Is the Growth-value Anomaly Related to the Asset Growth Anomaly? ☆

Hung Wan Kot
Department of Economics and Finance
City University of Hong Kong
Kowloon Tong, Kowloon, Hong Kong
Email: hungwkot@cityu.edu.hk
Tel: (852)-3442-6788
Fax: (852)-3442-0195

F.Y. Eric C. Lam [*]
Department of Finance and Decision Sciences
Hong Kong Baptist University
Kowloon Tong, Kowloon, Hong Kong
Email: fyericcl@hkbu.edu.hk
Tel: (852)-3411-5218
Fax: (852)-3411-5585

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[*] Corresponding author

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Abstract

It is well known that the market-to-book equity ratio and total asset growth are negatively associated with future stock returns. Much less known is that the predictabilities are related through the mispricing channel. We show that the growth-value anomaly is governed by ex-ante total asset growth expectation errors, so is the asset growth anomaly. The anomalies are weak when the expectation errors are low and strong when the errors are high. Growth firms with high expectation errors generate low returns and possess strikingly higher distress risk. Gross profitability affects the growth-value anomaly via the expectation errors. Limits to arbitrage exacerbates the effect of the expectation errors on the growth-value anomaly.

JEL Classification: G14, G31, G32, M41, M42

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1. Introduction

The growth-value anomaly has a long history in the asset pricing literature (see, e.g., Fama and French, 1992; Fama and French, 1998). It refers to high market-to-book equity firms or “growth” stocks delivering lower future abnormal stock returns than low market-to-book equity firms or “value” stocks. Besides, the literature recently documented the asset growth anomaly (see, e.g., Cooper, Gulen, and Schill, 2008; Watanabe, Xu, Yao, Yu, 2013). It refers to high total asset growth firms delivering lower future abnormal stock returns than low total asset growth firms. Both anomalies indicate a negative relation between growth and subsequent abnormal stock returns. It is interesting and important to examine whether the two well-known negative relations are connected. Financial economists would like to clarify whether the two anomalies are results of different pricing mechanisms or they stem from similar pricing error or risk. Practitioners would also like to know whether and how the anomalies might be combined to form a better investment strategy. Yet, there is not much empirical findings on the link between the two anomalies. Thereby, we study whether and how the valuation ratio based growth-value anomaly is related to the balance sheet based asset growth anomaly.

We first confirm that the growth-value anomaly persists after controlling for total asset growth in conventional ways (Lipson, Mortal, and Schill, 2011). Our new finding is that the growth-value anomaly is governed by consistency between two total asset growth expectations. The consistency between the extrapolative expectation and an informed expectation measures the ex-ante expectation errors which Lam and Wei (2016) show to be a key driver of the asset growth anomaly. When the extrapolative expectation is more consistent with the informed expectation, ex-ante expectation errors should be smaller. When the extrapolative expectation is less consistent with the informed expectation, ex-ante expectation errors should be larger. Both growth-value and asset growth anomalies are weak when the consistency is high, i.e., expectation errors are low, and strong when the consistency is low, i.e., expectation errors are high. We show that lower consistency does not identify less risky growth firms and riskier value firms. Besides, higher consistency does not identify riskier growth firms and less risky value firms. These indicate that the growth-value anomaly is related to the asset growth anomaly via the mispricing channel. This is our first contribution.

As our next contribution, we document that the channel connects a number of important empirical findings regarding the growth-value anomaly. First, Dichev (1998) finds that the low returns on high distress risk firms are mainly driven by growth firms. Griffin and Lemmon (2002) find that returns on growth firms with high distress risk are extremely low. We further show that the strikingly low returns are connected to ex-ante errors in total asset growth expectations. Growth firms with low consistency between total asset growth expectations generate low returns and possess especially higher distress risk. Second, Novy-Marx (2013) shows that the anomaly is stronger after controlling for gross profitability. We show that gross profitability itself supplies information on the prediction of total asset growth and it also provides information beyond other predictive instruments. As such, gross profitability is informative about consistency between total asset growth expectations, thereby improves the identification of ex-ante expectation errors. Third, Ali, Hwang, and Trombley (2003) document that the anomaly is stronger for firms with higher limits to arbitrage. We show that limits to arbitrage interacts with consistency between total asset growth expectations in determining the anomaly. The anomaly is stronger when the consistency is lower and even stronger when limits to arbitrage is more severe. This points to the role of mispricing in the anomaly.

2. Related Literature and Motivation

Berk, Green, and Naik (1999) develop a model in which capital investments raise the importance of assets in place relative to risky growth options. Thereby, exercise of growth options reduces the systematic risk exposure of the firm's equity and hence its expected return. As the book-to-market equity ratio proxies for the systematic risk of a firm's asset base, it is positively related to expected return. In other words, the market-to-book equity ratio is negatively related to expected return. This model suggests that capital investments should explain the growth-value anomaly as investments are the cause of the changes in risk and return over time. To test this implication, Anderson and Garcia-Feijóo (2006) examine whether controlling for capital expenditure growth over the previous two years or other capital expenditure measures reduces the growth-value anomaly in portfolios and cross sectional regressions. They find that the anomaly is somewhat reduced but it does not become completely insignificant.

Based on the *q*-theory of investment, Zhang (2005) constructs a model in which time variation in risk and return affects capital investments. Specifically, lower expected return leads to higher marginal *q* or benefit of investments, more positive NPV projects, and hence investments. As lower book-to-market equity ratio summarizes the higher marginal *q*, the book-to-market equity ratio picks up a positive relation with expected return. This model also suggests that the negative relation between capital investments and future return should capture the growth-value anomaly. To test this prediction, Xing (2008) examines whether the growth-value anomaly reduce after controlling for capital expenditure growth or the investment-to-capital ratio over the previous year. Xing finds that the anomaly is insignificant in double sorted portfolios but remains significant in cross sectional regressions.

