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What Is behind the Asset Growth and Investment Growth Anomalies?

Abstract

Existing studies show that firm asset and investment growth predict cross-sectional stock returns. Firms that shrink their assets or investments subsequently earn higher returns than firms that expand their assets or investments. I show that the superior returns of the low asset and investment growth portfolios are due to the omission of delisting returns in CRSP monthly stock return file and that the poor returns of the high asset and investment growth portfolios are largely driven by the subsample of firms that have issued large amounts of debt or equity in the previous year. Controlling for the effects of the delisting bias and external financing, I do not find an independent effect of asset or investment growth on stock returns.

JEL Classifications: G11, G12

Keywords: Asset Growth; Investment Growth; Cross-Sectional Stock Returns; Return Anomaly; Delisting; Equity and Debt Issuances; External Financing

1. Introduction

Cooper, Gulen, and Schill (2008) (hereafter CGS) present a significant asset growth effect in U.S. stock returns. On average, firms in the lowest asset growth decile earn risk-adjusted returns of 9.1% in the subsequent year, while firms in the highest asset growth decile earn -10.4%, an annual return spread of 19.5%. The return spreads are significant across different size groups and even after value-weighting (although the magnitude reduces to 8.4% per year). In an earlier study, Titman, Wei, and Xie (2004) (hereafter TWX) find that firms that substantially increase capital expenditure earn negative risk-adjusted returns subsequently. Stocks in the lowest investment growth quintile on average earn more than 1% per month in the following year than stocks in the highest investment growth quintile. Using different measures of investment growth, Anderson and Garcia-Feijoo (2006) confirm the negative relation between investment growth and subsequent stock returns. These two cross-sectional stock return patterns are often referred to as "asset growth anomaly" and "investment growth anomaly", respectively.[1]

The median firm in the lowest asset growth decile shrinks its total assets by more than 20% within a year and the median firm in the lowest investment growth decile cut its investments by 80%. What have happened and will happen to these firms that substantially reduce their assets and investments? It is very likely that these firms have performed poorly in the past and are dying out in the near future. If the stock of a shrinking firm gets delisted from the NYSE, AMEX, or Nasdaq in the following year, over 90% of the chance its return in the delisting month is not

[1] Strictly speaking, stock return anomalies refer to excess returns that cannot be explained by the stock's associated risk. Relating risk to return requires the use of an accurate asset pricing model, which researchers are still exploring. More broadly, an anomaly is a stylized pattern in stock returns that cannot be explained by existing asset pricing models such as CAPM, or the Fama-French three-factor model. The use of the word "anomaly" in this paper is in reference to this broader definition.

reported in CRSP's regular monthly stock return file. Data suggest that about a half of the stock delistings are due to poor firm performance. Since returns of delisting due to performance tend to be very negative, omitting them in the computation of portfolio returns introduces a significant bias into the tests. The true portfolio returns accounting for the probability of delisting are presumably lower.

The median firm in the top asset growth decile increases its assets by 130% and the median firm in the top investment growth decile triples its capital expenditure within a year. What drives the substantial increases in assets and capital investments of these firms? It is hard to imagine the 130% increase in firm assets is a result of organic growth. More likely these firms fast expand their assets by issuing large amounts of debt or equity. Large external financing mechanically increases the issuer's assets. The tripling of capital expenditure is also naturally fuelled by external financing proceeds. Vast evidence suggests that firms realize abnormally low returns following large equity and debt financing.[2] It is thus interesting to know to what extent the asset and investment growth anomalies are related to the widely documented "external financing anomaly".

In this paper, I show that the asset and investment growth anomalies are largely explained by the delisting bias and the external financing anomaly. In particular, the superior returns of the negative asset or investment growth portfolios are due to the omission of delisting returns in CRSP monthly stock return data; the poor returns of the high asset or investment growth portfolios are driven by the subsample of firms that have issued large amounts of debt or equity

[2] See, e.g., Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), Ritter (2003), Daniel and Titman (2006), and Pontiff and Woodgate (2008) for evidence of underperformance following equity issuances; Spiess and Affleck-Graves (1999), Lee and Loughran (1998), Dichev and Piotroski (1999), Billett, Flannery, and Garfinkel (2006) for evidence of underperformance following debt issuances. Bradshaw, Richardson, and Sloan (2006) develop a comprehensive measure of net external financing and confirm a strong negative relation between net external financing and future stock returns.

in the previous year. Controlling for these two factors, I do not find an independent effect of asset growth or investment growth on stock returns.

Shumway (1997) is the first to document the delisting bias in CRSP data. He finds severe omissions of delisting returns in CRSP data, especially for firms delisted for poor performance reasons. If this fact is ignored, portfolio returns constructed from CRSP data are upward biased. I examine 19,885 non-financial stocks that have appeared in the CRSP monthly stock return file (CRSP.msf) during the period from July 1968 to December 2009. Among them 4,004 are still listed by the end of 2009. Of the 15,881 delisted stocks, only 1,490 (9.38%) have the delisting-month returns reported in the CRSP monthly stock return file. In other words, more than 90% of the delisted stocks do not have their delisting returns recorded in the file. How large are delisting returns? Shumway (1997) and Shumway and Warther (1999) collected a large proportion of missing delisting returns from other sources and show that the delisting return is on average -30%. It could reduce further to -55% if the sharp decrease in liquidity after delisting and the expected worse returns of those uncollectable delisted stocks are accounted for.

I find that the probability of delisting in the following year due to poor performance is almost four times as high for firms in the lowest asset growth decile as it is for firms in other deciles (12.48% vs. 3.14%). Similarly, the probability of delisting for poor performance is 8.78% for stocks in the lowest investment growth decile versus 3.38% for other stocks. This evidence hints an important role of the delisting bias in generating the asset and investment growth anomalies. Indeed, after correcting the delisting bias, I do not find that stocks in the lowest growth decile (decile 1) earn higher returns than most other deciles (except for deciles 8-10 for the asset growth anomaly and decile 10 for the investment growth anomaly).

The poor returns of firms in the highest asset or investment growth deciles are limited to those that have issued large amounts of debt or equity in the previous year. High asset and investment growth are often accompanied by large equity and/or debt issuances. The Spearman rank correlation between asset growth and external financing is as high as 0.70 and the correlation between investment growth and external financing is 0.39. The correlations become stronger if we focus on firms with extremely high growth. For instance, I find that 87% of the firms in the highest asset growth decile (decile 10) have conducted at least a large equity or debt offering. This number is in sharp contrast to only 3%-5% of the firms in the first seven asset growth deciles that have sought external financing of similar magnitude.

