06%	1.03%	6.18**
Medium size	-0.14%	-0.51%	0.37%	1.79
Large size	0.35%	-0.28%	0.63%	2.54**

Table 5
Monthly returns of asset growth portfolios over five years

This table reports mean monthly returns and five-year cumulative returns for the extreme asset growth portfolios. At the end of June of each year *t* over 1968 to 2006, stocks are allocated into deciles based on asset growth rates defined as the percentage change in total assets from the past two fiscal years. Equal- and value-weighted portfolios are formed based on June asset growth decile cutoffs. The portfolios are held for one year, from July of the portfolio formation year to June of the following year, and then rebalanced based on updated asset growth data. * and ** represents statistical significance at the 5% and 1% level, respectively.

Panel A. Equal-weighted portfolios

Year after sorting	Low growth	High growth	Low-high growth	t-stat
Year 1	1.94%	0.35%	1.59%	8.36**
Year 2	1.62%	0.83%	0.78%	4.68**
Year 3	1.73%	1.29%	0.44%	3.40**
Year 4	1.69%	1.29%	0.41%	3.27**
Year 5	1.66%	1.40%	0.26%	2.05*
Cumulative (Years 1 through 5)	165.84%	74.72%	91.12%	9.63**

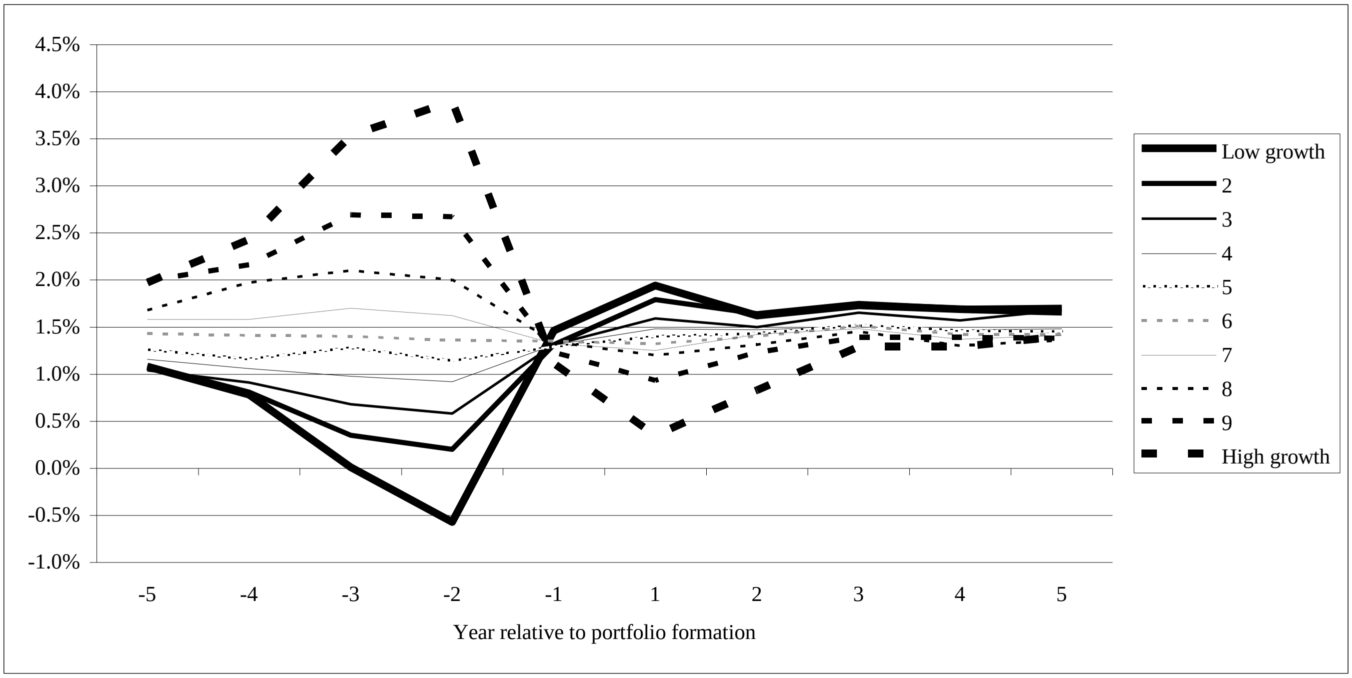
Panel B. Value-weighted portfolios

Year after sorting	Low growth	High growth	Low-high growth	t-stat
Year 1	1.48%	0.43%	1.05%	5.04**
Year 2	1.33%	0.65%	0.68%	3.39**
Year 3	1.69%	1.16%	0.53%	2.82**
Year 4	1.32%	1.20%	0.12%	0.61
Year 5	1.28%	1.26%	0.00%	0.11
Cumulative (Years 1 through 5)	128.79%	79.11%	49.67%	4.25**