Lipson, Mortal, Schill (2011) examine the rational investment explanation of the growth-value effect using total asset growth of Cooper, Gulen, and Schill (2008) as a composite investment measure. They show that the growth-value anomaly remains significant after controlling for total asset growth in cross sectional regressions. To complete the empirical analysis, we control for total asset growth in portfolio sorts as well as total asset growth over the previous two years in cross sectional regressions.

We hypothesize that the growth-value anomaly is linked to the asset growth anomaly via the mispricing channel. Lakonishok, Shleifer, and Vishny (1994) argue that growth firms are overvalued and value stocks are undervalued due to expectation errors made by investors, who extrapolate and overreact to past firm performance. La Porta, Lakonishok, Shleifer, and Vishny (1997) provide empirical evidence for the expectation errors hypothesis. They show that the anomaly is significantly associated with surprises around earnings announcements. Furthermore, Piotroski and So (2012) show the anomaly clusters among firms with ex-ante biased expectations. They identify such firms as firms that have inconsistent valuations and fundamentals, i.e., those that have high market-to-book equity ratio but weak fundamental strength and those that have low market-to-book equity ratio but strong fundamental strength.

Cooper, Gulen, and Schill (2008) suggest that the asset growth anomaly is due to mispricing. High total asset growth firms are overvalued and low total asset growth firms are undervalued due to extrapolative behavior of investors. Investors extrapolate past firm growth rates and hence they overreact to firm expansion and contraction. In support of the biased expectations explanation, Lipson, Mortal, and Schill (2011) show that the anomaly is stronger when idiosyncratic volatility, i.e., arbitrage risk, is higher. The anomaly is associated with surprises around earnings announcements. In addition, Lipson et al. find that analysts' earnings forecasts are systemically higher than realized earnings for high total asset growth firms. Furthermore, Lam and Wei (2016) show that ex-ante expectation errors determine the anomaly. They identify ex-ante expectation errors by the extrapolative total asset growth expectation being inconsistent with an informed total asset growth expectation supported by fundamentals. When the extrapolative expectation is more consistent with the informed expectation, expectation errors should be smaller. When the extrapolative expectation is less consistent with the informed expectation, expectation errors should be larger. The anomaly is weak when the consistency is high, i.e., expectation errors are low, and strong when the consistency is low, i.e., expectation errors are high.

Given the similarities in the mispricing explanations for the two growth anomalies, we test whether the growth-value anomaly is connected to the asset growth anomaly by ex-ante expectation errors in total asset growth expectation. Specifically, we expect the consistency to be associated with the growth-value anomaly in a way similar to the asset growth anomaly. This is what we find.

Various studies argue that growth firms could have lower risk and hence lower expected returns than value firms. E.g., Fama and French (1993, 1995) interpret the growth-value anomaly as risk compensation for systematic exposure to financial distress and growth firms are less likely to be in distress. Carlson, Fisher, and Giammarino (2004) and Zhang (2005) provide models in which growth firms have lower operating leverage, and Garcia-Feijóo and Jorgensen (2010) find empirical evidence support the leverage hypothesis. In addition, Lettau and Wachter (2007, 2011) and Da (2009) provide models in which growth firms have higher cash flow duration and hence they are less exposed to cash flow shocks. In this paper, we analyze the dispersion of these risks between growth stocks and value stocks across consistency between total asset growth expectations. We examine whether the consistency grouping might affect the growth-value anomaly by spreading the risk of growth firms and the risk of value firms.

Previous studies also document that the growth-value anomaly is strongly linked to gross profitability and limit to arbitrage. Novy-Marx (2013) shows that the anomaly is stronger after controlling for gross profitability. Novy-Marx interprets the finding as profitability helps to identify unproductive growth firms and productive value firms. Ali, Hwang, and Trombley (2003) document that the anomaly is stronger for firms with higher limits to arbitrage. This is consistent with the anomaly being driven by mispricing.

We synthesize gross profitability and limits to arbitrage with consistency between total asset growth expectations to provide further insights. We expect gross profitability to be a valid instrument in predicting total asset growth. Gross profitability affects the growth-value anomaly as it is informative about consistency between total asset growth expectations and hence useful in sorting out ex-ante expectation errors. We expect limits to arbitrage to interact with the consistency in determining the anomaly. When arbitrage is restricted, the mispricing due to expectation errors should persist and thereby exacerbate the anomaly.

The reminder of paper is organized as follows. Section 3 describes our sample and variables. Section 4 reports the empirical results. Section 5 concludes our study.

3. Sample and Variable Descriptions

3.1. Sample construction

Our sample contains firms listed on the NYSE, AMEX, and NASDAQ. Annual financial statements are from Compustat. Firms with valid total asset growth for a fiscal year appeared in Compustat in the previous fiscal year as well and hence selection bias and backfill bias are already mitigated. Monthly and daily stock market data are from the Center for Research in Security Prices (CRSP). We use delisting returns to alleviate survivorship bias.[1] Financial analyst data are from I/B/E/S. Institutional shareholding records are from Thomson Reuters Institutional (13f) Holdings.

Following the convention in the literature, we merge monthly stock returns from July of calendar year *t*+1 to June of calendar year *t*+2 with financial statements for fiscal year *t* and other information at the end of June of calendar year *t*+1. Following Fama and French (1992, 1993), we only include non-financial common stocks with positive book value of equity. Following Titman, Wei, and Xie (2004), we remove a firm year observation if the annual revenue for the fiscal year is below $10 million to avoid firms in an early stage of development. The sample period is from fiscal year 1962 to fiscal year 2014. As we require 11 fiscal years of data to estimate the predictive total asset growth regressions (1) each year, we start the trading strategies at the end of June of calendar year 1973. Hence, the monthly holding period returns are from the end of July 1973 to the end of December 2015. The strategies are updated at the end of June each year.

