Investment, financing activities and

the predictability of stock returns

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A large body of empirical work in finance and accounting finds that there is information in firms' financial statements for their future stock price performance. In particular, several recent articles suggest that changes over time in firms' asset positions have predictive power for returns. Titman, Wei and Xie (2004) find some evidence of weak stock price performance following large increases in capital expenditures. Firms ranked in the top quintile by changes in investment spending have average abnormal returns of -0.127 percent per month over the following year. Fairfield, Whisenant and Yohn (2003) report that changes in long-term net operating assets (change in property plant and equipment plus change in intangibles less depreciation and amortization expense) lead to lackluster future returns as well. The abnormal return on the high growth (low growth) portfolio averages -1.9 percent (5.5 percent) over the next year. Cooper, Gulen and Schill (2005) provide the starkest findings from this line of research. Their evidence indicates that the growth rate in a firm's total assets is the most important predictor of stock returns in the cross-section, dominating beta, book-to-market, size and momentum. Return spreads associated with this variable stand head and shoulders above the others: estimated one-year abnormal returns from the Fama-French three factor model are -9.1 percent and 9.2 percent for the high- and low-growth portfolios, respectively.

A related attention-grabbing set of results appears in Hirshleifer et al. (HHTZ, 2004). They study the association between stock returns and the prior level of a firm's net operating assets. In sorts by current-year net operating assets relative to total assets in the prior year, firms ranked in the top decile earn average monthly abnormal returns of -0.73 percent compared to 0.51 percent for the bottom decile, producing a spread of 1.24 percent per month.

While the results from this literature appear to be clear-cut and provocative, they raise several broader questions. First, it is not clear whether the effects documented in these papers are independent phenomena or at least partially overlap. Net operating assets generally make up a substantial portion of firms' total assets so these accounts share much common variation. Second, asset growth can take a variety of forms (growth in cash, current assets, or long-term assets). Previous work has not generally distinguished between different forms of asset growth and their effects on stock prices. At the very least, one potentially important distinction is between internally generated expansion in assets ("organic" growth) and acquisitions of other companies and their assets. Many studies find that acquiring firms in takeovers experience disappointing

stock returns (Loughran and Vijh (1997), Moeller, Schlingemann and Stulz (2005)). The consequences of asset growth from this source thus reflect an already well-documented phenomenon.

Last, and most importantly, the economic rationale for the drift in returns following changes in assets remains ambiguous. Several explanations, which are not mutually exclusive, can be put forward. The most common line of thought follows Jensen's (1986) argument that excessive accumulation of assets is a consequence of the agency cost of delegated management, as firm executives engage in wasteful spending that serves their own interests. When investors learn that such expenditures dissipate firm value, stock prices adjust downward. As another explanation, firms with high growth tend to be relatively more successful companies with strong past performance. Accordingly, their poor returns in subsequent years may reflect the reversal phenomenon documented in DeBondt and Thaler (1985) and Lakonishok, Shleifer and Vishny (1995). Physical assets can expand when managers spend the proceeds from earlier offerings of securities. To the extent that managers time equity issues to take advantage of overpricing of their firm's shares, external financing is a negative signal that triggers low returns. The rise in assets (which may be profitable investments by themselves) happens to coincide with the poor stock price performance. In short the existing studies do little to discriminate between different hypotheses about the effects of asset changes on stock prices.

These issues motivate what we do in this paper. Using a common sample and methodology, we explore whether previous studies on the association between returns and either the level or growth in assets capture different facets of the same underlying pattern in returns. We break down the sources of growth and examine their individual effects. Further, we assess explanations for the observed association between asset growth and subsequent returns. Since mergers and takeovers are prime sources of growth in assets, we first check that the return drifts are not solely due to the low post-acquisition returns of bidder firms. Unlike earlier studies we take into account the influence of past performance and external financing when examining the effect of asset growth.

Our main findings are as follows. Instead of measuring the structure of a firm's balance sheet in terms of the predominance of net operating assets, the information in the HHTZ variable differs in important ways. Their measure focuses on firms with elevated past growth and is tilted toward acquiring firms in corporate

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acquisitions. Accordingly, the HHTZ results echo earlier evidence from studies of stock price reversals and on mergers that such firms experience poor future returns on average. Other than for firms with high values of the HHTZ measure, there is no evidence of cross-sectional differences in returns.

The broader phenomenon behind the HHTZ results is that firms who undergo substantial expansion (growth in net operating assets, property plant and equipment, external financing) on average suffer reductions in shareholder wealth. Growth in total assets is a parsimonious, readily available measure that summarizes the overall features of this phenomenon. Adjusted for size and book-to-market value of equity, firms in the highest-ranked decile by total asset growth earn -5.88 percent in the following year and -4.76 percent in the second year.

Partitions by the form of asset expansion indicate that some, but not all, of the under-performance reflects the experience of acquiring firms in business combinations. The mean first-year abnormal return for firms with high growth due to acquisitions is -8.77 percent. Asset increases due to other forms of investment, except in the form of growth in cash holdings, are also associated with signigicant negative abnormal returns. Expansion in the form of raised property, plant and equipment are accompanied by abnormal returns of -9.69 percent. Firms whose growth takes the form of higher cash balances generally do not experience notable abnormal returns, consistent with the argument that cash holdings provide financial flexibility and avoid external financing costs.

Controlling for past performance and long-term price reversals does not drive out the predictive power of total asset growth. As well, firm expansion does not appear to be driven by opportunistic financing decisions by managers to take advantage of temporary undervaluation. Regardless of the source of funding, asset growth leads to negative long-term returns. Equity-financed increases in assets generate first-year abnormal returns of -9.28 percent while debt-financed growth generates -7.09 percent. One source of difference across firms with large build-ups in assets arises from their past investment efficiency. Firms with a consistent history of past ability to generate income or sales from shareholder capital show less signs of stock price under-performance. The distinction supports the argument that over-investment due to managerial agency costs, or over-confidence following past success, may be the driving element behind the subsequent negative return drifts.

In the remainder of the paper, section 1 describes the sample and methodology. In light of the debate sparked by the results of HHTZ and Richardson et al. (2006), we begin in section 2 with the net operating asset anomaly. Section 3 takes up the asset growth anomaly and studies the overlap between these return regularities. Different explanations are explored in section 4.

1.   Data and methods

We study the effect of each variable by investigating the properties of portfolios formed by sorts on the variable (in section 4 we consider the joint effects of the variables). This lets us assess the economic significance of the information in each variable for returns. Further, the portfolio analysis helps to reveal whether the association holds over the entire range of the variable, or shows up only at the extremes. Data on returns are from CRSP, and financial statement information is from Compustat. All listed domestic common stock with data from these sources are eligible for inclusion in the portfolios, subject to two additional selection criteria. Since there is ambiguity as to what constitutes operating assets and liabilities for financial firms, all stocks in the financial sector (with SIC codes between 6000 and 6999) are dropped from the sample. This practice follows what has been done in the prior literature. We also exclude firms whose market value of equity (at the time of portfolio formation) places them in the bottom decile of the distribution of firm size based on NYSE breakpoints. Dropping the smallest firms mitigates return measurement problems due to market microstructure issues. As well we avoid instances where asset growth is large in percentage terms but not in economic terms because the starting value of assets is trivial. The smallest stocks have large cross-sectional variability in their attributes and more volatile returns, as shown in Fama and French (2006). Accordingly, the performance of extreme portfolios from sorting procedures gives tiny stocks a weight that is disproportionate to their significance in terms of wealth. At year-end 2006, for example, 4696 domestic common stock issues have data on market value of outstanding shares available on CRSP. Of these, 2180 are smaller than the tenth percentile cutoff for size based on NYSE firms, representing 46 percent of the sample by count but only 1.6 percent by capitalization.

Data on the accounting variables are taken from firms' annual financial statements over the sample period of 1968–2004. In each calendar year t firms are ranked based on accounting data from the fiscal

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year ending in t, and assigned to one of ten portfolios. Stocks in a portfolio are equally weighted. We measure firm characteristics at fiscal year-end for the portfolios, and cumulate buy-and-hold returns starting four months after the fiscal year-end. Returns are measured over each of the three years following portfolio formation.[1] The characteristics and returns are then averaged over years.

Each stock is also paired with a reference portfolio, and its buy-and-hold return is measured net of the buy-and-hold return on the control portfolio. A decile portfolio's abnormal return is the equally-weighted average across member stocks of the net returns. To construct the control groups we draw on Chan, Dimmock and Lakonishok (2007), who evaluate different procedures for measuring portfolio performance. They find that reference portfolios formed from sorts first by market value of equity and then by book-to-market value of equity within each size group track track active portfolio returns better than the Fama-French (1996) reference portfolios from independent sorts by size and book-to-market. Accordingly we use as benchmarks the returns on portfolios from dependent sorts first by size and then by book-to-market. Our classification by size follows practice in the investment industry as represented by the widely-followed Russell indexes. There are six size groups: going down the list of stocks ranked by market value of equity they are, in order, the largest 200 stocks, the following 300, then 500, the next 1000, and the remainder. Within each size bracket stocks are further ranked by the ratio of book to market value of equity and placed into one of five groups with roughly the same number of stocks.

2. Net operating assets

HHTZ provide a different perspective on the prediction of returns using balance sheet information. They start from the accounting identity that the level of net operating assets (operating assets minus operating liabilities) denotes the cumulative amount over time of the difference between a firm's net operating income and its free cash flow. A firm with high net operating assets, they argue, is likely to be one where high past growth in accounting net income is not accompanied by commensurate growth in cash flow. The discrepancy suggests that such a firm's future prospects are not likely to be on par with its past performance.

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[1]If a stock is subsequently delisted we assume that any remaining funds are reinvested in the equally weighted market index until the end of the event-year. At the start of the following year the remaining stocks are rebalanced to equal weights.

To the extent that investors fail to anticipate the slowdown in future profitability growth, firms with high net operating assets ("bloated" balance sheets) suffer disappointing stock returns.

The empirical design in HHTZ has created some controversy, however (see Richardson et al. (2006)). While their logic indicates that balance sheet bloat should be measured by the level of net operating assets relative to the firm's contemporaneous asset base, HHTZ use total assets in the prior year as the scaling variable. Since current-year values with are measured against asset levels in the preceding year, the effects of net operating asset levels are confounded with the effects of asset growth. As a result, it is ambiguous as to whether net operating asset levels have independent predictive power beyond past growth in assets. In this section we explore whether this is the case.

2.1.   Net operating assets relative to assets from prior year

Table 1 reports the results from sorts by net operating assets in year t relative to total assets in the preceding year $t-1$, $NOATAL1 = \frac{NOA_t}{TA_{t-1}}$. Part 1 of the table provides statistics based on the full sample (all eligible stocks above the bottom decile). Part 2 gives results for large firms only (the top 1000 firms ranked by market value of equity), which represents the bulk of equity market value and hence is of primary interest from an investment perspective. Full details on the definitions and measurement of the accounting variables are provided in the appendix.

As in HHTZ, the portfolio of firms ranked highest by $NOATAL1$ under-perform in the years following portfolio formation: the abnormal returns are -6.57 percent in the first year, -4.75 percent in the second and -3.67 percent in the third year. The returns are large relative to their time series standard errors. The next highest-ranked portfolio also suffers negative abnormal returns, but to a lesser degree (-2.45 percent). Crucially, however, in the other portfolios returns do not vary with the level of net operating assets. For example, over the first year the portfolio of lowest-ranked stocks earns an abnormal return of 1.01 percent, which is not notably different from returns on the fifth portfolio (0.75 percent). For the sample of large stocks (part 2), the difference in returns between the extreme portfolios is attenuated. The spread between the top and bottom groups is -5.56 percent for the full sample in part 1, compared to -3.91 percent in part 2. It is still the case, however, that the poor performance of the top decile drives much of the difference. Large

firms that are ranked highest by $NOATAL1$ on average earn abnormal returns of -6.30 percent in the first following year. The conclusion is that the effect of net operating assets on future returns is not symmetric: a difference in returns arises only when net operating assets are at, or close to, their highest levels in the cross-section.

The remaining panels of Table 1 provide clues in identifying explanations for the association between net operating assets and returns. Panel B reports for each portfolio average values of $NOATAL1$, the sorting variable for this table. Because $NOATAL1$ compares a firm's asset position across dates it mixes information from two sources – the structure of the balance sheet, and changes in the asset base of the firm over time. To separate these influences we measure for each firm its net operating assets relative to contemporaneous total assets, $NOATAL0 = \frac{NOA_t}{TA_t}$, to represent the amount of a firm's net operating assets given its scale. Average values over time for each portfolio are given in the table. In addition we measure the median growth rate of total assets, $TAGROW = \frac{TA_t}{TA_{t-1}} - 1$, across firms in a decile portfolio and report its average over time.