To control for the effect of external financing, I divide firms in the three highest growth deciles (deciles 8-10) into those that have issued a large amount of debt or equity and those that have not. I find that the poor returns are only found in the users of large external financing. Firms that have not used external financing of such a magnitude but have expanded assets or investments of a similar magnitude do not underperform firms in the first seven deciles. In other words, asset and investment growth do not have an independent effect on stock returns after controlling for the effect of external financing. This conclusion is also confirmed by regression evidence.

A recent study by Fama and French (2008) also hints the importance of equity issuances in generating the asset growth anomaly. Unlike CGS, Fama and French construct asset growth on a per share basis, by which they effectively control for asset changes due to new equity issues, stock repurchases, and stock-swap acquisitions. They find that the asset growth anomaly (on a per share basis) is not robust in large stocks. However, even if based on their measure of asset growth, the anomaly still exists in microcap and small stocks (market cap below the NYSE median), in both equal- and value-weighted returns. Their measure does not account for asset growth due to debt issuances, which, as shown in this study, are also important in generating the anomaly. Fama and French do not examine the investment growth anomaly.

The findings of asset and investment growth anomalies have generated much research interest. Most studies have attempted to explain the phenomena from economic or behavioral points of view. For instance, Titman, Wei, and Xie (2004) show that the investment growth anomaly is stronger in firms whose managers have greater investment discretion and in time periods when hostile takeovers were less prevalent. They conclude that investors underreact to the empire building implications of investment expansion. Anderson and Garcia-Feijoo (2006) find strong correlations between investment growth and the book-to-market equity ratio and suggest that the negative relation between investment growth and subsequent returns is consistent with the rational models of Berk, Green, and Naik (1999), and Carlson, Fisher, and Giammarino (2004, 2006). Fast growing firms accelerate investment, which transfers more risky growth options into less risky assets in place and therefore reduces expected returns. Cooper, Gulen, and Schill (2008) argue that the asset growth anomaly is most consistent with investor over extrapolation of past gains to growth. Chan, Karceski, Lakonishok, and Sougiannis (2008) find that the asset growth anomaly is more pronounced in firms with low levels of past profitability and poor corporate governance, and imply that the anomaly is due to investors' under-reaction to managers' empire-building investments. Lipson, Mortal, and Schill (2010) find that the asset growth anomaly is more evident in stocks with high idiosyncratic volatility and suggest that costly arbitrage is the driving force behind it. Similarly, Lam and Wei (2010) suggest that limits to arbitrage and investors' under-reaction to managers' overinvestment jointly explain the asset growth anomaly. Li and Zhang (2010) also imply that the limits-to-arbitrage hypothesis seems to excel q-theory with investment frictions in a horse race to explain these two anomalies. On the other hand, Chen and Zhang (2009) show that the asset growth anomaly can largely be explained by the factor of market risk premium and two new factors they propose — an investment factor and a return-on-asset factor. They argue that these factors are motivated by rational economic models, and therefore the anomaly could be explained by risk-based theories.

I take a different approach to examine these two anomalies. Instead of searching for economic or behavioral driving forces, I scrutinize whether the "anomalous" return patterns are new anomalies or a repackaging of some previously-known return patterns. My findings point to the latter. Future studies attempting to explain these two anomalies should not separate them from the return underperformance following large debt and equity issuances. Similarly, studies attempting to explain the external financing anomaly need to account for issuers' substantial increases in capital investments. A few studies have already made efforts along this line of research, for instance, Carlson, Fisher, and Giammarino (2006), Lyandres, Sun, and Zhang (2008), Li, Livdan, and Zhang (2009), among others. In addition, my findings in the paper highlight the importance of correcting the delisting bias in asset pricing tests based on CRSP monthly stock return file.

The remainder of the paper proceeds as follows. Section 2 describes the data and the asset and investment growth variables. In Section 3, the first part examines the impact of the delisting bias on the anomalies; the second part examines the effect of large external financing on the anomalies. Section 4 concludes.

2. Data and Variables

Following Cooper, Gulen, and Schill (2008), I examine all NYSE, AMEX, and NASDAQ nonfinancial firms (excluding firms with SIC codes between 6000 and 6999) included in the CRSP monthly stock return file and the CRSP/COMPUSTAT merged database's fundamentals annual file. Firms are required to be included in the fundamentals annual file for at least two years. Stock returns on which I performed tests are between July 1968 and December 2009 (498 months).[3] Accounting variables that are used to explain returns from the July of calendar year *t* to the June of calendar year *t*+1 are constructed from fiscal years *t*-1 and *t*-2.

At the end of June of each year *t* from 1968 to 2009, stocks are allocated into deciles based on the ranking of each individual firm's asset or investment growth rate from fiscal year *t*-2 to *t*-1. Firms in decile 1 have the lowest growth rates and firms in decile 10 have the highest growth rates in each year. Portfolios are formed and held from July of year *t* to June of year *t*+1 and then rebalanced (based on the growth rates from fiscal year *t*-1 to *t*). Following CGS (2008), the asset growth rate (*AG*) is calculated using the year-to-year percentage change in total assets (*A*):

$$AG(t-1) = \frac{A(t-1)}{A(t-2)} - 1 \,. \tag{1}$$

Following TWX (2004), the investment growth rate (*IG*) is computed as follows:

$$IG(t-1) = \frac{(CAPX/Sales)_{t-1}}{((CAPX/Sales)_{t-2} + (CAPX/Sales)_{t-3} + (CAPX/Sales)_{t-4})/3} - 1, \tag{2}$$

where *CAPX/Sales* is a firm's capital expenditure scaled by its sales of the contemporaneous year. Alternatively, I also construct *IG* as used in Anderson and Garcia-Feijoo (2006) as their primary variable of investment growth:

$$IG(t-1) = \frac{CAPX_{t-1}}{CAPX_{t-3}} - 1. \tag{3}$$

[3] The monthly returns studied are from July 1968 to June 2003 in Cooper, Gulen, and Schill (2008), from July 1973 to June 1996 in Titman, Wei, and Xie (2004), from July 1976 to June 1999 in Anderson and Garcia-Feijoo (2006).

In most of the following tables, Panel A contains results about the asset growth anomaly and Panel B presents results about the investment growth anomaly. Although I used both measures of investment growth in the tests, for the sake of brevity, only the results based on the measure in Eq.(2) are reported. All the results based on the Eq.(3) measure are qualitatively same and are available upon request.

The first row in Panel A of Table 1 reports the time-series average of the cross-sectional median annual asset growth rate in each decile. The average annual asset growth rate is about -21% for firms in decile 1 (the lowest *AG*) and is 130% for firms in decile 10 (the highest *AG*). The average growth rate of firms in decile 5 is 7%. More than 20% of firms reduce their assets.

The first row in Panel B reports the time-series average of the cross-sectional median investment growth rate in each decile, where the investment growth rate is measured as in Eq.(2). The average investment growth rate is about -80% for firms in decile 1 (the lowest *IG*) and is 194% for firms in decile 10 (the highest *IG*). Over a half of the firms in fact experience negative investment growth.