3.2. Variable definitions

The market-to-book equity ratio (*M*/*B*) is market capitalization divided by book value of equity at the end of fiscal year *t*. Book equity is calculated according to Fama and French (1992, 1993). One-year total asset growth (*TAG*) is total assets at the end of fiscal year *t* minus total assets at the end of fiscal year *t*–1, scaled by total assets at the end of fiscal year *t*–1. Two-year

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[1] Shumway (1997) suggests that the returns of stocks delisted for poor performance (delisting codes 500 and 520 to 584) are usually unavailable. Following Shumway and Warther (1999), when the return is missing for an available CRSP month date, we use the delisting return. When the delisting return is not available, we use –30% for poor performance delisting and 0% for other cases.

total asset growth (*TAG*2) is total assets at the end of fiscal year *t* minus total assets at the end of fiscal year *t*–2, scaled by total assets at the end of fiscal year *t*–2. These asset growth definitions closely follow Cooper, Gulen, Schill (2008) and Lipson, Mortal, and Schill (2011).

Following Lam and Wei (2016), we use consistency between two total asset growth expectations (*Consistency*) to proxy for ex-ante expectation errors. The ex-ante expectation errors refer to how the extrapolative expectation deviates from an expectation informed by fundamentals. *Consistency* is a quintile ranking constructed as follows. We use *TAG* as the extrapolative expectation of next year total asset growth. We use five firm fundamentals to construct the informed total asset growth expectation. We estimate 10 annual cross sectional regressions

$$TAG_{i,\tau+1} = a_\tau + b_\tau{}' X_{i,\tau} + \varepsilon_{i,\tau+1}, \quad \tau = t-10, t-9, \dots, t-2, t-1. \tag{1}$$

The predictive instruments are firm age (*Age*) at the end of June of calendar year τ+1, research and development intensity (*RDI*) for fiscal year τ, a negative earnings indicator (*NEI*) for fiscal year τ, payout terciles based on all distributions to equity holders (*Payout*) for fiscal year τ, and the six-month cumulative adjusted stock return (*CAR*) from January to June of calendar year τ+1.

Younger firms or firms with more innovative efforts, which tend to possess more expansion opportunities, should have higher future total asset growth. Profitable firms or firms retaining more earnings, which tend to have more resources for expansion, should have higher future total asset growth. Stock returns and contemporaneous total asset growth are positively correlated (see, e.g., Cooper, Gulen, and Schill, 2008). Growing firms might receive more attention and hence higher abnormal returns. Therefore, the cumulative adjusted stock return should be informative about growth yet observable when we start or update the trading strategies. The Fama and MacBeth (1973) regression of total asset growth on the five instruments estimated from the full sample is

$$TAG_{t+1} = 0.20 - 0.03 \times Age_t + 0.29 \times RDI_t - 0.16 \times NEI_t$$
$$-0.01 \times Payout_t + 0.14 \times CAR_t + \varepsilon_{t+1}, adjusted R^2 = 0.12.$$

The absolute *t*-statistics for the slope estimates range from 6.55 to 29.02. The signs are in line with our priors. The set of instruments captures 12% of the cross sectional variation of next year total asset growth.

Next, we average each of the series of the estimated regression coefficients of regressions (1). We then compute the informed expectation as the linear combination of the average coefficients and the five firm fundamentals for fiscal year *t* or calendar year *t*+1, i.e.,

$$Informed\ expectation_{i,t} = \frac{1}{10}\sum_{\tau=t-10}^{t-1}\widehat{a_\tau} + \frac{1}{10}\sum_{\tau=t-10}^{t-1}\widehat{b_\tau}' X_{i,t}. \quad (2)$$

We independently sort stocks into deciles by the extrapolative expectation and deciles by the informed expectation. We then contrast the two decile rankings to define *Consistency*. On one hand, when the extrapolative expectation is closer to the informed expectation, *Consistency* is higher and ex-ante expectation errors should be smaller. On the other hand, when the extrapolative expectation is farther away from the informed expectation, *Consistency* is lower and ex-ante expectation errors should be larger. E.g., consider extrapolative expectation decile one. When the informed expectation decile is one, *Consistency* is five or high. When the informed expectation decile is two or three, *Consistency* is four. When the informed expectation decile is four, five, six, or seven, *Consistency* is three. When the informed expectation decile is eight or nine, *Consistency* is two. When the informed expectation decile is ten, *Consistency* is one or low. Figure 1 depicts the values of *Consistency* along other extrapolative expectation deciles.

[Figure 1 here]

O-score is the Ohlson (1980) O-score for predicting bankruptcy. Griffin and Lemmon

(2002) use this measure to study the role of distress risk in the growth-value anomaly. *OL* is operating leverage used in Garcia-Feijóo and Jorgensen (2010), among others, to examine the operating leverage risk of growth firms versus value firms. *Duration* is the Da (2009) ex-post cash flow duration.

Gross profitability (*GP*/*A*) is the gross-profit-to-assets ratio studied by Novy-Marx (2013). Limits to arbitrage (*LTA*) is a composite index calculated as the average ranking of the decile ranking independently sorted by nine variables, whichever is available. These variables are idiosyncratic volatility (*IVOL*), cash flow volatility (*CFVOL*), one period ahead analyst earnings forecast dispersion (*Dispersion*), Amihud (2002) illiquidity (*ILLIQ*), bid ask spread (*Bidask*) in ascending order and analyst coverage (*Coverage*), stock price (*Price*), dollar trading volume (*DVOL*), and institutional ownership (*IO*) in descending order.[2] The Appendix describes all the variables in detail.