The sort by $NOATAL1$ does not produce a tight association with $NOATAL0$. For example the top four portfolios by $NOATAL1$ share similar average values of $NOATAL0$. On the other hand there is a closer connection between high levels of net operating assets relative to prior year assets and asset growth. Median asset growth in the formation year is 12.61 percent on average for portfolio 7 and rises to 58.31 percent for the top portfolio. In sum, $NOATAL1$ does a poor job in separating firms with different balance sheet structures in terms of the importance of net operating assets in the firm's asset base. Instead, it is more successful at picking out firms with elevated past growth in assets.

Another way to assess the nature of the information conveyed by each variable is to examine its persistence over time. For all but the smallest firms, the size and composition of the balance sheet is likely to be steady over time. The relative amount of net operating assets is thus a persistent variable. Extreme changes in balance sheet size and make-up are infrequent and reflect the effects of non-recurring, short-lived shocks. HHTZ make a similar point. They argue in favor of using the level of net operating assets, rather than its change, because the level variable behaves in a smoother fashion and is more informative for future returns. If, as HHTZ argue, $NOATAL1$ captures the more permanent portion of the information in net operating

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assets, therefore, it should be a fairly persistent variable. In panel B we calculate in each post-formation year a stock's rank by $NOATAL1$ (from zero for the stock with the lowest value to one for the stock with the highest value), and provide its average for the portfolio. $NOATAL1$ does not exhibit high persistence in the post-formation years. The difference between the extreme portfolios in their average ranks is 0.61 in the first year, 0.53 in the second, and 0.48 in the third. Even in the case of large stocks (part 2), where stability in the levels of net operating assets should be more pronounced, there is not much more persistence in $NOATAL1$.

Two features of the portfolio characteristics tabulated in panel C catch the eye. Stocks in the highest-ranked portfolio have enjoyed notably better past performance than the others. They are outstanding in terms of their past growth rates of sales per share, as well as past returns on the stock. The growth rate in sales per share over the four years prior to portfolio formation averages 25.29 percent per year, and the mean annualized return from four years ago to the year before portfolio formation is 27.54 percent in the top decile.

Since $NOATAL1$ compares a firm's asset position over time, it will pick up asset shifts resulting from merger and acquisition activity. Panel C confirms that firms highly ranked by $NOATAL1$ are relatively more likely to be involved in merger and acquisition activity in the past year. Our source for firms' acquisition activity is the Securities Data Company's (SDC) Platinum database on mergers and acquisitions by U.S. companies. For each firm as of a given portfolio formation date we check if it is identified as an acquirer on the SDC Platinum database of corporate financial transactions over the preceding sixteen months.[2] Targets can be domestic or foreign firms, and can be privately held companies or publicly listed. On average 53.90 percent of the firms in the top decile are involved in past M&A activity over the previous year. The frequency of acquisition activity, however, does not take into account the magnitude of the transaction. As a refinement we consider cases where the acquisition size is material relative to the year-to-year change in total assets. To measure the size of the deal we perform several sequential tests. First we verify whether the acquisition size as given by SDC constitutes at least 10 percent of the asset change. Transaction values are

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[2]The sixteen months include the fiscal year just ended as of the portfolio formation date plus an assumed publication delay of four months.

not always reported by SDC, however, and particularly in the earlier years its coverage may be incomplete. As an additional filter we check if the accounting statement of cash flows shows acquisitions exceeding 10 percent of the change in total assets. Failing this, our last test is if the change in intangibles or goodwill from the balance sheet amounts to 15 percent or more of the asset change.[3] These filters indicate that on average 47.21 percent of firms in the top decile have conducted major acquisitions in the portfolio formation year for the full sample. For the large firm sample the corresponding frequency of large takeovers is 45.95 percent.

The message from Table 1 is that sorts by the HHTZ variable $NOATAL1$ generate notable return drifts only in the top decile. The lack of persistence in the sorting variable, as well as other characteristics of the portfolio, suggest that the information in $NOATAL1$ for returns may not come from the level of net operating assets. Instead, the low subsequent returns associated with high $NOATAL1$ may stem from the effects of high past performance, as well as the post-merger experience of acquirers.

2.2. Net operating assets relative to current-year total assets

A clearer picture should emerge if we divorce the effect of asset growth from measures of the relative magnitude of net operating assets. Table 2 performs sorts by $NOATAL0$, which scales net operating assets by total assets in the same year. From panel B, $NOATAL0$ is correlated with $NOATAL1$. The average value of $NOATAL1$ increases monotonically across the decile portfolios. However, the sort by $NOATAL0$ does not pick up differences due to past asset growth. The top decile by $NOATAL0$ is associated with past growth in assets of 16.55 percent on average, compared to the overall mean of 15.95 percent for the full sample. Another distinction is that $NOATAL0$ is more persistent than $NOATAL1$. The mean ranks of $NOATAL0$ differ by 0.81 in the first year, 0.76 in the second year, and 0.72 in the third year.

Mean returns in panel A indicate no discernible pattern across portfolios except for the top decile. For the full sample (part 1) the highest-ranked stocks by $NOATAL0$ experience average abnormal returns of

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[3]Goodwill is included in the intangibles item and is not always broken out separately, so we examine both accounts. In turn, intangible assets can grow for reasons other than acquisition of another firm, such as the addition of new copyrights, software development costs or the purchase of intangible assets from others. To avoid picking up such sources of growth beyond business combinations we apply a more demanding cutoff point to intangibles and goodwill.

-3.46 percent in the first year and -2.87 percent in the second year. In the case of large stocks (part 2) mean abnormal returns are -2.67 percent and -2.21 percent in the first and second years respectively. Return differences thus exist only in the uppermost ranges of both $NOATAL0$ and $NOATAL1$. Nonetheless, scaling net operating assets by contemporaneous total assets, thereby alleviating the effect of growth, cuts the magnitude of abnormal return in the top decile by about half, from -6.57 percent in Table 1 to -3.46 percent in Table 2.

However the two variables affect returns through different channels. Specifically, stocks that are ranked highly by $NOATAL1$ have very different features than those with high rankings by $NOATAL0$. In panel C of Table 2, the mean book-to-market ratio of the top decile is 0.8007 so firms with high net operating assets relative to their total assets tend to be value-oriented. Based on past sales growth and return over the preceding four years, these stocks are not different from the other portfolios. They are also similar to other stocks with respect to the incidence of M&A activity in the formation year. In comparison, the top decile in Table 1 is relatively more growth-oriented with a lower book-to-market ratio (0.5954), high levels of past sales growth and return, and elevated frequency of mergers and acquisitions. Results from the large stock sample tell the same story. For large firms mean book-to-market ratios for the top decile by $NOATAL0$ and by $NOATAL1$ are 0.7827 and 0.5918 respectively. The corresponding average values for past sales growth are 13.19 percent and 19.67 percent, while for past returns the means are 13.79 percent and 25.79 percent.

In summary, HHTZ identify an influence on stock returns that is different from what happens when net operating assets make up a dominant portion of a firm's assets. Instead, the HHTZ measure singles out firms with high levels of past growth and returns who have are more likely to have engaged in merger and acquisition activity. These firms subsequently experience negative drifts in average stock returns.[4]

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[4]Results when net operating assets are divided by the average of total assets in years t and $t-1$ are qualitatively similar to those in Table 1, although the magnitudes are generally smaller. Only the top decile portfolio experiences notable abnormal returns (-5.37 percent in the first year and -4.49 percent in the second year). The highest-ranked portfolio by this measure comprises stocks with high past growth in sales (21 percent per year over the last 4 years) and high past return (22 percent per year from four years to one year prior to portfolio formation). Roughly 41 percent of the firms in this group undertake major M&A transactions in the year of portfolio formation.

3.   The effects of asset growth

The results in HHTZ suggest than an indirect measure of firm growth helps to predict returns for at least some firms. We can sharpen the analysis by using more direct measures of expansion in the scale of a firm's operations. Many variables can be, and have been, used for this purpose. Sloan (1996) relates accruals, which are changes in one component of net operating assets (working capital) less depreciation and amortization, to future returns. Fairfield, Whisenant and Yohn (2004) look at growth in long-term net operating assets. Bradshaw, Richardson and Sloan (2006) measure expansion from the standpoint of the sources of funds, namely, net issuances of debt and equity. The appropriate definition of operating assets and liabilities is still debatable, however. Moreover, many firms do not have Compustat data available for all the individual balance sheet items required to perform the calculations. On the other hand, the level of total assets is available for almost all listed domestic common stock issues. For these reasons we choose to work with the growth in total assets $TAGROW = \frac{TA_t}{TA_{t-1}} - 1$ as a simple, readily available, measure of asset expansion.

3.1.   Correlation between indicators

Table 3 provides evidence that $TAGROW$ moves in tandem with $NOATAL1$, and measures of asset expansion that have been used in other papers. We sort all eligible stocks in the sample into decile portfolios by growth in total assets. For each of the stocks in a portfolio we measure its rank on a variable and take the equally-weighted average of the ranks. Part 1 of Table 3 reports each portfolio's rank on $NOATAL1$ and, for the sake of comparison, $NOATAL0$. In addition, mean portfolio ranks are provided for other indicators of asset increases: year-to-year changes in net operating assets relative to total assets in the previous year, $DNOA$; changes in property, plant and equipment relative to total assets in the prior year, $DPPE$. The remaining variables capture changes in the firm's financing position relative to total assets at the beginning of the year: new external financing raised over the year $DXFIN$; and internal financing $INTFIN$.[5] Additionally, cross-sectional correlations between these variables are computed each year. Mean correlations over years are given in part 2 of the table.

   Growth in total assets serves as a good stand-in for the other asset growth indicators and the financ-

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[5]See the appendix for complete details on these variables.

ing measures. Notably, the HHTZ variable lines up closely with total asset growth. Portfolio ranks by $NOATAL1$ rise steadily from 0.2187 in the bottom decile by $TAGROW$ to 0.7837 in the top decile. There is a similar pattern across deciles in their ranks by changes in net operating assets, and change in property, plant and equipment. Average correlations between $TAGROW$ and the other asset growth indicators vary from 0.461 with $NOATAL1$ to 0.757 with $DNOA$.

Differences in total asset growth also pick up cross-sectional variation in new external and internal financing. The bottom (top) decile by $TAGROW$ has a mean rank on external financing of 0.3113 (0.8549), and a mean rank on internal financing of 0.2269 (0.6418). $TAGROW$ and $DXFIN$ share an average correlation of 0.588. Growth rates of total assets thus serves as a parsimonious, comprehensive measure of asset expansion and new financing. The necessary data for its calculation are readily available for almost all firms, does not involve distinctions between operating and financing activities, and does not require detailed information on individual components of the balance sheet. Accordingly, we focus on this variable in the remainder of our analysis.

Of the variables considered in Table 3, the only one that does not appear to be aligned with firm expansion is $NOATAL0$. Instead, $NOATAL0$ is roughly constant across the $TAGROW$ portfolios. From part 2, the average correlation between the two variables is actually negative (-0.195). As well, correlations with the other investment growth and financing measures are weak. These results reinforce the evidence from Table 2 that $NOATAL0$ and $TAGROW$ capture different features of firms.

3.2. Sort by growth in total assets

Table 4 describes the returns and characteristics of portfolios sorted by growth in total assets, $TAGROW$. Stocks in the highest-ranked decile on average experience asset growth of 71.78 percent in the formation year, while the assets of stocks in the lowest-ranked decile shrink by 13.20 percent. Growth rapidly reverts in the following years, however. In the year following portfolio formation, for example, average ranks by asset growth differ by only 0.2858 between the top and bottom deciles. The sort by asset growth also spreads out stocks by $NOATAL1$.

As in the case of $NOATAL1$, variation in total asset growth is accompanied by return differences only

in the top decile. In particular, mean returns on the top decile in the post-formation years are disappointing. Adjusted for size and book-to-market, the stocks in the highest-ranked group by $TAGROW$ earn -5.88 percent in the first subsequent year. For the sample of large stocks (part 2), the average abnormal return for the top decile is not very different (-5.17 percent). Abnormal returns on the other portfolios are unremarkable.