3. Portfolio Return Analysis

After allocating firms into deciles based on their asset and investment growth rates at fiscal year *t*-1, I calculate the monthly returns for equal- and value-weighted portfolios from July of year *t* to June of year *t*+1. The value used for weighting is the stock's previous month market capitalization. This procedure generates a time-series of returns for each portfolio from July 1968 to December 2009 (498 months in total). Table 1 presents the time-series means of the monthly portfolio returns. Panel A reports the results of asset growth portfolios. The portfolio returns decrease almost monotonically from low asset growth deciles to high asset growth deciles. The portfolio of firms in the lowest asset growth decile (decile 1) earns an equal-weighted monthly return of 1.79% and the portfolio of firms in the highest asset growth decile (decile 10) earns 0.17% on average. A hedging portfolio long in stocks with the lowest asset growth and short in stocks with the highest asset growth earns a return of 1.62% (*t*-statistic = 9.03) per month in the following year. If portfolio returns are value-weighted, firms in decile 1 earn 1.26% and firms in decile 10 earn 0.27% on average per month, resulting in a spread of 0.99% (t-statistic = 4.63). These results are very close to what CGS find in their shorter sample period.[4] For the purpose of later comparison, I also report the return spreads between decile 1 and decile 6. Firms in decile 6 have achieved some positive growth in assets but not large in magnitude.

Next, I run time-series regressions of these portfolio returns on the Fama and French (1993) three factors. This is done to estimate the alphas – the average returns that are not explained by the Fama and French three factors. The implicit the null hypothesis is that the Fama and French three-factor model does an adequate job of explaining expected returns associated with firm asset growth. Therefore, a statistically significant alpha – the intercept from the time-series regression - suggests an "abnormal" return. The results are again similar to those demonstrated by CGS. Using equal-weighted portfolio returns, firms in the lowest asset growth decile have a monthly alpha of 0.59% (*t*-statistic = 2.65), while the highest growth firms have an alpha of –0.82% (*t*-statistic = -5.68). The alpha for the hedging portfolio is 1.41% (*t*-statistic = 8.87). Using value-weighted portfolio returns, firms in the lowest asset growth decile have a monthly alpha of 0.15% (*t*-statistic = 1.15), and firms with the highest asset growth rates have an alpha of –0.49% (*t*-statistic = -4.68). The alpha for the hedging portfolio is 0.64% (*t*-statistic = 3.64).

[4] The slight differences in magnitudes between CGS and my results are due to difference in our sample periods. In fact, I have replicated their results in almost same magnitudes in their sample period.

Panel B of Table 1 presents the results for portfolios sorted on investment growth. The equal-weighted average return is 1.35% for decile 1 (the lowest *IG*) and 0.78% for decile 10 (the highest *IG*), resulting in a monthly spread of 0.57% (*t*-statistic =6.12). Fama and French three factors do not explain the difference in returns. The alpha for the hedging portfolio is 0.52% and statistically significant (*t*-statistic =5.75). The investment growth anomaly, however, is less significant if portfolio returns are value-weighted. The return spreads between decile 1 and decile 10 are still positive, but not statistically significant, so is the alpha from the time-series regression of the Fama-French three-factor model.

Next in Section 3.1, I examine the probability of delisting for firms in each decile and its implication for portfolio returns if delisting returns are not included in the CRSP stock return files. In Section 3.2, I investigate how extremely high asset or investment growth is fuelled by large external financing and the implications for these two anomalies if large external financing is controlled for.

3.1. The delisting bias and its implications for the anomalies

Stock exchanges sometimes delist stocks before investors are able to sell them. Reasons for delisting include mergers and acquisitions, liquidations, moving to other exchanges, and poor performance (e.g. bankruptcy, insolvency, insufficient capital etc.). The CRSP monthly stock return file (in particular, CRSP.msf at WRDS) often does not include the delisting-month returns of the delisted stocks. Omitted delisting returns introduce a bias in empirical tests, as only the survivors' returns are accounted for. The delisting bias in the CRSP data is first documented by Shumway (1997). He shows that CRSP data fail to include delisting returns for most stocks that have been delisted for poor performance reasons. For example, only 120 out of 1029 firms

(11.7%) delisted from NYSE and AMEX due to poor performance during the period between 1962 and 1993 have their delisting return reported in CRSP's stock return files. For these reported cases, the average delisting return is -41.56%. The situation is even worse for Nasdaq-more firms have been delisted from Nasdaq due to poor performance, and none of their delisting returns is included in CRSP’s stock return files. In addition, he shows that delists for performance-related reasons are generally surprises and thus incur very negative returns.

Motivated by Shumway’s work, the CRSP research department has expended efforts and resources to retrieve delisting returns. Over 90% of the delisting returns are successfully retrieved (see CRSP Delisting Returns, 2001). Are we waived of the delisting bias concern, if so? Not really, it still depends on how we use the CRSP data. CRSP has a monthly stock return file (CRSP.msf) that collects the monthly returns of stocks traded in the NYSE, AMEX, or Nasdaq since January 1926. This file has become the most popular database for empirical tests on stock returns. But this file does not include delisting returns most of the time. The retrieved delisting returns are recorded in a separate file called monthly stock event file (CRSP.mse).[5] In order to avoid the delisting bias, researchers need to combine delisting returns recorded in the monthly stock event file into the monthly stock return file.

I use a simple test to illustrate that the regular monthly stock return file often omits delisting returns. Table 2 reports the results. I first identify all non-financial firms that have their stock returns once included in the CRSP monthly stock return file during the period between July 1968 and December 2009. Of the 19,910 stocks in total, 4,404 (22%) are still listed and traded at one of the three markets by the end of December 2009. Of the remaining stocks, I am able to identify the month of their delisting for 15,881 stocks using CRSP’s monthly stock event file. I

[5] I was informed by the CRSP staff that the separation of regular-month returns and delisting-month returns into two files could result from WRDS’s repackaging of the CRSP data.

then check if the regular monthly stock return file reports a non-missing return in the month of delisting for these delisted stocks. Only 1,490 out of the 15,881 stocks (9.38%) have a return reported for the delisting month, while the remaining 14,391 stocks (90.62%) fail to do so. Among them almost a half are delisted for performance-related reasons. Moreover, even for the 1,490 delisted stocks with a return reported for the delisting month, the reported return may not account for the delisting effect.