4. Empirical Findings

4.1. Summary statistics

Panel A of Table 1 presents summary statistics of our variables. The mean and standard deviation of *M*/*B* are 2.543 and 8.107, respectively. The mean and standard deviation of *TAG* are 0.176 and 0.952, respectively. Panel B presents correlations among the variables. *M*/*B* is positively correlated with *TAG* (correlation is 0.16). High market-to-book equity firms tend to have higher total asset growth.

On one hand, *M*/*B* and *TAG* have a few differences. *M*/*B* is positively correlated with *O-score* (correlation is 0.16) and *GP*/*A* (correlation is 0.08). However, *TAG* is negatively correlated

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[2] The literature typically uses these measures to study the effect of limits to arbitrage on cross sectional stock returns. See, e.g., Mashruwala, Rajgopal, and Shevlin (2006), McLean (2010), Li and Zhang (2010), Lam and Wei (2011), and Stambaugh, Yu, and Yuan (2015).

with *O-score* (correlation is –0.07) and *GP*/*A* (correlation is –0.04). On the other hand, *M*/*B* and *TAG* share a few commonalities. *M*/*B* is negatively correlated with *Consistency* (correlation is –0.01), *OL* (correlation is –0.02), and *LTA* (correlation is –0.02). *M*/*B* is positively correlated with *Duration* (correlation is 0.08). Similarly, *TAG* is negatively correlated with *Consistency* (correlation is –0.08), *OL* (correlation is –0.03), and *LTA* (correlation is –0.02). *TAG* is positively correlated with *Duration* (correlation is 0.18).

[Table 1 here]

4.2. The growth anomalies

Panel A of Table 2 presents median growth and subsequent abnormal returns on quintile portfolios sorted by *M*/*B*, *TAG*, or *TAG*2. The portfolios are held from July of calendar year *t*+1 to June of calendar year *t*+2 and rebalanced annually at the end of June. Abnormal return on a portfolio is the estimated intercept of the monthly time series regression

$$Ret_{p,t} - R_{ft} = \alpha_p + \beta_{p,MKT}MKT_t + \beta_{p,SMB}SMB_t + \beta_{p,HML}HML_t + \beta_{p,MOM}MOM_t + \beta_{p,CMA}CMA_t + \epsilon_{p,t}, \tag{3}$$

where Ret_p is the return on a portfolio while R_f is the risk free rate. *MKT* is the market factor, *SMB* is the size factor, and *HML* is the value factor from Fama and French (1993). *MOM* is the momentum factor from Carhart (1997). *CMA* is the investment factor from Fama and French (2015).[3] *HML* is omitted for *M*/*B* sorting. *CMA* is omitted for *TAG* or *TAG*2 sorting.

The median *M*/*B* is 0.55 for the low *M*/*B* portfolio and 3.75 for the high *M*/*B* portfolio. The difference in the abnormal return (α) between low and high *M*/*B* portfolios, i.e., (1–5), is 0.44%

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[3] The risk free rate and factors are from Kenneth French's Data Library. We do not include the profitability factor *RMW* as we incorporate the information of profitability via consistency in total asset growth expectations.

per month with a *t-statistics* of 2.66.[4] The median *TAG* is –0.10 for the low *TAG* portfolio and 0.43 for the high *TAG* portfolio. The difference in α between low and high *TAG* portfolios is 0.63% with a *t-statistics* of 4.10. The median *TAG*2 is –0.14 for the low *TAG*2 portfolio and 0.93 for the high *TAG*2 portfolio. The difference in α between low and high *TAG*2 portfolios is 0.69% with a *t-statistics* of 4.10. Consistent with the literature, future abnormal return is negatively related to the market-to-book equity ratio and total asset growth.

[Table 2 here]

Panel B of Table 2 reports abnormal returns on five by five portfolios independently sorted by *M*/*B* and *TAG*. The differences in α between low and high *M*/*B* portfolios are 0.86% (*t-statistics* is 3.17), 0.72% (*t-statistics* is 3.56), 0.46% (*t-statistics* is 2.50), 0.61% (*t-statistics* is 2.86), and 0.78% (*t-statistics* is 3.32). Panel C of Table 2 reports abnormal returns on five by five portfolios independently sorted by *M*/*B* and *TAG*2. The differences in α between low and high *M*/*B* portfolios are 0.85% (*t-statistics* is 3.35), 0.68% (*t-statistics* is 3.05), 0.45% (*t-statistics* is 2.52), 0.57% (*t-statistics* is 2.27), and 0.81% (*t-statistics* is 3.22). The relation between the market-to-book equity ratio and future return remains negative after controlling for total asset growth over the past one or two years. Besides, the asset growth anomaly remains after controlling for the market-to-book equity ratio.

Panel A of Table 3 reports the slope estimates of the Fama and MacBeth (1973) regression

$$R_{i,t+1} = a + \gamma_1 M/B_{i,t} + \gamma_2 TAG_{i,t} + \gamma_3 M/B_{i,t} \times TAG_{i,t} + c_1\beta_{i.t} + c_2 Ln(ME_{i.t}) + c_3 Ln(PRet_{i.t}) + \varepsilon_{i,t+1}, \tag{4}$$

where R_{t+1} is monthly stock return from July of calendar year *t*+1 to June of calendar year *t*+2. Control variables are the CAPM beta (β), logarithm of market capitalization (*ME*), and logarithm

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[4] We compute the time-series *t*-statistics with the Newey and West (1986) robust standard errors with autocorrelations up to 12 lags for all our tests.

of gross stock return for the previous year ending May of calendar year *t*+1 (*PRet*). Panel B of Table 3 reports the slope estimates of the regression with *TAG* replaced by *TAG*2. The *M*/*B*, *TAG*, and *TAG*2 slopes are –0.043% (*t-statistics* is –2.21), –0.469% (*t-statistics* is –5.96), and–0.237% (*t-statistics* is −5.89), respectively. These negative slopes echo the abnormal return spreads on portfolios.