The absence of an association with returns when asset growth is low stands in contrast to the results of Cooper at al. (2006). They find high average returns on stocks which experience large contraction in assets (decile portfolio 1). In Table 4, however, the mean raw return on the bottom decile is 13.14 percent in the first year, compared to the overall average of 13.29 percent. Average abnormal returns for this group are negligibly different from zero. Crucially, our sample differs from that in Cooper et al. because we exclude the decile of smallest stocks. While the smallest stocks are many in number they represent a trivial fraction of total market capitalization. Fama and French (2006) verify that the asset growth effect is limited to small stocks.

The overlap between the sorts by $TAGROW$ and $NOATAL1$ appears in dimensions other than the behavior of returns. Firms that enjoy high asset growth tend to be glamour companies with low ratios of book to market value of equity, high past return and strong past sales growth. In the top decile, 51.28 percent of firms are involved in some merger and acquisition activity in the portfolio formation year. Large merger transactions occur in 42.50 percent of the cases. The above-average incidence indicates that for many firms in the highest-ranked group, business combinations rather than internally-generated opportunities are a primary source of the expansion in assets.

3.3. Sorts by other investment and financing indicators

Table 5 verifies that while growth in total assets is a simple overall measure of firms' expansion, it does about as well as more detailed descriptors of investment or financing activity in spreading out future returns. We report the variation in returns and selected characteristics across decile portfolios formed from sorts on one of three indicators of investment or financing activity. In particular we focus on the change in net operating assets $DNOA$; change in net property, plant and equipment $DPPE$, and new external financing $DXFIN$, all scaled by total assets in the previous year. To eliminate clutter we report only the average abnormal

returns in each of the three post-formation years; annualized return from 4 years to 1 year prior to portfolio formation; annualized growth in sales per share over the preceding four years; and average frequency of large M&A transactions. These specific attributes appear to summarize the key features that are common to stocks ranked highly by $NOATAL1$ and $TAGROW$.

Given the correlations reported in Table 3 between the indicators, the results in Table 5 are generally unsurprising. Stocks that are placed in the top classification by either growth in net operating assets, property, plant and equipment, or new external financing, under-perform. The abnormal returns are close to those reported for the top decile by growth in total assets in Table 3. In the first post-formation year, the highest-tanked category by $TAGROW$ earns a mean abnormal return of -5.88 percent, compared to -7.47 percent for $DNOA$, -4.38 percent for $DPPE$ and -6.60 percent for $DXFIN$. There are generally no major differences in returns across the other portfolios, except in the case of the sort by change in external financing. In the latter case firms which have decreases in external financing (including those which repurchase shares) have positive abnormal returns of 3.48 percent on average.

The distinctive features that characterize firms falling in the high $TAGROW$ portfolio show up as well in Table 5. The portfolio of stocks ranked highest by any of the indicators comprises firms that have been relatively successful in the past. From four years before to the year preceding portfolio formation, the mean return on the top decile portfolio by $DXFIN$ is 26.84 percent per year, and the highest-ranked decile based on the other indicators have even higher mean returns. Firms ranked in the top decile by any of the indicators are also more likely to be part of a major M&A transaction in the portfolio formation year. In the case of the top $DXFIN$ decile portfolio, for instance, a sizeable takeover occurs in 38.15 percent of the component firms.

The results from the sample of large stocks in part 2 of Table 5 are similar. In the sort by $TAGROW$ the top decile portfolio's abnormal return in the first year is -5.17 percent. The corresponding performance for the top decile is -6.54 percent based on $DNOA$, -4.26 percent based on $DPPE$ and -4.67 percent after sorting on $DXFIN$. The upshot is that anomalies based on total asset growth, growth in net operating assets, growth in property, plant and equipment as well as new external financing bear many close resemblances to each other. As a result, spelling out the underlying sources of the effect of asset growth on returns

goes a long way to providing an understanding of the others.

4. Evaluating the effects of asset growth

We explore several hypotheses to account for the association between growth in assets and future returns. The possible explanations, which are not mutually exclusive, are: the acquisition hypothesis, the overvaluation hypothesis, and the extrapolation hypothesis.

4.1. Attribution of asset growth source

Acquisitions of other business operations are a prime candidate for major increases in assets. Moreover, the consequences of corporate takeovers for shareholder wealth have been thoroughly analyzed in previous studies. As a result, the patterns in stock returns following asset growth driven by business combinations are a manifestation of an effect that is already well-documented and extensively studied.

To see whether the effect of asset growth is a disguised version of the poor peformance of acquirers in takeovers, we break out those firms with high asset growth that are involved in takeover activity. More generally, we provide a decomposition of the sources of the increase in firms' assets. The decomposition lets us examine whether there are differences across sources with respect to their ability to predict returns, and thereby isolate some of the potential reasons for stock price under-performance. Specifically, variation in predictability across different components of asset growth can arise on several accounts. Managers have more opportunity to pursue their own interests for some kinds of investment decisions compared to others. For example, they are more likely to indulge in empire-building through acquisitions of other businesses than by expanding current assets such as receivables and inventories. The quality of management choices is also more opaque for mergers and assets such as property, plant and equipment. The effects of over-investment in other businesses and in physical assets are less easily reversible and more long-lived. Accumulation of cash, on the other hand, may be less costly and may be prudent in terms of enhancing financial flexibility.

Table 4 shows that the association between asset growth and returns is limited to the highest-ranked decile portfolio and, to a lesser extent, the next-highest ranked portfolio. Accordingly, we focus our attention

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on the behavior of these two sets of firms. We take each firm and attribute the primary source of asset growth to one of five mutually exclusive items. The amount of assets can grow due to acquisition of another firm or due to change in one of the following items: cash and marketable securities, net property, plant and equipment, current assets other than cash and securities, and other long-term assets excluding property plant and equipment.

First we break out those firms where asset growth is due primarily to acquisition activity, as measured by whether the acquisition size is at least twenty percent of the dollar change in total assets. The size of the acquisition is taken from SDC if available; if not we measure it (in the following order) as acquisitions from the statement of cash flows, or change in the value of goodwill or intangible assets. If there is no evidence of a substantial acquisition we then compute the change in each of the remaining four sources of asset changes. The item with the largest change relative to the dollar growth in total assets qualifies as the dominant source, provided its increase is at least 10 percent of the rise in total assets.

The results of the attribution of asset growth are given in Table 6. Observation counts in each category are too small to permit meaningful comparisons until 1988, so our sample period in this section extends from 1988 to 2004. On average there are 203 firms ranked in the top decile by growth in total assets for the full sample of firms. In 95 (or roughly 47 percent) of these cases the SDC database indicates they complete acquisitions of other companies over the sixteen months preceding portfolio formation, and these takeovers represent at least 20 percent of the asset increase. For 17 additional firms, there are signs of takeover activity from the statement of cash flows, goodwill or intangibles, amounting to at least 20 percent of the rise in assets. In total, business combinations account for the bulk of the change for 112 (or 55 percent) of the firms in the top decile by asset growth. Large companies are more prone to increasing assets through corporate acquisitions. For the large firm sample, takeover activity is the chief source of the asset growth in 43 of 71 cases (or 61 percent). Results for the next-highest ranked decile portfolio by $TAGROW$ yield a similar conclusion: takeovers are the prime source of the increase in assets for 47 percent (95 out of 203 firms) of the cases for the full sample, and 49 percent for the large firm subset. Firms that are ranked highly by total asset growth are thus heavily weighted toward acquirers in takeovers.

In the majority of the remaining cases, increases in cash and marketable securities account for the main

source of the asset change. This item is the leading contributor to asset growth in roughly 25 percent of the cases in the top decile for the full sample. Growth due to the other asset categories do not represent large proportions of the sample. Asset growth due chiefly to changes in property, plant and equipment makes up 6 percent, while changes in non-cash current assets constitute another 8 percent.

4.2. Stock price performance by growth source

The stock price performance of firms ranked in the top two deciles by asset growth, classified by the primary source of the increase in assets, is reported in Table 7. Stocks within each category are equally-weighted. The mean of the time series of portfolio returns is shown, along with t-statistics based on the standard error of the time series.[6]

Over the period 1988–2004 the mean return on stocks ranked in the top decile by $TAGROW$ is -7.52 percent in the first year after ranking, and -4.40 percent in the second year for the full sample. Abnormal returns for the large stock sample, as well as the stocks in decile 9, are attenuated but are still negative. For example, returns for large stocks in the top decile during the first year are -5.73 percent and in the second year are -2.22 percent. Much of the sub-par performance can be traced to the the poor long-term price performance of acquirers after takeovers. Those firms who engage in major acquisitions earn abnormal returns of -8.77 percent in the first post-formation year, and -6.23 percent in the second year. For the subset identified as acquirers on SDC, abnormal returns are -8.15 and -5.79 percent respectively. The experience of large firms with high asset growth due to acquisitions is similar, and the same result holds for firms ranked in the next highest category by asset growth (decile 9). As a specific case, average abnormal returns are -8.42 and -3.81 percent in the first and second years for large stocks in panel (B).

The disappointing performance of acquirers in our sample matches up with the findings from an extensive literature (such as Moeller et al. (2005)). In turn, the poor long-term results for acquiring firms could be due to a variety of reasons. Purchasing another company may be a signal that the acquirer has run out of in-

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[6]In several portfolio formation years, some of the categories are sparsely populated. To provide more reliable inferences about performance we pool firms over years within a category until it contains at least 10 stocks. The one-year returns on these stocks are then averaged and counted as a single time-series observation.

ternal growth opportunities. Acquisitions may also disclose that management suffers from over-confidence and the board is unable or unwilling to exercise oversight. As another possibility, a transaction that is paid for with shares may be a sign that the acquirer's equity is overvalued.

When assets grow as a result primarily of cash accumulation, the results for stock price performance depart from the overall pattern. While firms that have high asset growth subsequently earn below-average returns, there is no evidence of under-performance in those cases where growth takes the form of increased cash holdings. Mean abnormal returns are small and not reliably different from zero. In the full sample, for instance, the average abnormal return is 1.17 percent in the first year and 1.10 percent in the second. The result is robust across the top two deciles by $TAGROW$ and for large stocks as well. Averaged over the three post-formation years for the large stock sample in decile 10, the abnormal return is 2.92 percent. Our evidence from returns lines up nicely with other evidence on the operating performance of cash-rich firms in Mikkelson and Partch (2003). They find that firms with persistently large cash holdings have superior operating performance compared to similarly-sized firms belonging to the same industry.

As suggested by Opler, Pinkowitz, Stulz and Williamson (1999), building up large cash reserves may bypass the costs of raising external capital and avoid disruptions to investment when income is volatile. In particular indirect financing costs are exacerbated when there is an information asymmetry problem between managers and investors, as is likely to be the case when firms have large investments in intangible assets such as research and development (R&D) spending. In our sample there is some weak evidence that the effects of large increases in cash differ across firms depending on R&D levels. Large cash increases are associated with a mean abnormal return in the first year of 2 percent for firms engaged in R&D. Firms with no R&D spending, on the other hand, earn abnormal returns that are more in line with the results from the previous tables (-3.27 percent in the first year). There is large sampling variability in the returns, however, so the average returns are not statistically significant.

Firms in the other categories by source of asset growth generally experience lackluster returns, although sample sizes are small so the verdict is not entirely clear-cut. Notably, in those cases where the growth is primarily due to property, plant and equipment, abnormal returns averaged over the three years are -6.55 percent per year for the top decile for the full sample and -4.98 percent for large stocks.

4.3. Financing decisions and stock returns

It is possible that adjustments on the asset side of a firm's balance sheet are a consequence of other changes, and have no direct association with subseqent share prices. Rather, the increase in assets is a consequence of financing activities and these transactions on capital markets trigger a revision in the value of shares. In particular new security issues may occur when managers believe that the firm is temporarily overvalued. Investors respond to this negative signal by revising downward the stock price, possibly with a lag. Since the correction in equity prices occurs with a delay after funds are raised from issuing securities and assets accumulate, it appears that the expansion in assets leads returns. Under this scenario the correlation arises irrespective of agency costs due to managerial discretion or mangerial over-confidence about the profitability of investments.

To check on this misvaluation hypothesis of the effects of new financing and asset expansion we partition the firms with large asset increases by financing source. Firms that raise new capital through equity issues are more likely to be cases where managers are taking advantage of temporary overvaluation of their stock. On the other hand, there is a less compelling reason to think that firms obtaining funds through debt issues are doing so to exploit mispricing.

In Table 8 we split the firms in each of the top two deciles by asset growth into disjoint categories depending on the primary financing source. There are three possible sources: equity, debt or internal financing. We choose as the primary source the one constituting the largest portion of the dollar change in total assets, as long as it exceeds 20 percent of the asset increase. In each financing category we track the yearly equal-weighted average of the component stocks' abnormal returns.