Omitted delisting returns introduce a bias into studies that only use CRSP's monthly stock return file, especially when the variable of interest is correlated with the probability of delisting. For instance, Shumway and Warther (1999) show that the widely-documented size effect was found to be absent from NASDAQ stocks after correcting the delisting bias. Firms often reduce in size before being delisted for poor performance. The size effect is found in the data because, when the returns of size portfolios are computed, we do not account for the omitted delisting returns of some small firms. The delisting bias could also lead to the discovery of the asset and investment growth anomalies. Distressed firms cut investments, and for various reasons, their assets reduce before delisting. If firms in the negative growth portfolios tend to be delisted more often than firms in the high growth portfolios, the superior returns found in the low growth portfolios in the following year could be the result of delisting returns being omitted in the test.

I examine the potential of such a delisting bias on the asset and investment growth anomalies. Table 3 presents the results. I first compute the percentage of stocks that are delisted in the subsequent year (from July of year t to June of year t+1) for each asset growth decile, and find that the probability of delisting is 17.75% for stocks in the lowest asset growth decile, and 9.22% for stocks in the highest asset growth decile. The difference is statistically significant at the 1% level using a two proportion z-test. Shumway (1997) suggests that the delisting bias is more pronounced for stocks delisted for performance-related reasons. I follow his work to estimate the probability of delisting due to poor performance. Reasons for delisting (i.e., the delisting code) are obtained from CRSP's stock event file. Stocks in the lowest asset growth decile have a 12.48% probability of being delisted in the following year due to poor performance, while the probability is only 4.55% for stocks in the highest asset growth decile. The difference is also significant at the 1% level. Stocks in the second lowest asset growth decile (decile 2) also have a high probability of delisting for performance-related reasons, i.e. 5.64%. In comparison, the probability for deciles 3 to 9 ranges only from 2.08% to 3.31%. This evidence sends a clear message: compared to stocks with moderate or high asset growth, stocks with very negative asset growth have a significantly higher probability of being delisted for poor performance in the following year. Intuitively, poorly-performing firms would cut investments and shrink assets through a fire sale or spinoff before their stocks are delisted. Omitting delisting returns therefore would impose a potentially significant bias on the returns for the portfolios of poorly performed stocks.

Thanks to CRSP's efforts, the remedy for correcting the delisting bias is readily available. As reported in Table 4, CRSP has retrieved delisting returns for almost 95% of the stocks delisted from NYSE or AMEX, and for almost 90% of the stocks delisted from Nasdaq. The delisting returns with the reasons for delisting are stored in the stock event file (again, not the monthly stock return file). As suggested in Shumway (1997), delistings triggered by performance-related reasons (delisting codes 500, 505 to 588) incur extremely negative returns. For example, about 24% of the delistings from NYSE or AMEX are triggered by poor firm performance and these stocks have an average delisting return of -44.5%. The average delisting return for performance-driven Nasdaq stocks is -21.0% but a higher proportion of the delisted stocks in Nasdaq (46%)

are triggered by poor performance. Moreover, the 5% of NYSE/AMEX stocks and 10% of Nasdaq stocks that do not have their delisting return retrieved are primarily triggered by performance-related reasons. Shumway and Warther (1999) argue that the delisting returns of those unidentified stocks are almost certainly worse and the fact that there remains no trace of those stocks suggests that many may have become worthless.

I correct the delisting bias as follows. For the 90% of stocks in the monthly stock return file without delisting-month returns, I compound their last-reported return with the delisting return from the monthly stock event file. For the other 10% of stocks that have a return reported for the delisting month, I compare the reported return with the delisting return from the stock event file. If the delist is triggered by performance-related reasons, I choose the lower of these two returns as the true return. Note there are 5%-10% of delists that CRSP is unable to retrieve their delisting returns. I replace the missing delisting returns in the stock event file by the average of identified delisting returns in the same stock exchange for the same reason of delisting. For example, if an NYSE stock delisted for performance-related reasons does not have its delisting return reported, I assume its delisting return is -44.5%. Similarly if a Nasdaq stock is delisted for non-performance reasons, I replace its missing delisting return by 3.34%.

Table 3 presents the portfolio returns after correcting the delisting bias. The correction results in lower returns for all asset growth portfolios, but its effect is the largest on the lowest decile. The average equal-weighted return of decile 1 drops from 1.79% per month before correction, to 1.50% after correction. This translates into a magnitude of 29 basis points per month. The average equal-weighted return of decile 10 also drops from 0.17% to 0.10%. As a result, the spread between decile 1 and 10 remains as high as 1.40% per month and is statistically significant (*t*-statistic = 8.01). The correction of the delisting bias has a smaller effect on value-weighted returns. The reason is straightforward: in the month before delisting, most stocks have a small market capitalization. Therefore, their low returns in the following month contribute little to the value-weighted portfolio returns.

I run time-series regressions on both the equal- and value-weighted portfolio returns. The alpha estimates suggest consistent results. Both the equal- and value-weighted portfolio alphas for the lowest asset growth portfolio (decile 1) are no longer statistically different from zero. The spreads in alphas between deciles 1 and 10 are still positive and statistically significant. However, they are clearly driven by the large and negative alphas of the highest asset growth portfolio, which is -0.91% for the equally-weighted portfolio and -0.52% for the value-weighted portfolio. Both are statistically significant at the 5% level. In fact, the alpha of decile 1 is not different from the alphas of deciles 2 to 7 for the equally-weighted portfolios, and of deciles 2 to 9 for the value-weighted portfolios.

In summary, the superior returns of the low asset growth portfolios are largely driven by the delisting bias in CRSP's monthly stock return file. After correcting this bias, the lowest asset growth portfolio earns similar returns to other asset growth portfolios except for the three highest asset growth portfolios (deciles 8, 9, and 10).

The delisting bias has a similar effect on the investment growth anomaly. As reported in Panel B of Table 3, the probability of delisting during the subsequent year for stocks in the lowest IG decile is 13.67%, significantly higher than the average probability of delisting for stocks in other deciles. If we pin down to the delisting due to poor performance, the probability is 8.78% for stocks in the lowest IG decile versus 2%- 4% for most of the other deciles. The message is again clear: stocks with extremely negative investment growth are more likely to be delisted for poor performance in the subsequent year. Correcting the delisting bias, I do not find that stocks in the lowest IG decile outperform stocks in other deciles except for decile 10. In fact, the value-weighted returns of decile 1 tend to be lower than most of the other deciles. The return spreads between deciles 1 and 10 are still positive, and statistically significant for equal-weighted returns. This is clearly driven by the significant underperformance of stocks in decile 10.

3.2. External financing and its implications for the anomalies

It is interesting to learn what drives the significant growth in assets or investments for firms in deciles 8 to 10, and why these firms earn poor returns in the following year. A potential answer could be related to high levels of external financing. Large equity or debt offerings increase the issuers' assets substantially. External financing is often motivated to raise investment capital. In other words, significant asset growth, investment growth, and external financing often come hands in hands. This is confirmed by a simple correlation test. Table 5 presents the time-series averages of the cross-sectional Spearman rank correlations between these three variables. Since I intend to examine if *increases* in assets and investments are accompanied by external financing, I require asset and investment growth to be positive for the computation of correlations. The average correlation between asset growth and external financing is 0.70 and the average correlation between investment growth and external financing is 0.39. Not surprisingly, asset growth and investment growth are also highly correlated with a coefficient of 0.44. All correlations are statistically significant at the 1% level. The correlations are even higher if I limit to the observations with extremely large asset and investment growth.