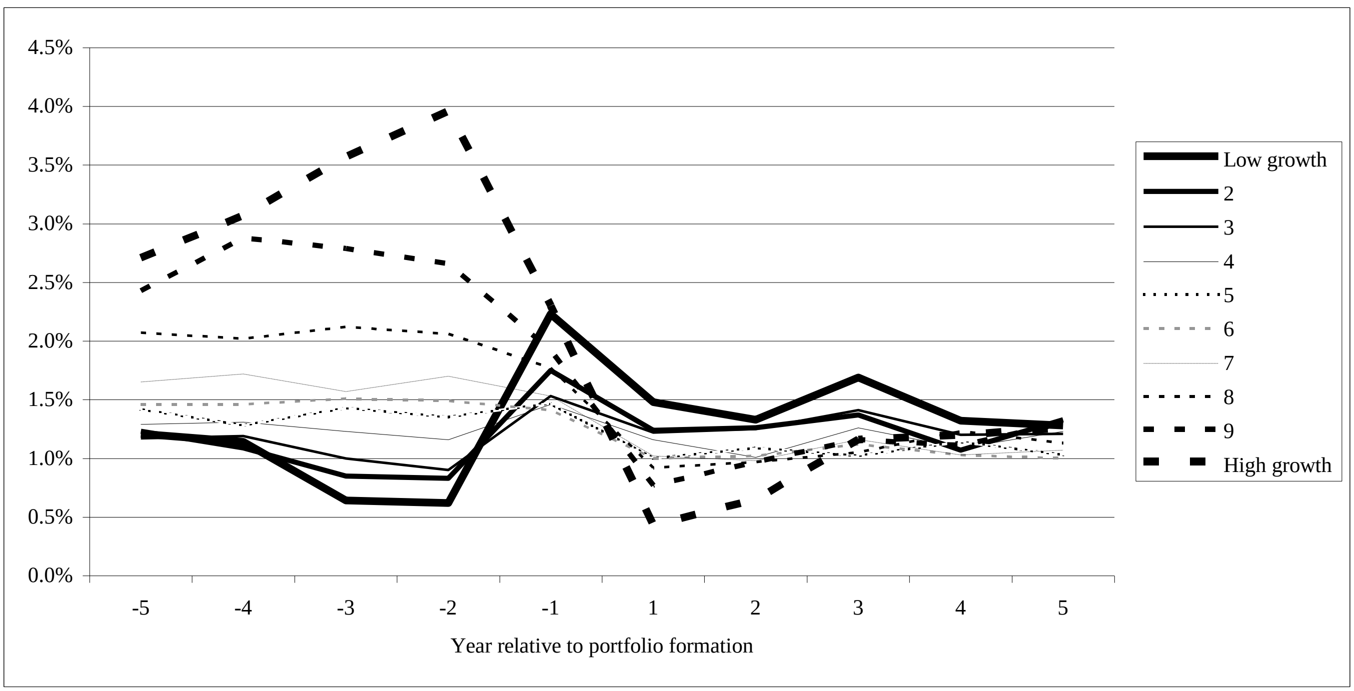
Table 6
Fama-MacBeth Regressions of Annual Stock Returns on Asset Growth and Other Variables

This table reports mean regression coefficients for annual cross-sectional regressions of annual firm returns on a set of annual firm characteristics following Fama-MacBeth (1973) for each year from 1968 to 2006. *Asset growth* is the asset growth rate defined as the percentage change in total assets from the fiscal year ending in calendar year *t*-2 to fiscal year ending in calendar year *t*-1. *Lag asset growth* is the one year lagged asset growth rate defined as the percentage change in total assets from the fiscal year ending in calendar year *t*-3 to fiscal year ending in calendar year *t*-2. The *book-to-market ratio* is calculated using the Compustat data in the fiscal year ending in calendar year *t*-1 and is defined as in Davis, Fama, and French (2000). *Market capitalization* is the June market value of equity. *Past 6 month return* is the buy-and-hold return over the past six months ending in June. *Past 36 month return* is the 36-month buy and hold return ending in June. Coefficient estimates are time series averages of cross-sectional regression betas obtained from annual cross-sectional regressions. The *t*-statistics, in parentheses, are adjusted for autocorrelation in the beta estimates.

	Intercept	Asset growth	Lag asset growth	Book-to-market ratio	Market capitalization	Past 6 months return	Past 36 months return
All firms							
Coefficient	0.1443	-0.0754	-0.0317	0.0359	-0.003	0.0192	0.0039
t-stat	(5.27**)	(-6.07**)	(-2.83**)	(3.38**)	(-1.41)	(0.95)	(0.44)
Small firms							
Coefficient	0.1932	-0.0749	-0.0369	0.0288	-0.4605	0.0159	-0.0058
t-stat	(4.51**)	(-5.19**)	(-2.20*)	(2.58**)	(-1.83)	(0.80)	(-0.54)
Medium firms							
Coefficient	0.1281	-0.073	-0.0153	0.0237	-0.0493	0.0539	0.0153
t-stat	(4.15**)	(-4.30**)	(-0.80)	(1.78)	(-0.99)	(1.47)	(2.06*)
Large firms							
Coefficient	0.1132	-0.0478	-0.0391	0.0124	-0.0006	0.0655	0.0122
t-stat	(5.59**)	(-3.59**)	(-1.35)	(0.63)	(-0.89)	(1.77)	(2.25*)



Panel A. Equal-weighted returns.