Firms in the highest-ranked growth decile are roughly divided into equal numbers by financing source. On average, in about 49 percent of the sample the largest portion of the increase in assets is financed through equity, while in 41 percent of the cases debt financing is the leading source of funding. Internally-generated funding is not often the main source, representing only about 9 percent of the firms in the top growth decile. Given the low number of firm-year observations in the internal funding category our main contrast in Table 8 is between equity- and debt-financed expansion in assets.

Both equity- and debt-financed asset expansion are associated with lackluster future returns. Firms in

the top decile by growth that raise equity funds earn mean abnormal returns of -9.28 percent in the first year while firms using debt earn mean returns of -7.09 percent. The associated t-statistics are -3.34 and -3.23, respectively. Returns are equally disappointing for both financing sources for firms in the ninth decile by growth (-3.61 percent for equity and -4.97 percent for debt). The similarity in returns across financing sources calls into question the hypothesis that managers opportunistically time major asset expansions to take advantage of temporary undervaluation of the firm's shares.

Turning to the specific forms of investment, the results continue to be roughly comparable for equity and debt financing. Notably, acquisitions that are funded with equity, which are associated with first year abnormal returns of -12.56 percent, are detrimental to shareholder wealth. Nonetheless, even debt-financed takeovers are plagued with poor returns of -6.68 percent. The poor price performance of firms increasing property, plant and equipment is also eye-catching, regardless of the method of financing. First-year abnormal returns average -11.44 percent when financed through equity and -10.63 percent when financed through debt. On the other hand firms with large increases in cash holdings are not associated with any signs of significant abnormal returns.[7]

4.4. Return regressions

Sorts by a variable do not confine the relation between returns and the underlying variable to any particular functional form. However, sorts do less well in controlling for the influence of multiple explanatory variables. To tease out the influence of different investment and financing decisions while controlling for past performance we turn to the results from cross-sectional regressions. We fit a cross-sectional regression each calendar year to all firms with fiscal year-ends falling in that year. The model relates abnormal returns over the first post-formation year (beginning four months after a firm's fiscal year-end) to explanatory variables observed as of the formation year or earlier.

We study the consequences of different sources of asset growth on returns by estimating a model of the

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[7]Sample sizes in a financing category are very small in several years. We follow the same procedure as for the investment categories in Table 7 and pool across years until there are at least ten firms in a financing category. The pooled average one-year return is treated as one time series datapoint. Since different years are aggregated in the two tables, the results for individual categories are not directly comparable between tables.

form

$$ar_{it} = \gamma_{0t} + \gamma_{1t}AQSDC_{it-1} + \gamma_{2t}AQDUM_{it-1} + \gamma_{3t}CASH_{it-1} + \gamma_{4t}OPA_{it-1}$$
$$+\beta_{1t}GSALES4_{it-1} + \beta_{2t}PASTR41_{it-1} + \beta_{3t}PASTR1_{it-1} + \epsilon_{it}$$

where ar_{it} is the abnormal return for stock i in year t. Growth in assets can be from one of five mutually exclusive sources. If the SDC database reports an acquisition by firm i in year $t-1$ then $AQSDC_{it-1}$ is the dollar value of acquisitions relative to the change in the firm's total assets. $AQDUM_{it-1}$ is a dummy variable taking on the value of one if there is evidence of an acquisition by firm i worth at least 20 percent of the asset change from either the statement of cash flows, or increase in goodwill or intangible assets over year t. The variable is zero otherwise. Since intangible assets can change for reasons other than business combinations we use an indicator variable to capture this event, rather than the dollar value of the growth in intangibles. In cases where firm i's increase in cash is at least 20 percent of the asset change then $CASH_{it-1}$ is the change in cash relative to the change in total assets. To increase the power of our tests, we aggregate the remaining sources of changes in assets into one broad category of non-cash operating assets. When the change in property, plant and equipment, non-cash current assets and other long-term assets is the dominant source (at least 20 percent) of the asset change, OPA_{it-1} measures its change relative to the asset increase. The remaining variables control for the effects of past firm performance. $GSALES4_{it-1}$ is the past growth rate in firm i's sales per share. We use up to four years ending in year $t-1$ to measure growth (fewer if any past year's sales are not available). As a measure of long-term past returns we use $PASTR41_{it-1}$, the stock's rate of return beginning from year $t-4$ (if available) to year $t-2$; the variable $PASTR1_{it-1}$, stock i's return over year $t-1$ captures the effect of intermediate-term price trends.

The results from portfolio sorts indicate that returns are associated with asset growth only when growth is at relatively high levels. To capture this relationship using the parsimonious functional specification (1) without eliminating any observations, we adopt the following procedure. The investment variables $AQSDC$, $AQDUM$, $CASH$ and OPA take on non-zero values in the regression only for firms in the top decile by asset growth; for the rest of the sample these variables are set to zero. As a result cross-sectional variation in asset growth influences returns only in the relevant region. As a safeguard against extreme values of the

regressors driving the results we also express each asset growth indicator as a percentile value. In the case of $CASH$, to take as an example, we take all firms categorized in the top decile in a given year by asset growth and rank them by the dollar change in cash relative to the asset increase. The firm with the lowest relative cash increase is assigned a value of zero while the firm with the largest relative cash increase receives a value of one for $CASH$ in that year.

We average the time series of regression slope coefficients from (1) and compare them to the standard error of the time series. Table 9 reports the results for a variety of fitted models.

Model (1) in Table 9 confirms that, without controlling for past firm performance, abnormal returns are negatively related to each source of asset growth except for cash. For those acquirers with transaction values avaliable on SDC, increases in acquisition size, given the change in total assets, are associated with mean abnormal returns of -12.66 percent with a t-statistic of -2.84. Similarly, firms with high growth in non-cash operating assets underperform those with low growth by -18.66 percent on average (t-statistic of -4.00). Growth in cash holdings, on the other hand, have virtually no relationship with subsequent abnormal returns.

Firms with high rates of asset growth tend to enjoy past success with respect to sales growth and returns (see Table 4). Their past performance may have a separate confounding effect on future stock returns. Investors who naively extrapolate past trends too far into the future may overvalue the shares of such firms. At the same time, the cognitive biases may be on the part of managers, who wind up over-extending firm resources and ultimately fall short. Model (2) introduces past sales growth, past long-term returns and the preceding one-year return to control for these influences. They do not detract from the strong effects of asset growth. The coefficients of the acquisition variables and growth in operating assets are not much different between the two models. The message from model (2) is that past performance does not subsume the effect of asset growth on future abnormal returns.

The remaining models in Table 9 introduce the effects of financing decisions. Within each investment category we categorize firms on the basis of the primary funding source (equity or debt). The item that constitutes the largest portion of the increase in assets, provided it makes up at least 20 percent of the increase, is taken to be the main financing source. In the enhanced models (3) and (4) we interact each of

the three investment variables with separate indicator variables for financing:

$$
\begin{aligned}
ar_{it} \quad = \quad & \gamma_{0t} + (\sum_{j=1}^{3} \gamma_{jt} INV_{ijt-1}) EQUITY_{it-1} + (\sum_{j=1}^{3} \delta_{jt} INV_{jt-1}) DEBT_{it-1} \\
& + \beta_{1t} GSALES4it - 1 + \beta_{2t} PASTR41_{it-1} + \beta_{3t} PASTR1_{it-1} + \epsilon_{it}.
\end{aligned}
$$

$EQUITY_{it-1}$ equals one if firm i's increase in assets is primarily financed through equity and is zero otherwise; and similarly $DEBT_{it-1}$ is one if its asset growth is chiefly funded through debt and is zero otherwise.

Regardless of the source of funding, acquisitions and growth in non-cash operating assets lead to weak future returns. The coefficient for acquisition size relative to asset increase is -0.1087 for equity and -0.0596 for debt in model (3). Change in non-cash operating assets relative to the asset increase has a coefficient of -0.1702 for equity and -0.1220 for debt. Results after controlling for past firm performance (model (4)) are similar.

In contrast, firms whose assets grow substantially due to increases in cash holdings show no signs of stock price under-performance. Model (5) estimates the model for firms in the top decile by asset growth, but with no R&D spending. We focus on firms not engaged in R&D activity because they form the majority of the sample. For these firms there is some evidence that increases in cash holdings, along with acquisitions and increases in non-cash operating assets, are all associated with negative abnormal returns. However, while the coefficients for cash for the subset of firms with zero R&D spending are negative, they are not significantly different from zero.

4.5. Investment efficiency and the effects of asset growth

When investors learn from financial statements about large increases in a firm's assets, their response is likely to be shaped by the management's ability to generate profits from investments in the past. A firm with a consistent record of earning favorable returns on capital has a higher expectation in general of deploying assets profitably. As a result, the chances are higher for a positive stock price reaction to asset increases by such a firm. In comparison, when a firm without a background of profitable investments increases assets, the likelihood is higher that managers are making self-serving decisions or over-committing resources. Long-

term returns for a firm in the latter situation are likely to be less appealing.

Table 10 checks up on whether long-term returns following asset expansions vary with past investment efficiency. We use two proxies to measure management's ability to use invested capital to increase shareholder wealth: return on equity, and the sales-to-price ratio. Return on equity (net income relative to the book value of equity) is a popular metric to judge management performance. Net income has a large transitory element, however. Sales are more stable than earnings, and a high sales-to-price ratio is another indication of managers' ability to invest shareholders' capital to generate revenues. To smooth out year-to-year fluctuations and obtain more reliable signals of the quality of management's investment decisions, we average net income (or sales) over the past two years before scaling by the current-year book value (or market value) of common equity.

As hypothesized, firms with high asset growth but poor historical investment efficiency have more severe stock price under-performance. When classified by past return on equity, for example, firms with historically less profitable investments earn abnormal returns of -15.16 percent on average during the first year after portfolio formation. Abnormal returns for firms with relatively superior efficiency, on the other hand, are close to zero. The resulting difference between the high- and low-efficiency groups is 14.35 percent on average with a t-statistic of 4.13. The other measure of investment efficiency, sales-to-price, gives similar but weaker results. High-growth firms with poor past efficiency under-perform firms with similar growth but better efficiency by 5.65 percent (with a t-statistic of 1.16). In the second post-formation year the difference in abnormal returns between firms with high and low efficiency continues to be positive (3.05 percent when classified by return on equity and 4.14 percent under the partition by sales-to-price). While conditioning on investment efficiency clarifies the relationship between asset growth and returns, the cost is a reduction in sample size. As a result the differences in second-year returns, while economically notable, are difficult to distinguish statistically.

5.   Summary and conclusions

An expanding body of evidence suggests that large expansions in firm assets on average are detrimental to shareholder wealth. This empirical regularity explains much of the effect documented by Hirshleifer et al.

(2004) In particular, because their design indirectly focuses on increases in net operating assets from the previous year, their sample is skewed toward firms with growth in assets and firms who have acquired other businesses. Other studies have documented similar associations between returns and specific forms of asset growth such as rises in long-term net operating assets, capital expenditures or new financing.

The sources of the association between returns and asset growth are, however, harder to pin down. Our analysis examines different, not mutually exclusive, hypotheses to account for the asset growth anomaly. Since merger and acquisition activity are a prime reason for significant expansions in the scale of a firm, one argument is that the association is driven by the poor long-term performance of acquiring firms. It is indeed the case that 55 percent of the firms categorized in the top decile by asset growth are involved in acuisition activity in the ranking year. These firms tend to have weak returns in the following years: mean abnormal returns are -8.77 percent in the first subsequent year and -6.23 percent in the second year. However, other forms of asset growth also are accompanied by negative drifts in returns. In the case of increases in property, plant and equipment, for example, the returns are -9.69 percent and -7.46 percent in the first and second years, respectively. In brief, the link between asset growth and future returns is not entirely driven by corporate acquisition activity.

Cases where assets rise in the form of cash holdings are notable exceptions to the negative correlation between asset increases and returns. When the growth is primarily due to higher cash balances, there is no evidence of abnormal future return. This finding is consistent with academic theories and practitioner logic that increased cash tends to promote flexibility, particularly when indirect costs of raising capital are high.

A second line of argument is that the timing of increases in assets coincides with episodes when the firm's equity is temporarily overvalued, and managers raise funds to take advantage of the opportunity. The expansion then leads future declines in the stock price as investors realize that the firm is overvalued and adjust valuations accordingly. The correlation holds irrespective of the profitability of the investments financed by the additional funds. When we classify firms based on the method of financing for the expansion we find that future returns are disappointing regardless of the funding source. When growth in assets is funded through new equity the mean first-year abnormal return is -9.28 percent. In cases where debt capital is used to fund the growth the mean first-year abnormal return is -7.09 percent. The similarity across

financing channels suggests that asset growth is not proxying for the effects of overvalued equity.