The evidence of stock return underperformance following large equity or debt financing is ubiquitous. Loughran and Ritter (1995), and Spiess and Affleck-Graves (1995) find that firms conducting seasoned equity offerings significantly underperform non-issuing firms for up to five years following the offerings. Ritter (2003) shows the underperformance during the first five years is about 20% relative to control firms matched on size and book-to-market equity. Daniel and Titman (2006) and Pontiff and Woodgate (2008) construct comprehensive measures of equity issuances that capture outstanding share variations due to SEOs, stock acquisitions, stock repurchases, and other corporate transactions, and find that they are negatively related to future returns in the cross-section. Spiess and Affleck-Graves (1999) find significant return underperformance for firms have conducted public bond offerings. The average magnitude is over 20% in five years. Lee and Loughran (1998), and Dichev and Piotroski (1999) find that firms with large issues of convertible debt underperform the market on the magnitude of 50 to 70 percent in the following five years. Billett, Flannery, and Garfinkel (2006) find significant long-run return underperformance following bank loans despite of the widely-documented positive announcement returns. Combining with the positive return performance following open market repurchases, documented by Ikenberry, Lakonishok, and Vermaelen (1995), Bradshaw, Richardson, and Sloan (2006) develop a comprehensive measure of net external financing and find a negative relation between this measure and future stock returns. They claim that the economic and statistical significance of their results is stronger than in previous studies focusing on individual categories of financing.

I examine two research questions in this section: (1) To what extent are the large increases in assets or investments of firms in deciles 8 to 10 driven by large external financing? (2) Do the poor returns of these firms in the following year merely reflect the widely-documented return underperformance following large equity or debt issuances? Results pertaining to the first question are presented in Table 6, in which Panel A is for the asset growth anomaly and Panel B is for the investment growth anomaly. The variables in the first three rows are, respectively, the proceeds of new equity issues, net debt issues, and the sum of equity and debt issues deflated by the issuing firm's lagged total assets. The fourth and fifth rows present the annual percentage changes in shares outstanding, and in the debt amount. The construction of percentage change in shares outstanding adjusts for distribution events such as stock splits and stock dividends, as in Pontiff and Woodgate (2008). Data used for computation are obtained from the fundamental annual file in the merged CRSP and Compustat database. The reported numbers are the time-series means of the cross-sectional medians in each AG or IG decile.

I find that on average, firms in the first eight asset growth deciles issue equity that amounts to less than 1% of the firm's existing assets. This is in sharp contrast to the firms in the highest asset growth decile (decile 10), which issue equity amounting to 70.48% of their existing assets. This evidence confirms that equity offerings are rare, but once they occur, they are large in magnitude. Firms in the first four deciles reduce debt, and the reduction for firms in decile 1 is about 3% of the firms' existing assets. In contrast, firms in decile 10 on average increase debt by 16.77% of their assets. Combining equity and debt issues, I find that firms in decile 1 reduce assets by -2.11% while firms in decile 10 double their assets through external financing. The percentage changes suggest consistent results – the substantial increases in assets for the firms in the last several deciles are primarily fuelled by external financing.

I also examine the percentage of firms whose equity or debt issues relative to its existing assets are greater than the 90th percentile of all firms in the year. That is, their debt or equity issuances place them among the top 10% largest issuers in that year.[6] As shown in Panel A of Table 3, less than 5% of the firms in the first six deciles (5.41% for firms in decile 1) have

[6] The choice of 90 percentile, admittedly, is arbitrary. My following results are qualitatively similar, however, using alternative cutting points such as 80 percentile or third quartile.

financed externally to such a large amount. However, the percentage of firms with such a high level of external financing is 17.54% for decile 8, 46.76% for decile 9, and a surprisingly high 86.98% for decile 10. Since previous studies have found significant return underperformance following large debt and equity issuances, it is important to investigate if the poor returns of firms in high asset growth deciles are driven by this subsample.

To do so, I divide firms in deciles 8, 9, and 10 into two groups (Group II and III), depending on whether the firm has issued a large amount of debt or equity in the year of asset growth (over the 90th percentile). Firms in the first seven deciles are regarded as a benchmark group (Group I), in which firms have relatively low asset growth and used little external financing. Group II consists of firms that have achieved significant asset growth, but not by using a large amount of external financing. Group III consists of firms that have grown their assets substantially through large external financing. I examine the differences in portfolio returns between these groups. The delisting bias is adjusted as before and the results are presented in Panel A of Table 7. Not surprisingly, Group I consists of 70% of the firm-month observations. Groups II and III each accounts for approximately half of the remaining observations. I find that both the equal- and value-weighted returns are similar between Groups I and II, although their asset growth rates differ significantly. However, the portfolio returns between Groups II and III differ significantly despite of the similar rates of asset growth for firms in these two groups. Time-series regressions of the Fama-French three-factor model yield consistent results, suggesting that the key factor is whether firms have used large external financing. Firms that grow assets through large external financing incur significantly negative returns in the following year, while firms that grow assets through other channels (e.g., retained earnings, external financing of small or medium size) do not underperform.[7]

A recent study by Fama and French (2008) also suggests the importance of equity issues in affecting the asset growth anomaly. They divide firms' total assets by the number of shares outstanding and measure asset growth on a per share basis, by which they control for the growth of assets due to new equity issues, stock-swap acquisitions, and stock repurchases (for negative growth). Although Fama and French do not find robust asset growth effects in large stocks – stocks with market capitalization above the NYSE median, they still find significant asset growth effects in microcaps and small stocks. This is because they do not control for the asset growth driven by debt issuances as well as the delisting bias. Spiess and Affleck-Graves (1999) demonstrate more severe return underperformance for small firms following debt issuances. Adjusting for the delisting bias, I find that Fama and French's finding of robust asset growth anomaly in relatively small firms is driven primarily by the firms that grow their assets through debt increases. In the last row of Panel A of Table 6, I show that debt issuances are as important as equity offerings in driving extreme large asset growth.