[Table 3 here]

The *M*/*B* slope is –0.039% (*t-statistics* is –2.11) after controlling for *TAG*. The *M*/*B* slope is –0.038% (*t-statistics* is –2.10) after controlling for *TAG*2. The *M*/*B* slope is –0.036% (*t-statistics* is –2.19) after controlling for *TAG* and *M*/*B*×*TAG*. The *M*/*B* slope is –0.032% (*t-statistics* is –2.13) after controlling for *TAG*2 and *M*/*B*×*TAG*2. The relation between the market-to-book equity ratio and future return remains negative, after controlling for total asset growth and its interaction with the market-to-book equity ratio. Moreover, the relation between total asset growth and future return also remains negative, after controlling for the market-to-book equity ratio and its interaction with total asset growth.

Alternatively, we estimate the Fama and MacBeth (1973) regression

$$R_{i,t+1} = a + \gamma_1 Growth_{i,t} + c_1\beta_{i.t} + c_2 Ln(ME_{i.t}) + c_3 Ln(PRet_{i.t}) + \varepsilon_{i,t+1}. \tag{5}$$

Panel A of Table 4 reports the slope γ_1 with *Growth* being *M*/*B* and the cross sectional regression estimated separately from each of the terciles annually sorted by *TAG* or *TAG*2. The *M*/*B* slopes are –0.025% (*t-statistics* is –1.92), –0.062% (*t-statistics* is –2.31), and –0.062% (*t-statistics* is –2.49) across the three *TAG* groups. The *M*/*B* slopes are –0.010% (*t-statistics* is –0.68), –0.062% (*t-statistics* is −1.91), and –0.069% (*t-statistics* is –2.72) across the three *TAG*2 groups. The negative market-to-book-equity slopes are significant across the total asset growth terciles except the one in low two-year total asset growth. Panel B of Table 4 reports the slope γ_1 with *Growth* being either *TAG* or *TAG*2 and the cross sectional regression estimated separately from each of the terciles annually sorted by *M*/*B*. The total asset growth slopes are negative across the three market-to-book-equity groups. Mirroring the literature, the growth-value anomaly is seemingly unrelated to the asset growth anomaly.

[Table 4 here]

4.3. Consistency between total asset growth expectations and the growth anomalies

Panel A of Table 5 reports subsequent abnormal returns on five by five portfolios independently sorted by *TAG* and *Consistency*. The differences in α between low and high *TAG* portfolios are 1.60% (*t-statistics* is 5.89), 0.90% (*t-statistics* is 4.91), 0.72% (*t-statistics* is 6.12), 0.60% (*t-statistics* is 3.00), and 0.08% (*t-statistics* is 0.34) across the five *Consistency* groups. The difference in the difference in α between low and high *TAG* portfolios across low and high *Consistency* is –1.52% (*t-statistics* is –3.83). The asset growth anomaly is strong when *Consistency* is low, i.e., ex-ante expectation errors are severe. The asset growth anomaly monotonically weakens when *Consistency* is higher. The asset growth anomaly is weak when *Consistency* is high, i.e., there is no particular ex-ante expectation error.

For low *TAG* portfolio, the difference in α between low and high *Consistency* is 0.22% (*t-statistics* is 1.02). For high *TAG* portfolio, the difference in α between low and high *Consistency* is –1.30% (*t-statistics* is –4.99). This indicates the significant difference in difference in α is mostly driven by the high *TAG* portfolio having lower abnormal return when *Consistency* is low. In other words, low *Consistency* strengthens the asset growth anomaly mostly through affecting the short leg of the strategy.

Panel B of Table 5 reports subsequent abnormal returns on five by five portfolios independently sorted by *M*/*B* and *Consistency*. The differences in α between low and high *M*/*B* portfolios are 0.77% (*t-statistics* is 3.60), 0.75% (*t-statistics* is 3.43), 0.55% (*t-statistics* is 2.79), 0.37% (*t-statistics* is 1.74), and 0.26% (*t-statistics* is 1.41) across the five *Consistency* groups. The difference in the difference in α between low and high *M*/*B* portfolios across low and high *Consistency* is –0.51% (*t-statistics* is –2.18). The growth-value anomaly is strong when *Consistency* is low, i.e., ex-ante expectation errors are severe. The growth-value anomaly monotonically weakens when *Consistency* is higher. The growth-value anomaly is weak when *Consistency* is high, i.e., there is no particular ex-ante expectation error.

For low *M*/*B* portfolio, the difference in α between low and high *Consistency* is –0.29% (*t-statistics* is –1.55). For high *M*/*B* portfolio, the difference in α between low and high *Consistency* is –0.80% (*t-statistics* is –3.48). This indicates the significant difference in difference in α is mostly driven by the high *M*/*B* portfolio having lower abnormal return when *Consistency* is low. In other words, low *Consistency* strengthens the growth-value anomaly mostly through affecting the short leg of the strategy.

We document that the way the growth-value anomaly responds to consistency between total asset growth expectations highly resembles the way the asset growth anomaly does. Consistency between total asset growth expectations is an important characteristic that governs the growth-value anomaly as well as the asset growth anomaly. We draw similar findings when we alternatively study the relations in linear regressions. Table 6 reports the slope estimates of the Fama and MacBeth (1973) regression

$$R_{i,t+1} = a + \gamma_1 Growth_{i,t} + c_1 \beta_{i.t} + c_2 Ln(ME_{i.t}) + c_3 Ln(PRet_{i.t}) + \varepsilon_{i,t+1}. \quad (6)$$

The cross sectional regression is estimated separately from each of the quintiles annually sorted by *Consistency*. *Growth* is *TAG* in Panel A and it is *M*/*B* in in Panel B.