Expansions in firm scale usually follow on the heels of favorable performance and strong stock returns. Controlling for these confounding factors in regressions does not drive out the effect of asset growth. It does not seem to be the case, therefore, that investors' extrapolation of past trends, or managerial over-commitment after past success, are the culprits behind the asset growth anomaly. On the contrary, investors appear to take into consideration a firm's past success in extracting revenues and profits from capital investments. Firms with poor indicators of investment efficiency, proxied by past return on equity or past sales-to-price ratio, have worse returns than firms with better indicators. The spread in abnormal returns between firms with high and low past return on equity averages 14.35 percent in the first post-ranking year, for example.

Appendix

Accounting data for portfolios formed in calendar year t are taken from the fiscal year ending in year t. We generally scale the accounting variables by total assets TA, given by Compustat annual data item 6. Net operating assets NOA are given by total assets minus cash and equivalents (data item 1) minus operating liabilities. Operating liabilities are given by accounts payable (item 70) plus deferred taxes (item 74) plus other current liabilities (item 75). We set net operating assets to be missing if any of these items is unavailable.

For other measures of firm expansion we use the change in net property, plant and equipment or new external financing, both relative to prior-year total assets. Net property, plant and equipment PPE is annual data item 8 on Compustat. The default measure of new external financing is based on the statement of cash flows. New external financing $DXFIN$ is given by the sum of new equity financing and new debt financing. New equity financing is the sum of: sale of common and preferred stock (item 108) minus purchase of common and preferred stock (item 115) minus cash dividends (item 127). New debt financing is issuance of long-term debt (item 111) minus reduction in long-term debt (item 114) plus changes in current debt (item 301). We follow Richardson et al. (2006) in treating dividends to common equity as a return of shareholders' capital and hence a negative financing source. If changes in current debt (item 301) is missing we set it to zero. In the event that the statement of cash flow items are unavailable we switch to the balance sheet and measure $DXFIN$ as the change in common equity plus change in preferred equity plus the change in debt. The change in common equity is given as the year-to-year change in book value of common equity (item 60) minus net income (item 172). Change in preferred equity is the yearly change in carrying value of preferred stock (item 130). Change in debt is yearly change in long-term debt (item 9) plus the change in the current portion of long-term debt (item 44) plus change in short-term debt (debt in current liabilities, item 34, minus the current portion of long-term debt, item 44).

Portions of our analysis decompose the growth in total assets into mutually exclusive components. One component is expansion through corporate takeovers. Growth in total assets for reasons other than acquisitions is attributed to one of the following items. Growth can be primarily due to an increase in one of the following: cash and equivalents (item 1), net property, plant and equipment (item 8), current assets other

than cash and short-term investments (total current assets, item 4, minus cash and equivalents), other long-term assets (investments and advances, items 31 and 32, plus intangibles, item 33, plus other assets, item 69).

We also categorize firms with large growth in assets by the primary source of funding (as a percentage of the dollar increase in assets). There are three mutually exclusive primary financing sources: equity, debt and internal financing. The amount of equity and debt funding is measured as above for new external financing through equity or debt. Internal financing is measured as income before extraordinary items available for common (data item 237) minus dividends to common equity (item 21).

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Table 1
Returns and characteristics for portfolios sorted by net operating assets (NOA) relative to prior year total assets (TA)

Each month from 1968 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by net operating assets (NOA_t) relative to total assets in the prior year (TA_{t-1}) and assigned to decile portfolios. All stocks are equally weighted in a portfolio. Returns on the portfolio are reported over each of the following three years , as well as abnormal returns (in excess of the return on a control portfolio matched on size and book-to-market value of equity). Characteristics of the portfolio at the formation date and in subsequent years are also reported. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Results are averaged over years in the sample period.

Part 1. All stocks

	1 Low	2	3	4	5	6	7	8	9	10 High
	(A) Returns over post-formation years									
Return in first year	0.1424	0.1549	0.1619	0.1528	0.1501	0.1470	0.1325	0.1207	0.1062	0.0608
Return in second year	0.1603	0.1627	0.1730	0.1723	0.1640	0.1523	0.1407	0.1360	0.1191	0.0909
Return in third year	0.1543	0.1574	0.1633	0.1564	0.1552	0.1568	0.1528	0.1437	0.1446	0.1053
Abnormal return in first year	0.0101	0.0147	0.0203	0.0101	0.0075	0.0060	-0.0026	-0.0158	-0.0245	-0.0657
t-statistic	0.73	1.73	2.83	1.69	1.28	0.96	-0.53	-3.05	-2.95	-4.47
Abnormal return in second year	0.0120	0.0083	0.0140	0.0115	0.0034	-0.0016	-0.0105	-0.0121	-0.0245	-0.0475
t-statistic	0.86	0.94	1.74	1.70	0.65	-0.29	-1.68	-1.85	-2.78	-4.94
Abnormal return in third year	0.0178	0.0126	0.0146	0.0108	0.0052	0.0068	0.0044	-0.0004	-0.0017	-0.0367
t-statistic	1.07	1.52	1.88	1.27	0.84	0.90	0.58	-0.05	-0.16	-3.21
	(B) Assets and growth in assets									
NOA_t/TA_{t-1}	0.3358	0.5420	0.6307	0.6899	0.7374	0.7817	0.8270	0.8840	0.9714	1.2984
NOA_t/TA_t	0.3294	0.5205	0.6002	0.6500	0.6856	0.7177	0.7421	0.7675	0.7920	0.7798
Growth in total assets over prior year	0.0772	0.0673	0.0688	0.0752	0.0867	0.0997	0.1261	0.1654	0.2444	0.5831
Rank by NOA_t/TA_{t-1} in first year	0.1295	0.2438	0.3413	0.4121	0.4900	0.5491	0.6102	0.6675	0.7375	0.7404
Rank by NOA_t/TA_{t-1} in second year	0.1630	0.2743	0.3649	0.4242	0.4885	0.5391	0.5871	0.6393	0.6979	0.6928
Rank by NOA_t/TA_{t-1} in third year	0.1855	0.2907	0.3770	0.4267	0.4793	0.5359	0.5696	0.6220	0.6761	0.6703
	(C) Characteristics									
Book-to-market ratio	0.5974	0.7016	0.7416	0.7482	0.7628	0.7477	0.7326	0.6942	0.6742	0.5954
Size (billion $)	1.2072	1.5682	2.2797	2.6232	2.5505	2.0105	1.8157	1.4515	1.2434	1.2042
Growth in sales over past 4 years	0.1091	0.1070	0.1025	0.1056	0.1113	0.1159	0.1298	0.1467	0.1747	0.2529
Return from 4 years ago to 1 year ago	0.1292	0.1156	0.1169	0.1203	0.1267	0.1277	0.1466	0.1673	0.1900	0.2754
Return over past year	0.1272	0.1330	0.1353	0.1267	0.1322	0.1318	0.1336	0.1394	0.1335	0.1497
Incidence of M&A activity over past year	0.2196	0.2714	0.2782	0.2971	0.3107	0.3178	0.3362	0.3604	0.4000	0.5390
Incidence of major M&A activity over past year	0.1208	0.1555	0.1648	0.1768	0.1975	0.2206	0.2423	0.2723	0.3329	0.4721

Part 2. Large stocks

	1 Low	2	3	4	5	6	7	8	9	10 High
	(A) Returns over post-formation years									
Return in first year	0.1556	0.1508	0.1385	0.1465	0.1443	0.1272	0.1197	0.1145	0.1004	0.0550
Return in second year	0.1530	0.1657	0.1632	0.1527	0.1501	0.1441	0.1265	0.1199	0.1202	0.0905
Return in third year	0.1401	0.1538	0.1517	0.1247	0.1402	0.1503	0.1286	0.1324	0.1280	0.1078
Abnormal return in first year	0.0239	0.0188	0.0105	0.0129	0.0152	-0.0024	-0.0100	-0.0140	-0.0241	-0.0630
t-statistic	2.10	2.20	1.51	1.81	2.48	-0.32	-1.65	-2.02	-3.05	-4.19
Abnormal return in second year	0.0174	0.0215	0.0133	0.0085	0.0048	0.0038	-0.0066	-0.0153	-0.0089	-0.0404
t-statistic	1.94	2.85	1.64	1.23	0.73	0.47	-1.12	-2.07	-0.88	-3.48
Abnormal return in third year	0.0063	0.0187	0.0190	-0.0076	0.0057	0.0065	-0.0062	0.0022	-0.0083	-0.0207
t-statistic	0.70	2.43	2.15	-0.98	0.89	0.92	-0.82	0.23	-0.80	-1.48
	(B) Assets and growth in assets									
NOA_t/TA_{t-1}	0.4024	0.5810	0.6515	0.7011	0.7419	0.7802	0.8202	0.8710	0.9455	1.2097
NOA_t/TA_t	0.3889	0.5518	0.6149	0.6557	0.6873	0.7154	0.7385	0.7660	0.7967	0.7984
Growth in total assets over prior year	0.0795	0.0674	0.0703	0.0781	0.0874	0.0979	0.1188	0.1474	0.2013	0.4722
Rank by NOA_t/TA_{t-1} in first year	0.1216	0.2404	0.3300	0.4079	0.4822	0.5500	0.6080	0.6777	0.7534	0.7597
Rank by NOA_t/TA_{t-1} in second year	0.1458	0.2696	0.3584	0.4194	0.4745	0.5371	0.5807	0.6454	0.7247	0.7207
Rank by NOA_t/TA_{t-1} in third year	0.1709	0.2900	0.3655	0.4152	0.4712	0.5292	0.5695	0.6268	0.6981	0.7007
	(C) Characteristics									
Book-to-market ratio	0.5346	0.5954	0.6251	0.6470	0.6623	0.6520	0.6364	0.6291	0.6340	0.5918
Size (billion $)	4.1629	4.6314	6.0564	5.9043	5.2068	4.9291	3.9817	3.3448	3.1851	3.4508
Growth in sales over past 4 years	0.0942	0.0890	0.0929	0.0989	0.1070	0.1078	0.1189	0.1270	0.1526	0.1967
Return from 4 years ago to 1 year ago	0.1653	0.1474	0.1339	0.1344	0.1404	0.1388	0.1581	0.1692	0.1905	0.2579
Return over prior year	0.1631	0.1449	0.1550	0.1340	0.1316	0.1288	0.1395	0.1314	0.1289	0.1476
Incidence of M&A activity over past year	0.3378	0.3468	0.3546	0.3666	0.3740	0.3783	0.3905	0.3921	0.3973	0.5228
Incidence of major M&A activity over past year	0.1843	0.1941	0.2067	0.2153	0.2402	0.2671	0.2806	0.2930	0.3322	0.4595

Table 2
Returns and characteristics of portfolios sorted by net operating assets (NOA) relative to current-year total assets (TA)

Each month from 1968 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by net operating assets (NOA_t) relative to total assets in the current year (TA_t) and assigned to decile portfolios. All stocks are equally weighted in a portfolio. Returns on the portfolio are reported over each of the following three years , as well as abnormal returns (in excess of the return on a control portfolio matched on size and book-to-market value of equity). Characteristics of the portfolio at the formation date and in subsequent years are also reported. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Results are averaged over years in the sample period.