In their Section II.D, CGS examine the interaction between the asset growth anomaly and the share issuance/repurchase anomaly. They run Fama-MacBeth regressions of annual stock returns on asset growth and share issuance variables, and find that the coefficient estimates of the asset growth variable show up significance more often than the share issuance variables. Moreover, they find that the asset growth effect is more pronounced among small and medium

[7] Brav, Geczy, and Gompers (2000) find that underperformance following equity issues is concentrated primarily in small issuing firms with low book-to-market equity ratio. Spiess and Affleck-Graves (1999) find more severe underperformance for smaller firms following public debt offerings. These external financing issuers are thus more likely to have a high proceeds-to-assets ratio, qualifying them into decile 9 or 10.

size firms, whereas the share issuance effect is stronger among large firms.[8] Similar to Fama and French, they do not control for the effect of debt issuances on asset growth, which results in their finding of a stronger asset growth effect in small and medium firms after controlling for share issuances.

Although never interpreted in this way, some of the CGS results imply the lack of an independent asset growth effect after controlling for equity and debt issuances. In their Section II.C, CGS decompose total asset growth into four components: stock financing growth, debt financing growth, retained earnings growth, and the leftover (which they call operating liabilities growth). They run Fama-MacBeth regressions of annual stock returns on the lagged components of asset growth in all firms as well as firms in different size groups, and find that growth in debt predicts significantly negative returns in the following year for small and medium size firms but not for large firms whereas growth in equity predicts negative returns for small and large firms but not for medium firms. However, neither the growth in retained earnings growth nor the growth in operating liabilities predicts returns in the subsequent year, after controlling for debt and equity growth, in the regressions of all firms and firms in three different size groups. This is consistent with my findings for Group II stocks in Table 7 – asset growth not relying on external financing does not predict lower future returns.

As a check for robustness, I also decompose the asset growth rate into three components: the growth due to equity issuances, the growth due to debt issuances, and the growth due to others (including the growth in retained earnings and the growth in operating liabilities in CGS's study), and similar to CGS, run Fama-MacBeth regressions of individual stock returns on these

[8] The asset growth variables in CGS's regression results of Table V still contain the growth of assets by equity offerings. According to my findings in Tables 5 and 6, the correlation between these variables is presumably very high.

components. Before the adjustment of the delisting bias, each of these components negatively relates to the subsequent year returns in univariate regressions, and the relations are statistically significant. However, the variable of asset growth due to others does not predict returns after controlling for the asset growth due to equity and debt issuances. Moreover, if the delisting bias is corrected, the asset growth due to others fails to predict returns even in univariate regressions. The overall results (available upon request) are consistent with what I have shown in Table 7. Asset growth does not have an independent effect on stock returns after controlling for the delisting bias and the return underperformance following large external financing.

Although lesser in magnitude, external financing does have a similar impact on the investment growth anomaly. As reported in Panel B of Table 6, firms in the highest investment growth decile (decile 10) tend to use a significantly higher amount of external financing than firms in other deciles. They also have a higher percentage of firms that have issued a large amount of debt or equity (i.e., over the 90^{th} percentile during the recent two years). To account for the possible lag of capital expenditure following external financing, external financing is accumulated for two years instead of only the year of investment growth. Panel B of Table 7 compares returns between the portfolio of stocks that do not increase investments much (Group I), the portfolio of stocks that increase investments substantially but do not resort to large external financing (Group II), and the portfolio of stocks that increase investments substantially and in the meantime, issue a large amount of debt or equity (Group III). Similarly, I find the poor return performance is limited to stocks in Group III. Firms in Group II, though they have expanded investments significantly, do not realize negative returns in the subsequent year.

4. Conclusion

Cooper, Gulen, and Schill (2008) find a significant asset growth effect in the cross-section of stock returns. Stocks in the low asset growth deciles outperform stocks in the high asset growth deciles in the following year. Titman, Wei, and Xie (2004) and a few other studies find an investment growth effect on stock returns. Firms that substantially increase capital expenditure realize abnormally low returns in the subsequent year. I find that the superior returns of the low asset and investment growth deciles result from the delisting bias in CRSP data and that the poor returns of the high asset and investment growth deciles are primarily driven by a subsample of firms that have issued large amounts of debt or equity in the previous year. After controlling for these two factors, I do not find an independent asset or investment growth effect on stock returns.

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Table 1
Portfolio returns sorted on asset and investment growth

At the end of June of each year *t* from 1968 to 2008, stocks are allocated into deciles based on their asset or investment growth rates at fiscal year *t*-1. Asset and investment growth are defined as in Eq. (1) and (2) of the paper. The portfolios are held for 1 year, from July of year *t* to June of year *t*+1, and then rebalanced. This table reports the time-series averages of yearly cross-sectional median asset and investment growth rates, equal-weighted and value-weighted portfolio returns, and alphas – the intercepts of the time-series regressions of portfolio returns on the Fama-French three factors. Alphas marked with * are statistically significant at the 5% level. All numbers are in percentage. Corporate data (total assets, capital expenditure, and sales) are obtained from the CRSP/COMPUSTAT merged database's fundamental annual file. Stock return data are obtained from CRSP's monthly stock return file. The sample period of stock returns is from July 1968 to December 2009.

Panel A: Portfolios sorted on asset growth

Asset growth deciles formed in June of year t	1(Low)	2	3	4	5	6	7	8	9	10(High)	Spread(1-10) (t-stat)	Spread(1-6) (t-stat)
Asset growth rates from fiscal year t-2 to t-1	-21.12	-6.75	-0.75	3.31	6.98	11.04	16.32	25.05	44.38	129.82	-150.94 (-36.79)	-37.44 (-90.36)
EW portfolio monthly returns (July t - June t+1)	1.79	1.62	1.53	1.36	1.26	1.22	1.15	0.95	0.78	0.17	1.62 (9.03)	0.58 (2.72)
VW portfolio monthly returns (July t - June t+1)	1.26	1.10	1.15	1.01	0.94	0.88	0.92	0.85	0.74	0.27	0.99 (4.63)	0.38 (2.01)
FF alpha for EW portfolio returns	0.59*	0.45*	0.36*	0.25*	0.19*	0.16*	0.10	-0.10	-0.24*	-0.82*	1.41 (8.87)	0.43 (2.48)
FF alpha for VW portfolio returns	0.15	0.11	0.15*	0.14*	0.04	0.08	0.15*	0.12	0.02	-0.49*	0.64 (3.64)	0.07 (0.49)

Panel B: Portfolios sorted on investment growth

Investment growth deciles formed in June of year t	1(Low)	2	3	4	5	6	7	8	9	10(High)	Spread(1-10) (*t*-stat)	Spread(1-6) (t-stat)
Investment growth rates at fiscal year t-1	-80.30	-57.17	-40.65	-27.08	-14.62	-2.31	12.06	31.96	68.41	193.98	-274.28 (-136.51)	-77.99 (243.26)
EW portfolio monthly returns (July t - June t+1)	1.35	1.33	1.31	1.25	1.22	1.22	1.15	1.14	1.15	0.78	0.57 (6.12)	0.13 (0.81)
VW portfolio monthly returns (July t - June t+1)	0.62	1.00	1.04	1.02	0.89	0.85	0.85	0.85	0.90	0.45	0.17 (1.16)	-0.22 (-1.05)
FF alpha for EW portfolio returns	0.24	0.21	0.20*	0.15	0.14	0.13	0.09	0.05	0.06	-0.28*	0.52 (5.75)	0.11 (0.79)
FF alpha for VW portfolio returns	-0.26*	0.16	0.26*	0.23*	0.10	0.02	0.03	0.01	0.03	-0.42*	0.16 (1.05)	-0.28 (-2.01)

Table 2
The missing of delisting returns in CRSP monthly stock return file

This table presents the delisting-month return missing information of non-financial firms in the CRSP monthly stock return file during July 1968 to December 2009. I first identify the month when a stock is delisted, if so, and the month that the stock's last monthly return is reported in the CRSP monthly stock return file, and compute the time difference between the month of delisting and the month of last reported return. The month of delisting is obtained from the CRSP monthly stock event file.