The *TAG* slopes are –1.240% (*t-statistics* is –4.22), –0.987% (*t-statistics* is –6.89), –0.579% (*t-statistics* is –4.95), –0.650% (*t-statistics* is –3.72), and –0.004% (*t-statistics* is –0.02) across the five *Consistency* groups. The difference in the *TAG* slopes across low and high *Consistency* is – 1.236% (*t-statistics* is –3.36). The *M*/*B* slopes are –0.152% (*t-statistics* is –3.17), –0.111% (*t-statistics* is –4.02), –0.046% (*t-statistics* is –1.97), –0.054% (*t-statistics* is –2.06), and –0.049% (*t-statistics* is –1.60) across the five *Consistency* groups. The difference in the *M*/*B* slopes across low and high *Consistency* is –0.103% (*t-statistics* is –3.00). To contrast with the state of the art, we find that the growth-value anomaly is indeed related to the asset growth anomaly. The subtle connection is via consistency between total asset growth expectations or the ex-ante expectation error in the extrapolative expectation with respect to an informed expectation.

[Table 6 here]

4.4. Risk characteristics across M/B and Consistency

Panel A of Table 7 reports *O-score*, *OL*, and *Duration* of quintile portfolios sorted by *M*/*B*. We multiply *O-score* by 100 for easier visual comparison. The median *O-score*, *OL*, and *Duration* of the portfolio with low *M*/*B* are 0.213, 1.973, and 4.785, respectively. The median *O-score*, *OL*, and *Duration* of the portfolio with high *M*/*B* are 0.082, 1.194, and 4.930, respectively. The differences these characteristics between low and high *M*/*B* portfolios are 0.132 (*t-statistics* is 5.15), 0.779 (*t-statistics* is 13.97), and –0.145 (*t-statistics* is –1.67), respectively. Growth firms have lower bankruptcy likelihood and operating leverage but longer ex-post cash flow duration. Consistent with the literature, growth firms are less risky than value firms.

[Table 7 here]

Panel B of Table 7 reports *O-score*, *OL*, and *Duration* of five by five portfolios independently sorted by *Consistency* and *M*/*B*. Among low *Consistency* (quintile one), growth portfolio has much higher *O-score* or bankruptcy risk than value portfolio (1.175 vs. 0.358; *t-statistics* of the difference is 4.06). Recall from Panel B of Table 5, the former generates especially lower abnormal return than the latter (–0.73 vs. 0.05). Indeed, Panel B of Table 5 shows that the abnormal return on growth portfolio with low *Consistency* is the lowest among the returns on five by five portfolios independently sorted by *Consistency* and *M*/*B*. Besides, *O-score* of growth portfolio with low *Consistency* is the highest among those of the five by five portfolios. This interesting pattern reveals that the extremely low returns documented by Griffin and Lemmon (2002) on growth firms with high *O-score*. It also echoes the finding in Dichev (1998) that the low returns on high distress risk firms are mainly driven by growth firms. We show that the low returns are also associated with low consistency or high ex-ante errors in total asset growth expectations.

Among the low *Consistency* quintile, *OL* of the low *M*/*B* portfolio is 2.032 and *OL* of the high *M*/*B* portfolio is 1.150. Although growth portfolio has lower operating leverage than value portfolio for low *Consistency*, the difference in leverage between these portfolios (0.882; *t*-statistics is 2.52) is rather close to the difference in leverage between high and low *M*/*B* portfolios (0.779; *t-statistics* is 13.97) reported in Panel A. Moreover, the *t*-statistics suggest the former difference is less reliable than the latter one.

Among the low *Consistency* quintile, *Duration* of the low *M*/*B* portfolio is 5.350 and *Duration* of the high *M*/*B* portfolio is 4.737. The difference is 0.613 (*t*-statistics is 3.18). The results suggest tht among low *Consistency* firms, growth portfolio has shorter ex-post cash flow duration than value portfolio. The growth portfolio does not have less risky cash flow than the value portfolio. These risk profiles suggest that low *Consistency* does not sort out less risky growth firms and riskier value firms.

Among the high *Consistency* group (quintile five), value firms are uniformly riskier than growth firms, *O-score* of low *M*/*B* portfolio is 0.246 and *O-score* of high *M*/*B* portfolio is 0.060. The difference in bankruptcy risk between these portfolios (0.186; *t*-statistics is 5.78) is similar to the difference in the risk between low and high *M*/*B* portfolios (0.132) reported in Panel A. Among the high *Consistency* quintile, *OL* of the low *M*/*B* portfolio is 2.280 and *OL* of high *M*/*B* portfolio is 1.284. The difference in operating leverage between these portfolios (0.996; *t*-statistics is 9.69) is similar to the difference in leverage between low and high *M*/*B* portfolios (0.779) reported in Panel A. Among the high *Consistency* quintile, *Duration* of the low *M*/*B* portfolio is 4.743 and *Duration* of high *M*/*B* portfolio is 4.942. The difference in ex-post cash flow duration between these portfolios (–0.199 with a *t*-statistics of –1.93) is similar to the difference in the duration between low and high *M*/*B* portfolios (–0.145) reported in Panel A. These risk profiles suggest that high *Consistency* does not sort out riskier growth firms and less risky value firms.