Panel B. Value--weighted returns.

Figure 1. Mean returns for asset growth deciles in event time. At the end of June of each year from 1968 to 2006, stocks are allocated into deciles based on asset growth rates defined as the percentage change in total assets from the past two fiscal years. Equal-weighted (Panel A) and value-weighted (Panel B) portfolio return statistics are reported every year for 10 years around the portfolio formation year over the period of July 1968 to June 2003. Monthly average returns to the portfolios formed in June and held over to the following July. The x-axes labels refer to the year relative to the time of portfolio formation.

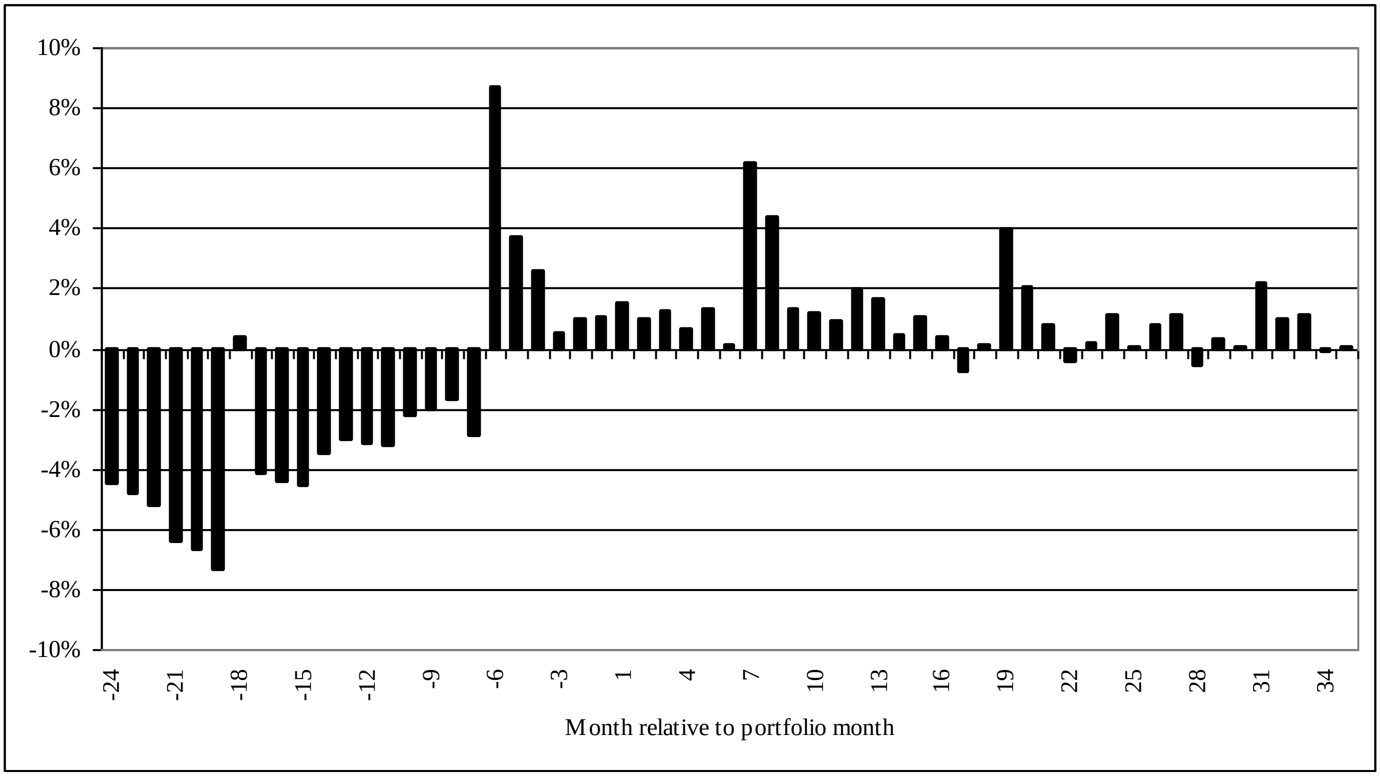


Figure 2. Mean equal-weighted monthly returns for low growth less high growth portfolio in event time. This figure plots the mean equal-weighted monthly returns for a low minus high growth portfolio for the 24 months prior to and 36 months after the portfolio formation month (June).