Delisting information	Number of stocks (%)	Delisted for performance reasons (%)
Month (Delisted) = Month (last reported return)	1,490 (9.38%)	490 (32.89%)
Month (Delisted) = Month (last reported return) +1	14,313 (90.13%)	6,970 (48.70%)
Month (Delisted) > Month (last reported return) +1	78 (0.49%)	60 (76.92%)
Total number of delisted stocks	15,881 (100%)	7,520 (47.35%)
The number of stocks that are still listed by the end of December 2009	4,004	

Table 3
Delisting and its effect on portfolio returns

This table presents the probability of delisting for stocks in each asset or investment growth decile. The differences in probability between decile 1 and 10 are tested using a two-proportion *z*-test. Missing delisting returns for stocks delisted for performance-related reasons (delisting code 500, 505-588) are replaced by a figure of -30% to adjust for the delisting bias. The table reports the equal and value-weighted portfolio returns and the alphas from the Fama-French three-factor model for each asset or investment growth portfolio, as well as the spreads and the associated *t*-statistics between deciles 1 and 10. Alpha estimates marked with * are statistically significant at the 5% level.

Panel A: Portfolios sorted on asset growth

Asset growth deciles formed in June of year t	1(Low)	2	3	4	5	6	7	8	9	10(High)	Spread(1-10) (z/t-stat)	Spread(1-6) (t-stat)
Probability of delisting	17.75	11.38	9.47	8.34	8.22	7.56	7.91	7.63	8.20	9.22	8.53 (23.11)	
Probability of delisting for poor performance	12.48	5.64	3.26	2.49	2.17	2.08	2.22	2.56	3.31	4.55	7.93 (26.65)	
EW portfolio monthly returns (July t - June t+1)	1.50	1.50	1.47	1.31	1.22	1.17	1.10	0.90	0.72	0.10	1.40 (8.01)	0.33 (1.56)
VW portfolio monthly returns (July t - June t+1)	1.18	0.97	1.10	0.85	0.84	0.85	0.86	0.77	0.71	0.23	0.97 (4.48)	0.32 (1.65)
FF alpha for EW portfolio returns	0.31	0.33*	0.30*	0.19*	0.14	0.12	0.06	-0.14	-0.30*	-0.91*	1.22 (7.76)	0.19 (1.16)
FF alpha for VW portfolio returns	0.05	-0.03	0.10	-0.04	-0.07	0.05	0.10	0.06	-0.01	-0.52*	0.58 (3.16)	0.00 (0.01)

Panel B: Portfolios sorted on investment growth

Investment growth deciles formed in June of year t	1(Low)	2	3	4	5	6	7	8	9	10(High)	Spread(1-10) (z/t-stat)	Spread (1-6) (t-stat)
Probability of delisting	13.67	10.68	9.73	8.65	8.39	8.09	8.20	8.28	8.83	10.21	3.46 (17.66)	
Probability of delisting for poor performance	8.78	5.12	3.85	3.52	2.70	2.43	2.51	2.59	3.21	4.48	4.30 (24.26)	
EW portfolio monthly returns (July t - June t+1)	1.23	1.27	1.27	1.21	1.19	1.19	1.12	1.11	1.11	0.71	0.52 (5.58)	0.04 (0.24)
VW portfolio monthly returns (July t - June t+1)	0.63	1.01	1.04	1.03	0.89	0.85	0.85	0.85	0.91	0.45	0.18 (1.26)	-0.22 (-1.03)
FF alpha for EW portfolio returns	0.11	0.15	0.15	0.11	0.11	0.10	0.06	0.02	0.01	-0.35*	0.47 (5.13)	0.01 (0.10)
FF alpha for VW portfolio returns	-0.26*	0.18	0.26*	0.24*	0.10	0.02	0.03	0.01	0.04	-0.41*	0.16 (1.06)	-0.28 (-1.97)

Table 4
Delisting returns in CRSP monthly stock event file

The table presents the information about delisting returns in CRSP's monthly stock event file for delisting during the period of July 1968 to December 2009. Delisting stocks with the codes 500, 505 to 588 are considered as triggered by performance-related reasons. Delisting returns are considered as not retrieved if the delisting return is missing or replaced by a partial-month return. The information is classified separately for NYSE/AMEX and Nasdaq stocks.

Delisting returns retrieved?	Delisting Reasons	NYSE/AMEX		Nasdaq	
		N (%)	Mean (median) delisting returns (%)	N (%)	Mean (median) delisting returns (%)
Yes	Performance-related	1199 (23.75%)	-44.52 (-48.29)	4981 (45.82%)	-21.02 (-14.29)
	Others	3581 (70.92%)	2.74 (1.33)	4707 (43.30%)	3.34 (1.41)
No	Performance-related	231 (4.58%)		1129 (10.39%)	
	Others	38 (0.75%)		54 (0.50%)	
Total		5049 (100%)		10871 (100%)	

Table 5
Spearman rank correlations between asset growth, investment growth, and external financing

This table presents the time-series averages of the cross-sectional Spearman rank correlations between asset growth, investment growth, and net external financing. Variables are defined as follows:

$$\text{Asset growth } = \frac{\text{Total Assets}_t - \text{Total Assets}_{t-1}}{\text{Total Assets}_{t-1}},$$

$$\text{Investment growth } = \frac{\text{CAPEX}_t - \text{Mean}(\text{CAPEX}_{t-1}, \text{CAPEX}_{t-2}, \text{CAPEX}_{t-3})}{\text{Total Assets}_{t-1}},$$

$$\text{Net External Financing } = \frac{(\text{Sales of Common and Preferred Stock}_t - \text{Purchases of Common and Preferred Stock}_t) + (\text{Total Debt}_t - \text{Total Debt}_{t-1})}{\text{Total Assets}_{t-1}},$$

where total debt is the sum of long-term debt and debt in current liabilities. I limit the sample period to be 1971-2008 because statements of cash flow data are widely available in Compustat only since fiscal year 1971. Since I intend to examine if *increases* in assets and investments are accompanied by large external financing, I require asset growth and investment growth to be positive for the results of this table. The associated t-statistics are in parenthesis.