4.5. The role of gross profitability in the growth-value anomaly

Panel A of Table 8 reports subsequent abnormal returns on five by five portfolios independently sorted by *M*/*B* and *GP*/*A*. The differences in *α* between low and high *M*/*B* portfolios are 0.86% (*t-statistics* is 4.19), 0.65% (*t-statistics* is 3.57), 0.75% (*t-statistics* is 3.89), 0.50% (*t-statistics* is 2.44), and 0.51% (*t-statistics* is 2.18) across the five *GP*/*A* groups. The average of the difference in *α* over the *GP*/*A* quintiles is 0.66% (*t-statistics* is 3.78). Recall, from

Panel A of Table 1, the difference in α between low and high *M*/*B* portfolios is 0.44% (*t-statistics* is 2.66). Consistent with Novy-Marx (2013), the growth-value anomaly remains significant across gross profitability and it is also stronger after conditioning on gross profitability.

[Table 8 here]

Panel B of Table 8 reports subsequent abnormal returns on five by five portfolios independently sorted by *M*/*B* and *Consistency* constructed using *GP*/*A* as the only predictive instrument on the right hand sides of regressions (1). The differences in α between low and high *M*/*B* portfolios are 0.67% (*t-statistics* is 2.80), 0.60% (*t-statistics* is 3.36), 0.54% (*t-statistics* is 2.92), 0.34% (*t-statistics* is 1.69), and 0.22% (*t-statistics* is 1.16) across the five *Consistency* groups. The difference in the difference in α between low and high *M*/*B* portfolios across low and high *Consistency* is –0.45% (*t-statistics* is –1.98). The Fama and MacBeth (1973) regression of total asset growth on previous gross profitability estimated from the full sample is

$$TAG_{t+1} = 0.11 + 0.06 \times GP/A_t + \varepsilon_{t+1}, adjustedR^2 = 0.01.$$

The *t*-statistics for the slope coefficient is 8.90. Gross profitability affects the growth-value anomaly because it provides some information to the informed total asset growth expectation and hence consistency between total asset growth expectations.

The Fama and MacBeth (1973) regression of total asset growth on the six predictive instruments estimated from the full sample is

$$TAG_{t+1} = 0.20 - 0.03 \times Age_t + 0.27 \times RDI_t - 0.16 \times NEI_t - 0.01 \times Payout_t$$
$$+0.14 \times CAR_t + 0.02 \times GP/A_t + \varepsilon_{t+1},\ adjustedR^2 = 0.13.$$

The absolute *t*-statistics for the slope coefficients range from 4.40 to 29.26. Recall the adjusted R^2 is 0.12 when *GP*/*A* is not included. On top of the five instruments in regressions (1), gross profitability provides marginal information to the informed total asset growth expectation and hence consistency between total asset growth expectations.

Panel C of Table 8 reports subsequent abnormal returns on five by five portfolios independently sorted by *M*/*B* and *Consistency* constructed using *GP*/*A* as an additional predictive instrument on the right hand sides of regressions (1). The differences in α between low and high *M*/*B* portfolios are 0.93% (*t-statistics* is 3.66), 0.74% (*t-statistics* is 3.45), 0.57% (*t-statistics* is 3.64), 0.33% (*t-statistics* is 1.58), and 0.27% (*t-statistics* is 1.48) across the five *Consistency* groups. The difference in the difference in α between low and high *M*/*B* portfolios across low and high *Consistency* is –0.66% (*t-statistics* is –2.75). Recall, from Panel B of Table 4, the difference in α between low and high *M*/*B* portfolios is 0.77% (*t-statistics* is 3.60) when *Consistency* without *GP*/*A* is low and the difference in difference in α is –0.51% (*t-statistics* is –2.18). As expected, the *Consistency* measure improved by *GP*/*A* generates a slightly stronger growth-value anomaly and it also spreads the anomaly more effectively than the measure without *GP*/*A*.

4.6. Limits to arbitrage and the abnormal returns on the M/B and Consistency sorts

Panel A of Table 9 reports subsequent abnormal returns on three by three portfolios independently sorted by *M*/*B* and *LTA*. The differences in α between low and high *M*/*B* portfolios are –0.05% (*t-statistics* is –0.43), 0.27% (*t-statistics* is 1.75), and 0.64% (*t-statistics* is 3.61) across the three *LTA* groups. The difference in the difference in α between low and high *M*/*B* portfolios across low and high *LTA* is 0.69% (*t-statistics* is 4.79). Consistent with Ali, Hwang, and Trombley (2003), the growth-value anomaly is weak when limits to arbitrage is low and is stronger when limits to arbitrage is more severe.

[Table 9 here]

Panel B of Table 9 reports subsequent abnormal returns on three by three by three portfolios independently sorted by *LTA*, *M*/*B* and *Consistency*. *Consistency* includes *GP*/*A* as an instrument on the right hand side of equation (1).[5] When *LTA* is low, the differences in α between low and high *M*/*B* portfolios are –0.07% (*t-statistics* is –0.43), –0.03% (*t-statistics* is –0.33), and 0.19% (*t-statistics* is 1.39) across the three *Consistency* groups. The growth-value anomaly is insignificant if arbitrage is easy to implement, even when *Consistency* is low.

When *LTA* is medium, the differences in α between low and high *M*/*B* portfolios are –0.46% (*t-statistics* is 2.33), 0.38% (*t-statistics* is 2.23), and 0.06% (*t-statistics* is 0.34) across the three *Consistency* groups. The difference in the difference in α between low and high *M*/*B* portfolios across low and high *Consistency* is –0.41% (*t-statistics* is –2.36). The growth-value anomaly is significant across *Consistency* and it is also stronger as *Consistency* is lower when arbitrage is not easy to implement.

When *LTA* is high, the differences in α between low and high *M*/*B* portfolios are 1.07% (*t-statistics* is 4.50), 0.67% (*t-statistics* is 3.25), and 0.41% (*t-statistics* is 2.10) across the three *Consistency* groups. The difference in the difference in α between low and high *M*/*B* portfolios across low and high *Consistency* is –0.66% (*t-statistics* is –2.92). The growth-value anomaly is significant across *Consistency* and it is also much stronger as *Consistency* is lower when arbitrage is hard to implement. When arbitrage is highly restricted, the anomaly is significant even when *Consistency* is high, i.e., ex-ante expectation errors tend to be small. Consistency between total asset growth expectations and limits to arbitrage are two crucial interacting characteristics that determine the growth-value anomaly.