Part 1. All stocks

	1 Low	2	3	4	5	6	7	8	9	10 High
					(A) Returns over post-formation years					
Return over first year	0.1379	0.1488	0.1497	0.1428	0.1333	0.1371	0.1318	0.1238	0.1239	0.1000
Return over second year	0.1486	0.1511	0.1513	0.1656	0.1667	0.1440	0.1480	0.1442	0.1339	0.1141
Return over third year	0.1448	0.1594	0.1650	0.1534	0.1502	0.1478	0.1416	0.1485	0.1524	0.1253
Abnormal return over first year	0.0065	0.0125	0.0121	0.0052	-0.0056	-0.0017	-0.0095	-0.0151	-0.0104	-0.0346
t-statistic	0.45	1.34	1.51	0.79	-0.91	-0.24	-1.50	-2.55	-1.57	-2.99
Abnormal return over second year	0.0060	0.0033	-0.0007	0.0082	0.0071	-0.0087	-0.0041	-0.0114	-0.0179	-0.0287
t-statistic	0.41	0.37	-0.10	1.16	1.03	-1.56	-0.64	-1.54	-2.67	-2.42
Abnormal return over third year	0.0109	0.0171	0.0210	0.0074	0.0050	-0.0043	-0.0098	-0.0034	0.0050	-0.0169
t-statistic	0.68	1.67	2.16	0.91	0.64	-0.56	-1.21	-0.44	0.48	-1.31
					(B) Assets and growth in assets					
NOA_t/TA_{t-1}	0.3802	0.5966	0.6804	0.7324	0.7751	0.8146	0.8533	0.8910	0.9426	1.0324
NOA_t/TA_t	0.3012	0.4937	0.5768	0.6321	0.6735	0.7077	0.7395	0.7715	0.8098	0.8786
Growth in total assets over prior year	0.2230	0.1803	0.1619	0.1460	0.1397	0.1395	0.1429	0.1433	0.1531	0.1655
Rank by NOA_t/TA_t in first year	0.0980	0.2120	0.3042	0.3912	0.4723	0.5433	0.6243	0.7071	0.7939	0.9109
Rank by NOA_t/TA_t in second year	0.1311	0.2454	0.3332	0.4115	0.4760	0.5389	0.6132	0.6804	0.7651	0.8898
Rank by NOA_t/TA_t in third year	0.1570	0.2706	0.3499	0.4220	0.4789	0.5376	0.6000	0.6639	0.7435	0.8729
					(C) Characteristics					
Book-to-market ratio	0.5191	0.6065	0.6434	0.6818	0.7134	0.7310	0.7578	0.7655	0.7775	0.8007
Size (billion $)	1.2322	1.6049	2.1705	2.8975	2.7090	2.1029	1.9451	1.3184	1.0460	0.9272
Growth in sales over past 4 years	0.1491	0.1355	0.1308	0.1242	0.1200	0.1205	0.1238	0.1252	0.1367	0.1494
Return from 4 years ago to 1 year ago	0.1857	0.1690	0.1677	0.1541	0.1518	0.1416	0.1374	0.1356	0.1426	0.1302
Return over past year	0.1599	0.1646	0.1534	0.1508	0.1308	0.1290	0.1240	0.1208	0.1105	0.0990
Incidence of M&A activity over past year	0.2426	0.3051	0.3236	0.3427	0.3614	0.3723	0.3750	0.3617	0.3505	0.2962
Incidence of major M&A activity over past year	0.1505	0.2022	0.2175	0.2370	0.2493	0.2622	0.2654	0.2642	0.2659	0.2418

Part 2. Large stocks

	1	2	3	4	5	6	7	8	9	10
	Low									High
	(A) Returns over post-formation years									
Return over first year	0.1369	0.1569	0.1288	0.1363	0.1250	0.1350	0.1207	0.1138	0.1022	0.0968
Return over second year	0.1510	0.1513	0.1407	0.1489	0.1492	0.1430	0.1423	0.1233	0.1200	0.1123
Return over third year	0.1406	0.1509	0.1388	0.1290	0.1466	0.1392	0.1324	0.1357	0.1250	0.1182
Abnormal return over first year	0.0114	0.0214	-0.0004	0.0089	-0.0053	0.0063	-0.0092	-0.0144	-0.0246	-0.0267
t-statistic	1.04	2.27	-0.05	1.18	-0.74	0.71	-1.25	-2.13	-4.35	-1.77
Abnormal return over second year	0.0193	0.0148	0.0007	0.0043	0.0073	-0.0001	0.0034	-0.0128	-0.0174	-0.0221
t-statistic	2.12	1.16	0.10	0.55	1.05	-0.02	0.51	-1.42	-2.17	-1.44
Abnormal return over third year	0.0105	0.0221	0.0040	-0.0024	0.0097	-0.0011	-0.0034	-0.0031	-0.0106	-0.0118
t-statistic	1.09	1.72 0.56	-0.30	1.13	-0.13	-0.35	-0.34	-1.23	-0.70	
	(B) Assets and growth in assets									
NOA_t/TA_{t-1}	0.4406	0.6253	0.6842	0.7293	0.7658	0.8036	0.8360	0.8777	0.9286	1.0150
NOA_t/TA_t	0.3638	0.5313	0.5983	0.6436	0.6782	0.7085	0.7370	0.7674	0.8081	0.8768
Growth in total assets over prior year	0.2000	0.1621	0.1334	0.1267	0.1216	0.1262	0.1266	0.1364	0.1410	0.1490
Rank by NOA_t/TA_t in first year	0.0782	0.1915	0.2726	0.3685	0.4571	0.5392	0.6253	0.7245	0.8075	0.9101
Rank by NOA_t/TA_t in second year	0.0876	0.1953	0.2835	0.3897	0.4626	0.5436	0.6288	0.7233	0.8068	0.9115
Rank by NOA_t/TA_t in third year	0.1120	0.2265	0.3145	0.4095	0.4639	0.5414	0.6243	0.6989	0.7776	0.8796
	(C) Characteristics									
Book-to-market ratio	0.4630	0.5173	0.5579	0.5980	0.6154	0.6557	0.6731	0.6683	0.6741	0.7827
Size (billion $)	4.3896	4.4865	6.0864	6.5523	6.0287	4.5838	4.5978	2.9270	2.8201	2.3953
Growth in sales over past 4 years	0.1267	0.1163	0.1091	0.1107	0.1134	0.1065	0.1103	0.1159	0.1210	0.1319
Return from 4 years ago to 1 year ago	0.2249	0.1945	0.1726	0.1555	0.1576	0.1420	0.1435	0.1569	0.1508	0.1379
Return over past year	0.1819	0.1656	0.1566	0.1538	0.1345	0.1381	0.1248	0.1230	0.1175	0.1090
Incidence of M&A activity over past year	0.3635	0.3687	0.3937	0.3971	0.4242	0.4389	0.4106	0.4041	0.3704	0.2916
Incidence of major M&A activity over past year	0.2264	0.2357	0.2600	0.2711	0.2880	0.2944	0.2824	0.2983	0.2786	0.2399

Table 3

Net operating assets, asset growth rates and financing

for portfolios ranked by growth in total assets

Each month from 1968 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets ($TAGROW = \frac{TA_t}{TA_{t-1}}$) and assigned to decile portfolios. All stocks are equally weighted in a portfolio. For each portfolio the rank values as of the portfolio formation date are averaged across all component stocks for the following variables: NOATAL1 net operating assets in year t relative to previous year's total assets, NOATAL0 net operating assets in year t relative to current year's total assets; DNOA change from previous year to current year in net operating assets relative to previous year's total assets; DPPE the change from previous year to current year in property, plant and equipment relative to previous year's total assets; DXFIN current year new external financing relative to previous year's total assets; INTFIN current year internal financing relative to previous year's total assets. Rank values of portfolio characteristics (from zero for the lowest to one for the highest) are then averaged over years in the sample period and reported in part 1. In part 2, cross-sectional correlations between the rank values are calculated across stocks each year, and averaged over years.

Part 1. Ranks by net operating assets, asset growth rates and financing

Variable	1 Low	2	3	4	5	6	7	8	9	10 High
$NOATAL1$	0.2187	0.3641	0.4248	0.4616	0.4862	0.5063	0.5365	0.5708	0.6490	0.7837
$NOATAL0$	0.4555	0.5265	0.5426	0.5429	0.5303	0.5118	0.5005	0.4777	0.4710	0.4442
$DNOA$	0.1523	0.2469	0.3188	0.3924	0.4574	0.5246	0.5920	0.6699	0.7670	0.8801
$DPPE$	0.2339	0.2952	0.3590	0.4265	0.4782	0.5354	0.5752	0.6249	0.6938	0.7802
$DXFIN$	0.3113	0.3190	0.3582	0.3976	0.4391	0.4804	0.5381	0.6142	0.7202	0.8549
$INTFIN$	0.2269	0.3449	0.4064	0.4662	0.5074	0.5551	0.5888	0.6230	0.6407	0.6418

Part 2. Average correlations between net operating assets, asset growth rates and financing

	$NOATAL0$	$TAGROW$	$DNOA$	$DPPE$	$DXFIN$	$TOTFIN$
$NOATAL1$	0.801	0.461	0.597	0.402	0.346	0.434
$NOATAL0$		-0.156	0.229	0.310	-0.003	0.213
$TAGROW$			0.757	0.504	0.588	0.827
$DNOA$				0.584	0.538	0.686
$DPPE$					0.376	0.467
$DXFIN$						0.615

Table 4
Returns and characteristics for portfolios sorted by growth in total assets

Each month from 1968 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets ($\frac{TA_t}{TA_{t-1}}$) and assigned to decile portfolios. All stocks are equally weighted in a portfolio. Returns on the portfolio are reported over each of the following three years , as well as abnormal returns (in excess of the return on a control portfolio matched on size and book-to-market value of equity). Characteristics of the portfolio at the formation date and in subsequent years are also reported. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Results are averaged over years in the sample period.

Part 1. All stocks

(A) Returns in years following portfolio formation										
Return in first year	0.1314	0.1481	0.1504	0.1459	0.1493	0.1515	0.1455	0.1303	0.1095	0.0673
Return in second year	0.1628	0.1696	0.1653	0.1586	0.1550	0.1610	0.1544	0.1418	0.1197	0.0836
Return in third year	0.1653	0.1527	0.1666	0.1505	0.1456	0.1538	0.1433	0.1476	0.1391	0.1257
Abnormal return in first year	-0.0064	0.0036	0.0050	0.0051	0.0058	0.0112	0.0108	0.0021	-0.0177	-0.0588
t-statistic	-0.56	0.49	0.84	0.96	1.08	1.78	2.08	0.33	-1.99	-4.57
Abnormal return in second year	-0.0018	0.0075	0.0032	-0.0016	0.0018	0.0081	0.0030	0.0007	-0.0178	-0.0485
t-statistic	-0.14	0.99	0.58	-0.29	0.37	1.16	0.45	0.10	-1.99	-4.76
Abnormal return in third year	0.0180	0.0025	0.0125	0.0008	-0.0005	0.0089	0.0060	0.0063	-0.0048	-0.0150
t-statistic	1.43	0.34	1.60	0.12	-0.08	1.18	0.81	0.60	-0.47	-1.08
(B) Assets and growth in assets										
NOA_t/TA_{t-1}	0.5490	0.6687	0.7055	0.7265	0.7380	0.7497	0.7689	0.7894	0.8626	1.1407
NOA_t/TA_t	0.6222	0.6752	0.6863	0.6873	0.6797	0.6706	0.6636	0.6470	0.6392	0.6146
Growth in total assets over prior year	-0.1320	-0.0130	0.0259	0.0555	0.0846	0.1176	0.1592	0.2231	0.3543	0.7178
Rank by TA_t/TA_{t-1} in first year	0.3337	0.3584	0.3926	0.4242	0.4616	0.4999	0.5402	0.5732	0.6101	0.6195
Rank by TA_t/TA_{t-1} in second year	0.3837	0.3898	0.4080	0.4308	0.4590	0.4800	0.5087	0.5246	0.5487	0.5503
Rank by TA_t/TA_{t-1} in third year	0.4029	0.4075	0.4194	0.4280	0.4490	0.4619	0.4866	0.4977	0.5173	0.5248
(C) Characteristics										
Book-to-market ratio	0.8681	0.8959	0.8357	0.7821	0.7332	0.6794	0.6235	0.5762	0.5244	0.4898
Size (billion $)	0.8812	1.4443	1.9551	2.1296	2.2497	2.3468	2.1723	1.9956	1.5934	1.1841
Annualized return from 4 years ago to prior year	0.0214	0.0585	0.0857	0.1121	0.1261	0.1488	0.1756	0.2082	0.2589	0.3204
Return over prior year	0.0525	0.0973	0.1087	0.1254	0.1248	0.1387	0.1543	0.1677	0.1768	0.1961
Growth in sales over past 4 years	0.0631	0.0819	0.0895	0.1014	0.1146	0.1275	0.1481	0.1741	0.2216	0.2978