	Asset Growth	Investment Growth	Net External Financing
Asset Growth		0.44 (38.33)	0.70 (63.79)
Investment Growth			0.39 (30.95)

Table 6
External financing in asset and investment growth portfolios

This table presents the time-series average equity issues, net debt issues, and external financing (i.e., the sum of equity and net debt issues) relative to the issuing firms' total assets in the previous fiscal year. It also presents the percentage change in shares outstanding and in debt amount for each asset or investment growth decile. Changes in shares outstanding due to firm distribution events are adjusted away. For Panel B pertaining to the investment growth anomaly, external financings are accumulated for both year t-1 and year t-2 deflated by the total assets at t-3. The purpose is to account for the possible lag of capital investments following external financing. Corporate data are obtained from the CRSP/COMPUSTAT merged database's fundamental annual file. The variable of sale of common and preferred stock is SSTK (previously data108 in the Compustat industrial annual file). Net debt issues are calculated as the annual change in the sum of long-term and short-term debt (DLTT + DLC, previously data9 + data34). The last rows report the percentage of firms in each decile that have issued equity or debt, equity and debt, and debt separately, relative to their existing total assets above the 90th percentile across all firms in each year.

Panel A: Portfolios sorted on asset growth

Asset growth deciles formed in June of year t based on AG(t-1)	1(Low)	2	3	4	5	6	7	8	9	10(High)	Spread (1-10)
Sale of new stock at t-1 (deflated by total assets)	0.18	0.11	0.11	0.14	0.22	0.30	0.47	0.91	6.30	70.48	-70.30
Net debt issues at t-1 (deflated by total assets)	-2.89	-1.65	-0.85	-0.15	0.53	1.32	2.86	5.24	9.77	16.77	-19.66
External Financing at t-1 (deflated by total assets)	-1.93	-1.05	-0.45	0.23	1.16	2.53	5.03	10.25	25.67	103.52	-105.45
Percentage change in shares outstanding at t-1	0.43	0.21	0.19	0.27	0.45	0.69	1.38	3.34	10.29	37.54	-37.11
Percentage change in debt amount at t-1	-21.07	-10.87	-5.81	-1.67	1.99	6.96	14.42	26.72	46.82	77.67	-98.74
Percentage of firms with stock or debt growth >p90	5.41	3.54	3.00	2.96	3.80	4.71	7.87	17.54	46.76	86.98	-81.57
Percentage of firms with external financing >p90	1.62	0.91	0.70	0.62	0.73	0.83	1.52	3.56	15.31	75.78	-74.16
Percentage of firms with debt growth >p90	1.64	1.32	0.96	1.06	1.22	1.60	3.66	10.91	30.70	47.01	-45.37

Panel B: Portfolios sorted on investment growth

Investment growth deciles formed based on IG(t-1)	1(Low)	2	3	4	5	6	7	8	9	10(High)	Spread (1-10)
Sale of new stock at t-1 and t-2 (deflated by total assets)	3.91	1.17	1.11	1.09	1.04	1.06	1.12	1.46	2.08	7.97	-4.06
Net debt issues at t-1 and t-2 (deflated by total assets)	0.34	0.96	1.48	2.07	2.13	2.58	3.22	3.45	3.71	6.20	-5.86
External Financing at t-1 and t-2 (deflated by total assets)	10.91	5.06	5.40	5.96	5.57	6.15	7.16	8.57	11.16	25.19	-14.28
Percentage change in shares outstanding from t-3 to t-1	6.41	3.36	3.34	3.82	4.12	4.18	5.54	7.45	9.28	15.12	-8.71
Percentage change in debt amount from t-3 to t-1	-1.94	2.45	6.25	10.23	11.13	13.87	17.43	19.26	19.94	32.26	-34.20
Percentage of firms with stock or debt growth >p90	22.96	16.11	14.90	13.72	12.76	12.88	14.13	16.56	20.10	32.21	-9.25
Percentage of firms with external financing >p90	15.67	9.34	8.08	6.71	6.11	6.33	6.90	8.50	11.36	22.03	-6.36

Table 7
Asset growth portfolio returns after controlling for the delisting bias and large external financing

This table presents the equal- and value-weighted portfolio returns and the Fama-French three-factor model alphas of three groups of stocks. Stocks in Group I are stocks in the first seven asset or investment growth deciles (negative or low growth). Group III consists of stocks in the last three deciles (high growth) that have used large amounts of external financing (i.e. net debt or equity issues above the 90th percentile of all firms in that year). Group II is made up of the remaining stocks in the last three deciles, which have increased their assets or investments substantially but have not used large amounts of external financing. Alpha estimates marked with * are statistically significant at the 5% level.

Panel A: Portfolios sorted on asset growth

Asset growth deciles formed in June of year t	Group I: Decile 1-7	Group II: Decile 8-10 (excl. EF)	Group III: Decile 8-10 (EF)	Spread(I-II) (*t*-stat)	Spread (II-III) (*t*-stat)
EW portfolio monthly returns (July t - June t+1)	1.23	0.95	0.18	0.28 (1.85)	0.77 (8.63)
VW portfolio monthly returns (July t - June t+1)	0.95	0.86	0.37	0.09 (0.71)	0.49 (4.15)
FF alpha for EW portfolio returns	0.16*	-0.06	-0.85*	0.22 (2.16)	0.78 (9.76)
FF alpha for VW portfolio returns	0.09	0.16*	-0.42*	-0.07 (-0.73)	0.58 (5.14)
Firm-month observations (%)	1,339,937 (70.05%)	283,909 (14.84%)	288,959 (15.11%)		

Panel B: Portfolios sorted on investment growth

Investment growth deciles formed in June of year t	Group I: Decile 1-7	Group II: Decile 8-10 (excl. EF)	Group III: Decile 8-10 (EF)	Spread(I-II) (*t*-stat)	Spread (II-III) (*t*-stat)
EW portfolio monthly returns (July t - June t+1)	1.21	1.20	0.33	0.01 (0.23)	0.87 (6.66)
VW portfolio monthly returns (July t - June t+1)	0.90	0.87	0.39	0.03 (0.31)	0.48 (3.15)
FF alpha for EW portfolio returns	0.11	0.09	-0.71*	0.02 (0.33)	0.80 (7.80)
FF alpha for VW portfolio returns	0.10*	0.01	-0.46*	0.09 (1.16)	0.47 (3.70)
Firm-month observations (%)	1,245,073 (70.84%)	395,653 (22.51%)	116,762 (6.64%)		