Part 2. Large stocks

	(A) Returns in years following portfolio formation									
Return in first year	0.1374	0.1416	0.1442	0.1288	0.1372	0.1376	0.1295	0.1170	0.1135	0.0649
Return in second year	0.1589	0.1617	0.1512	0.1514	0.1318	0.1412	0.1390	0.1336	0.1182	0.0970
Return in third year	0.1530	0.1532	0.1420	0.1365	0.1333	0.1301	0.1301	0.1296	0.1225	0.1274
Abnormal return in first year	0.0048	0.0075	0.0104	0.0024	0.0038	0.0051	0.0029	-0.0038	-0.0137	-0.0517
t-statistic	0.45	1.00	1.39	0.35	0.66	0.56	0.49	-0.67	-1.35	-3.16
Abnormal return in second year	0.0083	0.0122	0.0039	0.0030	-0.0059	0.0038	0.0033	0.0012	-0.0091	-0.0220
t-statistic	0.86	1.40	0.59	0.55	-0.84	0.60	0.51	0.19	-1.10	-1.71
Abnormal return in third year	0.0148	0.0081	0.0031	-0.0024	0.0000	-0.0039	-0.0022	0.0024	-0.0076	0.0036
t-statistic	1.64	1.31	0.36	-0.30	0.00	-0.59	-0.33	0.23	-0.73	0.24
	(B) Assets and growth in assets									
NOA_t/TA_{t-1}	0.6034	0.6920	0.7217	0.7356	0.7491	0.7491	0.7700	0.7894	0.8281	1.0680
NOA_t/TA_t	0.6562	0.6870	0.6961	0.6934	0.6908	0.6744	0.6738	0.6634	0.6463	0.6347
Growth in total assets over prior year	-0.0869	0.0049	0.0349	0.0593	0.0832	0.1101	0.1433	0.1918	0.2852	0.5927
Rank by TA_t/TA_{t-1} in first year	0.3247	0.3528	0.3927	0.4184	0.4680	0.5070	0.5478	0.5696	0.6257	0.6327
Rank by TA_t/TA_{t-1} in second year	0.3588	0.3897	0.4100	0.4274	0.4711	0.4869	0.5112	0.5264	0.5619	0.5662
Rank by TA_t/TA_{t-1} in third year	0.3971	0.3979	0.4187	0.4342	0.4441	0.4706	0.4973	0.4983	0.5257	0.5505
	(C) Characteristics									
Book-to-market ratio	0.7798	0.7788	0.7333	0.6861	0.6449	0.5971	0.5676	0.5199	0.4752	0.4335
Size (billion $)	3.1079	3.7975	4.5067	4.8020	5.0106	5.5665	5.1298	4.8028	4.4868	3.6388
Annualized return from 4 years ago to prior year	0.0576	0.0888	0.1047	0.1253	0.1344	0.1536	0.1698	0.1997	0.2605	0.3404
Return over prior year	0.1110	0.1113	0.1303	0.1359	0.1240	0.1361	0.1437	0.1511	0.1631	0.1976
Growth in sales over past 4 years	0.0572	0.0760	0.0817	0.0951	0.1042	0.1145	0.1293	0.1480	0.1876	0.2419

Table 5
Returns and characteristics for portfolios sorted by change in net operating assets,
change in property, plant and equipment, or external financing

Each month from 1968 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by either: change in net operating assets relative to prior year total assets ($\frac{\Delta NOA_t}{TA_{t-1}}$) in panel (A), change in property, plant and equipment relative to prior year total assets ($\frac{\Delta PPE_t}{TA_{t-1}}$) in panel (B), or external financing relative to prior year total assets ($\frac{XFIN_t}{TA_{t-1}}$) in panel (C), and assigned to decile portfolios. All stocks are equally weighted in a portfolio. Abnormal returns (returns in excess of the return on a control portfolio matched on size and book-to-market value of equity) on the portfolios are reported over each of the following three years, as well as characteristics of the portfolios at the formation date. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Results are averaged over years in the sample period.

Part 1. All stocks

(A) Portfolios sorted by $\Delta NOA_t/TA_{t-1}$										
Abnormal return in first year	0.0160	0.0235	0.0161	0.0148	0.0079	0.0027	-0.0056	-0.0120	-0.0275	-0.0747
Abnormal return in second year	-0.0001	0.0167	0.0014	0.0105	0.0060	0.0021	0.0011	-0.0130	-0.0186	-0.0519
Abnormal return in third year	0.0064	0.0160	0.0105	0.0041	0.0023	0.0054	0.0040	0.0050	0.0042	-0.0241
Return from 4 years to 1 year ago	0.0358	0.0661	0.0931	0.1131	0.1310	0.1563	0.1711	0.2006	0.2451	0.3036
Growth in sales over past 4 years	0.0732	0.0870	0.0974	0.1035	0.1139	0.1312	0.1419	0.1641	0.2105	0.2757
Major M&A activity over past year	0.0612	0.0928	0.1216	0.1683	0.1981	0.2362	0.2805	0.3107	0.3892	0.4965
(B) Portfolios sorted by $\Delta PPE_t/TA_{t-1}$										
Abnormal return in first year	0.0067	0.0113	0.0068	0.0052	0.0013	-0.0022	-0.0006	-0.0059	-0.0177	-0.0438
Abnormal return in second year	0.0077	0.0035	-0.0003	0.0031	-0.0048	0.0018	0.0003	-0.0047	-0.0201	-0.0320
Abnormal return in third year	-0.0008	0.0159	0.0021	-0.0020	0.0174	0.0044	0.0120	-0.0019	0.0041	-0.0168
Return from 4 years to 1 year ago	0.0284	0.0821	0.1171	0.1302	0.1482	0.1584	0.1705	0.1915	0.2165	0.2720
Growth in sales over past 4 years	0.0732	0.0947	0.1067	0.1140	0.1249	0.1316	0.1402	0.1517	0.1761	0.2324
Major M&A activity over past year	0.1111	0.1191	0.1534	0.1837	0.2131	0.2312	0.2622	0.2980	0.3383	0.4458
(C) Portfolios sorted by $XFIN_t/TA_{t-1}$										
Abnormal return in first year	0.0348	0.0236	0.0190	0.0116	0.0034	0.0040	-0.0093	-0.0152	-0.0304	-0.0660
Abnormal return in second year	0.0154	0.0067	0.0089	-0.0026	0.0084	-0.0038	0.0037	-0.0109	-0.0086	-0.0558
Abnormal return in third year	0.0184	0.0083	0.0025	0.0096	0.0058	0.0085	0.0115	-0.0011	-0.0091	-0.0235
Return from 4 years to 1 year ago	0.1301	0.1206	0.1230	0.1182	0.1190	0.1298	0.1442	0.1492	0.1891	0.2684
Growth in sales over past 4 years	0.0960	0.0959	0.0998	0.1028	0.1120	0.1275	0.1419	0.1545	0.1837	0.2624
Major M&A activity over past year	0.1354	0.1763	0.1906	0.1866	0.1983	0.2058	0.2473	0.2766	0.3547	0.3815

Part 2. Large stocks

	(A) Portfolios sorted by $\Delta NOA_t/TA_{t-1}$									
Abnormal return in first year	0.0252	0.0120	0.0174	0.0132	0.0061	0.0009	-0.0051	-0.0161	-0.0195	-0.0654
Abnormal return in second year	0.0165	0.0170	0.0052	0.0102	0.0010	-0.0043	-0.0061	-0.0014	-0.0129	-0.0274
Abnormal return in third year	0.0017	0.0068	0.0087	0.0034	0.0058	0.0003	-0.0093	0.0046	-0.0039	-0.0028
Return from 4 years to 1 year ago	0.0767	0.0913	0.1149	0.1293	0.1387	0.1570	0.1824	0.1871	0.2403	0.3175
Growth in sales over past 4 years	0.0662	0.0831	0.0903	0.0982	0.1033	0.1142	0.1266	0.1390	0.1676	0.2250
Major M&A activity over past year	0.0880	0.1239	0.1598	0.2055	0.2406	0.2652	0.3024	0.3463	0.4214	0.5194
	(B) Portfolios sorted by $\Delta PPE_t/TA_{t-1}$									
Abnormal return in first year	0.0048	0.0128	0.0029	0.0050	0.0069	-0.0013	-0.0058	0.0035	-0.0184	-0.0426
Abnormal return in second year	0.0003	0.0150	0.0168	-0.0051	-0.0036	0.0115	-0.0034	0.0012	-0.0147	-0.0211
Abnormal return in third year	-0.0036	0.0073	0.0020	0.0019	0.0150	0.0064	-0.0062	0.0051	-0.0085	-0.0037
Return from 4 years to 1 year ago	0.0674	0.0992	0.1332	0.1481	0.1581	0.1615	0.1794	0.1940	0.2155	0.2766
Growth in sales over past 4 years	0.0674	0.0853	0.0956	0.1079	0.1115	0.1182	0.1222	0.1324	0.1524	0.1923
Major M&A activity over past year	0.1468	0.1829	0.2089	0.2327	0.2472	0.2565	0.2806	0.3061	0.3544	0.4563
	(C) Portfolios sorted by $XFIN_t/TA_{t-1}$									
Abnormal return in first year	0.0236	0.0182	0.0220	0.0067	0.0015	-0.0006	-0.0028	-0.0066	-0.0376	-0.0467
Abnormal return in second year	0.0163	0.0046	0.0036	0.0018	0.0029	0.0082	-0.0034	-0.0011	-0.0099	-0.0217
Abnormal return in third year	0.0106	-0.0030	0.0067	0.0007	0.0015	0.0083	-0.0024	0.0098	-0.0015	-0.0135
Return from 4 years to 1 year ago	0.1535	0.1408	0.1296	0.1311	0.1318	0.1453	0.1488	0.1626	0.1819	0.2708
Growth in sales over past 4 years	0.0967	0.0936	0.0927	0.0970	0.0995	0.1076	0.1191	0.1312	0.1455	0.2028
Major M&A activity over past year	0.1788	0.2265	0.2212	0.2233	0.2245	0.2374	0.2655	0.2890	0.3468	0.4473

Table 6
Number of firms in deciles 10 and 9 from sort by growth in total assets
classified by source of asset growth, all stocks and large stocks

Each month from 1988 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets ($\frac{\Delta TA_t}{TA_{t-1}}$). Firms ranked in deciles 9 and 10 by asset growth are further categorized by whether they engaged in merger and acquisition activity over the prior year, as represented by whether the firm is reported as an acquirer on the SDC database, or whether the firm engaged in any type of merger and acquisition activity over the prior year (appearance on SDC, change in goodwill of at least 20% of the change in assets, change in intangibles of at least 20% of the change in assets, acquisitions from the statement of cash flows of at least 20% of the change in assets). The remaining firms not engaged in merger and acquisition activity are classified by the largest source of the change in assets (change in cash and short-term investments, change in property, plant and equipment, change in non-cash current assets, change in other long-term assets), provided that the largest source accounts for at least 10% of the change in assets. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Results are averaged over years in the sample period.

| | All stocks | | Large stocks | |
Number of firms in category	Decile 10	Decile 9	Decile 10	Decile 9
Total	203	203	71	72
M&A activity from SDC	95	74	38	29
Any M&A activity	112	95	43	35
Asset growth from cash	51	40	12	12
Asset growth from ΔPPE	13	27	6	10
Asset growth from other current assets	17	31	5	9
Asset growth from other long-term assets	9	9	4	5

Table 7
Returns of firms in deciles 10 and 9 from sort by growth in total assets
classified by source of asset growth, all stocks and large stocks

Each month from 1988 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets ($\frac{\Delta TA_t}{TA_{t-1}}$). Firms ranked in deciles 9 and 10 by asset growth are further categorized by whether they engaged in merger and acquisition activity over the prior year, as represented by whether the form is reported as an acquirer on the SDC database, or whether the firm engaged in any type of merger and acquisition activity (appearance on SDC, change in goodwill of at least 20% of the change in assets, change in intangibles of at least 20% of the change in assets, acquisitions from the statement of cash flows of at least 20% of the change in assets). The remaining firms not engaged in merger and acquisition activity are classified by the largest source of the change in assets (change in cash and short-term investments, change in property, plant and equipment, change in non-cash current assets, change in other long-term assets), provided that the largest source accounts for at least 10% of the change in assets. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Abnormal returns (net of the return on a control portfolio of stocks matched by size and book-to-market) on the equally weighted portfolio of stocks in each category are calculated in the first, second and third years following portfolio formation. Results are averaged over years in the sample period. t-statistics based on the time series mean and standard deviation of portfolio returns are reported in parentheses.

(A) All stocks

Abnormal return of firms in category	First year Decile 10	First year Decile 9	Second year Decile 10	Second year Decile 9	Third year Decile 10	Third year Decile 9
Total	-0.0752	-0.0191	-0.0440	-0.0208	0.0144	0.0115
	(-3.55)	(-1.35)	(-2.53)	(-1.30)	(0.65)	(0.70)
M&A activity from SDC	-0.0815	-0.0334	-0.0579	-0.0200	-0.0106	0.0001
	(-3.11)	(-2.29)	(-3.51)	(-1.20)	(-0.42)	(0.01)
Any M&A activity	-0.0877	-0.0308	-0.0623	-0.0258	-0.0089	0.0012
	(-3.32)	(-2.01)	(-4.19)	(-1.71)	(-0.36)	(0.07)
Asset growth from cash	0.0117	0.0709	0.0110	0.0294	0.0439	0.0415
	(0.25)	(1.81)	(0.30)	(0.60)	(1.00)	(1.13)
Asset growth from ΔPPE	-0.0969	-0.0374	-0.0746	-0.0129	-0.0250	-0.0076
	(-1.39)	(-1.15)	(-3.20)	(-0.36)	(-0.80)	(-0.28)
Asset growth from other current assets	-0.0762	-0.0661	0.0480	-0.0157	0.0005	0.0324
	(-2.35)	(-2.52)	(0.60)	(-0.34)	(0.02)	(1.22)
Asset growth from other long-term assets	-0.1650	-0.0476	-0.0420	-0.0565	0.0701	-0.0037
	(-7.19)	(-1.00)	(-0.82)	(-1.87)	(1.99)	(-0.12)

(B) Large stocks

Abnormal return of firms in category	First year Decile 10	First year Decile 9	Second year Decile 10	Second year Decile 9	Third year Decile 10	Third year Decile 9
Total	-0.0573	-0.0027	-0.0222	-0.0155	0.0247	0.0082
	(-1.83)	(-0.15)	(-0.90)	(-1.21)	(0.98)	(0.46)
M&A activity from SDC	-0.0821	-0.0283	-0.0354	-0.0281	0.0058	0.0058
	(-2.49)	(-1.60)	(-1.65)	(-1.68)	(0.29)	(0.31)
Any M&A activity	-0.0842	-0.0304	-0.0381	-0.0298	0.0127	-0.0010
	(-2.60)	(-1.88)	(-1.93)	(-1.98)	(0.53)	(-0.05)
Asset growth from cash	0.0161	0.1025	-0.0182	0.0167	0.0896	0.0263
	(0.33)	(2.79)	(-0.56)	(0.69)	(1.90)	(1.15)
Asset growth from ΔPPE	-0.1006	-0.0495	-0.0665	-0.0576	0.0178	0.0165
	(-2.39)	(-1.37)	(-5.10)	(-3.10)	(0.46)	(0.41)
Asset growth from other current assets	0.0154	-0.0129	0.2417	0.0049	-0.0265	0.0600
	(0.48)	(-0.50)	(2.07)	(0.13)	(-0.91)	(0.93)
Asset growth from other long-term assets	-0.0035	0.0318	-0.0417	0.0189	-0.0099	-0.0396
	(-0.10)	(0.84)	(-1.09)	(0.71)	(-0.69)	(-2.90)

Table 8

Returns of firms in deciles 10 and 9 from sort by growth in total assets

classified by source of financing and by source of asset growth, all stocks

Each month from 1988 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets ($\frac{\Delta TA_t}{TA_{t-1}}$). Firms ranked in deciles 9 and 10 by asset growth are further categorized by the primary source of financing (equity or debt), and then by the primary source of growth in assets. The sources of growth in assets are defined to be: whether the firm engaged in merger and acquisition activity over the prior year, as represented by whether the form is reported as an acquirer on the SDC database, or whether the firm engaged in any type of merger and acquisition activity (appearance on SDC, change in goodwill of at least 20% of the change in assets, change in intangibles of at least 20% of the change in assets, acquisitions from the statement of cash flows of at least 20% of the change in assets). The remaining firms not engaged in merger and acquisition activity are classified by the largest source of the change in assets (change in cash and short-term investments, change in property, plant and equipment, change in non-cash current assets, change in other long-term assets), provided that the largest source accounts for at least 10% of the change in assets. All accounting information for a stock is from the most recently ended fiscal year assuming a four-month publication delay. Abnormal returns (net of the return on a control portfolio of stocks matched by size and book-to-market) on the equally weighted portfolio of stocks in each category are calculated in the first, second and third years following portfolio formation. Results are averaged over years in the sample period. t-statistics based on the time series mean and standard deviation of portfolio returns are reported in parentheses.

(A) Stocks in decile 10 by growth in total assets

Abnormal return	First year		Second year		Third year	
of firms in category	Equity	Debt	Equity	Debt	Equity	Debt
Total	-0.0928	-0.0709	-0.0660	-0.0346	0.0193	0.0072
	(-3.34)	(-3.23)	(-2.19)	(-1.91)	(0.56)	(0.33)
M&A activity from SDC	-0.1294	-0.0580	-0.0894	-0.0451	-0.0369	-0.0056
	(-3.70)	(-2.49)	(-4.08)	(-1.86)	(-1.13)	(-0.16)
Any M&A activity	-0.1256	-0.0668	-0.0801	-0.0551	-0.0508	0.0099
	(-3.50)	(-2.72)	(-3.48)	(-2.69)	(-1.70)	(0.31)
Asset growth from cash	-0.0086	-0.0286	-0.0145	0.0256	0.0522	-0.0235
	(-0.15)	(-0.47)	(-0.28)	(0.56)	(1.15)	(-0.48)
Asset growth from ΔPPE	-0.1144	-0.1063	-0.0819	-0.0498	-0.0483	-0.0039
	(-2.46)	(-1.59)	(-2.03)	(-1.41)	(-0.96)	(-0.07)
Asset growth from other current assets	-0.1080	-0.0708	-0.1728	0.2274	0.0558	-0.0292
	(-2.52)	(-1.21)	(-4.93)	(1.23)	(1.45)	(-0.48)
Asset growth from other long-term assets	-0.2632	-0.0464	-0.0459	-0.0943	0.1031	0.0153
	(-6.36)	(-0.81)	(-0.76)	(-3.49)	(1.87)	(0.37)

(B) Stocks in decile 9 by growth in total assets

Abnormal return	First year		Second year		Third year	
of firms in category	Equity	Debt	Equity	Debt	Equity	Debt
Total	-0.0361	-0.0497	-0.0586	-0.0132	-0.0130	0.0001
	(-1.02)	(-4.00)	(-1.64)	(-0.88)	(-0.42)	(0.01)
M&A activity from SDC	-0.0423	-0.0207	-0.0249	-0.0018	0.0026	-0.0008
	(-0.84)	(-1.15)	(-0.47)	(-0.08)	(0.05)	(-0.04)
Any M&A activity	-0.0208	-0.0358	-0.0425	-0.0113	-0.0134	-0.0012
	(-0.47)	(-2.51)	(-1.09)	(-0.57)	(-0.34)	(-0.07)
Asset growth from cash	-0.0189	-0.0404	-0.0200	0.0365	0.0050	0.0502
	(-0.44)	(-0.64)	(-0.29)	(0.48)	(0.10)	(0.80)
Asset growth from ΔPPE	-0.0883	-0.0669	-0.0735	0.0117	0.0033	-0.0259
	(-1.25)	(-2.38)	(-1.77)	(0.21)	(0.10)	(-0.40)
Asset growth from other current assets	-0.1162	-0.1108	-0.1203	-0.0271	-0.0450	0.0519
	(-2.64)	(-1.94)	(-3.54)	(-0.56)	(-0.45)	(0.84)
Asset growth from other long-term assets	-0.0388	-0.0583	-0.0472	-0.0629	0.0990	-0.0183
	(-0.86)	(-0.98)	(-0.46)	(-3.97)	(0.84)	(-0.30)

Table 9
Regression results for future stock returns, growth in assets and financing source

Each year from 1988 to 2004 all listed domestic U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets ($\frac{\Delta TA_t}{TA_{t-1}}$). Firms ranked in the top decile by asset growth are categorized by the primary source of asset growth and also by main source of financing (equity or debt). For the categorization by source of growth we first check whether the firm engaged in major acquisition activity over the prior year, as determined by whether the SDC database reports an acquisition of at least 20% of the dollar value of the change in the firm's assets. In the absence of such information, we also screen for takeover activity amounting to at least 20% of the change in assets, as identified from either acquisitions from the statement of cash flows, or change in goodwill, or change in intangible assets). For firms with such indications we set the value of a dummy variable denoting other acquisition activity to equal one (it takes a value of zero for all other cases). For the remaining firms not engaged in merger and acquisition activity, we classify them by the largest source of the change in assets: change in cash and short-term investments, or change in operating assets (property, plant and equipment, non-cash current assets, other long-term assets), provided that the largest source accounts for at least 20% of the change in assets. The primary financing source is determined as the larger of either debt or equity as long as the item is at least 20% of the change in assets. All accounting information for a stock is from the fiscal year ending in the specific calendar year, assuming a four-month publication delay. The dependent variable in the regression is a firm's abnormal return (net of the return on a control portfolio of stocks matched by size and book-to-market) in the first year following ranking. Other regressors include the growth rate in the firm's sales per share extending up to four years before the ranking date; the stock's past rate of return beginning four years and ending one year before ranking; the stock's past rate of return over the year leading up to the ranking date. Regressions are estimated each year, and coefficients are averaged over years in the sample period. t-statistics based on the time series mean and standard deviation of coefficients are reported in parentheses.

(A) Returns and growth in assets

Equation	Intercept	SDC acquisition amount	Other acquisition dummy	Growth in cash	Growth in operating assets	Growth in sales over past 4 years	Return from 4 years ago to 1 year ago	Return over past year
(1)	-0.0006	-0.1266	-0.1942	0.0001	-0.1866			
	(-0.09)	(-2.84)	(-3.00)	(0.00)	(-4.00)			
(2)	0.0047	-0.1152	-0.1226	0.0379	-0.1743	0.0206	0.1728	-0.1762
	(0.52)	(-2.88)	(-1.53)	(0.58)	(-3.75)	(1.06)	(2.56)	(-3.16)

(B) Returns, growth in assets and financing

Equation	Intercept	Merger and acquisition activity financed by: Equity	Debt	Growth in cash financed by: Equity	Debt	Growth in operating assets financed by: Equity	Debt	Growth in sales over past 4 years	Return from 4 years ago to 1 year ago	Return over past year
(3)	-0.0003	-0.1087	-0.0596	-0.0094	0.0188	-0.1702	-0.1220			
	(-0.04)	(-2.52)	(-1.94)	(-0.18)	(0.26)	(-6.19)	(-2.64)			
(4)	0.0044	-0.0926	-0.0560	0.0160	0.0223	-0.1677	-0.0877	0.0242	0.1728	-0.1745
	(0.48)	(-2.46)	(-1.81)	(0.29)	(0.29)	(-6.75)	(-1.95)	(1.24)	(2.61)	(-3.18)
(5)	0.0044	-0.0931	-0.0560	-0.0107	-0.0017	-0.1673	-0.0870	0.0230	0.1737	-0.1770
	(0.48)	(-2.41)	(-1.77)	(-0.17)	(-0.02)	(-6.78)	(-1.94)	(1.14)	(2.65)	(-3.20)

Table 10
Growth in total assets and returns, classified by
past profitability and sales-to-price

Each year from 1988 to 2004 all listed U.S. nonfinancial common stocks in the intersection of the CRSP-Compustat universe and with market value of equity exceeding the bottom decile of NYSE stocks are ranked by growth in total assets. Firms categorized in the top decile are further divided into groups based on past return on equity, or past sales-to-price ratio. The groups are: the bottom 20 percent (low), the middle 60 percent (medium), and the top 20 percent (high) of firms ranked by either past profitability or past sales-to-price. Abnormal returns relative to a control portfolio matched on size and book-to-market are calculated for the equally-weighted portfolio of stocks in each group over the subsequent three years. Return on equity is measured as income before extraordinary items available to common equity averaged over the prior two years divided by book value of common equity at the end of the ranking year. Sales-to-price is the ratio of net sales averaged over the prior two years to market value of equity at the end of the ranking year.

Sorted by	Year	Low	Medium	High	Difference
	First year	-0.1516	-0.0701	-0.0081	0.1435
		(-5.14)	(-2.71)	(-0.30)	(4.13)
Return on equity	Second year	-0.0718	-0.0336	-0.0413	0.0305
		(-2.07)	(-1.83)	(-2.01)	(0.75)
	Third year	0.0384	0.0047	0.0228	-0.0156
		(0.88)	(0.18)	(0.73)	(-0.28)
	First year	-0.1020	-0.0668	-0.0455	0.0565
		(-2.82)	(-2.84)	(-1.52)	(1.16)
Sales to price	Second year	-0.0577	-0.0435	-0.0163	0.0414
		(-1.40)	(-1.74)	(-0.52)	(0.62)
	Third year	0.0213	0.0246	-0.0095	-0.0308
		(0.45)	(1.03)	(-0.34)	(-0.52)