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[5] Here, we contrast the quintile ranking of the extrapolative expectation and the quintile ranking of the informed expectation to construct a *Consistency* tercile.

5. Conclusions

It is well known that the market-to-book equity ratio and total asset growth are negatively associated with future stock returns. Previous studies show that the growth-value anomaly and the asset growth anomaly are seemingly unrelated, as the growth-value anomaly persists when the asset growth anomaly is controlled for in typical portfolio sorts and cross sectional regressions. By contrast, in this paper we find that the growth-value anomaly is indeed related to the asset growth anomaly.

The channel is consistency between total asset growth expectations or the ex-ante expectation errors in the extrapolative expectation with respect to an informed expectation. The two anomalies seem to stem from similar pricing error. This mispricing channel also connects a number of important empirical findings regarding the growth-value anomaly. Growth firms with high expectation errors generate low returns and possess strikingly higher distress risk. Gross profitability affects the anomaly via the expectation errors and limits to arbitrage exacerbates the effect of the expectation errors on the anomaly. To the best of our knowledge, this is the first study that connects the two important asset pricing anomalies.

References

Ali, Ashiq, Lee-Seok Hwang, and Mark A. Trombley, 2003. Arbitrage risk and the book-to-market anomaly. Journal of Financial Economics 69, 355–373.

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

Anderson, Christopher W., and Luis Garcia-Feijóo, 2006. Empirical evidence on capital investment, growth options, and security returns. Journal of Finance 61, 171–194.

Berk, Jonathan B., Richard C. Green, and Vasant Naik, 1999. Optimal investment, growth options and security returns. Journal of Finance 54, 1153–1607.

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

Carlson, Murray, Adlai Fisher, and Ron Giammarino, 2004. Corporate investment and asset price dynamics: implications for the cross-section of returns. Journal of Finance, 59, 2577–2603.

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

Da, Zhi, 2009. Cash flow, consumption risk, and the cross-section of stock returns. Journal of Finance, 64, 923–956.

Dichev, Ilia D., 1998. Is the risk of bankruptcy a systematic risk? Journal of finance 53, 1131–1147.

Fama, Eugene F., and Kenneth R. French, 1992. The cross-section of expected stock returns. Journal of Finance 47, 427–465.

Fama, Eugene F., and Kenneth R. French, 1993. Common risk factors in the returns on stocks and bonds. Journal of Financial Economics 33, 3–56.

Fama, Eugene F., and Kenneth R. French, 1995. Size and book-to-market factors in earnings and returns. Journal of Finance, 50, 131–155.

Fama, Eugene F., and Kenneth R. French, 1998. Value versus growth: the international evidence. Journal of Finance 53, 1975–1999.

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

Fama, Eugene F., and James D. MacBeth, 1973. Risk, return and equilibrium: empirical tests. Journal of Political Economy 81, 607–636.

Garcia-Feijóo, Luis, and Randy D. Jorgensen, 2010. Can operating leverage be the cause of the value premium? Financial Management 39, 1127–1153.

Griffin, John M., and Michael L. Lemmon, 2002. Book-to-market equity, distress risk, and stock returns. Journal of Finance 57, 2317–2336.

La Porta, Rafael, Josef Lakonishok, Andrei Shleifer, and Robert W. Vishny, 1997. Good news for value stocks: evidence on market efficiency. Journal of Finance 52, 859–874.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994. Contrarian investment, extrapolation, and risk. Journal of Finance 49, 1541–1578.

Lam, F.Y. Eric C., and K.C. John Wei, 2011. Limits-to-arbitrage, investment frictions, and the asset growth anomaly. Journal of Financial Economics 102, 127–149.

Lam, F.Y. Eric C., and K.C. John Wei, 2016. Ex-ante expectation errors and the asset growth anomaly. Working paper.

Lettau, Martin, and Jessica Wachter, 2007. Why is long-horizon equity less risky? A duration-based explanation of the value premium. Journal of Finance, 62, 55–92.

Lettau, Martin, and Jessica Wachter, 2011, The term structures of equity and interest rates, Journal of Financial Economics, 101 90–113.

Li, Dongmei, and Lu Zhang, 2010. Does *q*-theory with investment frictions explain anomalies in the cross-section of returns? Journal of Financial Economics 98, 297–314.

Lipson, Marc L., Sandra Mortal, and Michael J. Schill, 2011. On the scope and drivers of the asset growth effect. Journal of Financial and Quantitative Analysis 46, 1651–1682.

Mashruwala, Christina, Shivaram Rajgopal, and Terry Shevlin, 2006. Why is the accrual anomaly not arbitraged away? The role of idiosyncratic risk and transaction costs. Journal of Accounting and Economics 42, 3–33.

McLean, R. David 2010. Idiosyncratic risk, long-term reversal, and momentum. Journal of Financial and Quantitative Analysis 45, 883–906.

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

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

Ohlson, James A., 1980. Financial ratios and the probabilistic prediction of bankruptcy. Journal of Accounting Research 18, 109–131.

Piotroski, Joseph D., and Eric C. So, 2012. Identifying expectation errors in value/glamour strategies: a fundamental analysis approach. Review of Financial Studies 25, 2841–2875.

Shumway, Tyler, 1997. The delisting bias in CRSP data. Journal of Finance 52, 327–340.

Shumway, Tyler, and Vincent A. Warther, 1999. The delisting bias in CRSP's Nasdaq data and its implications for the size effect. Journal of Finance 54, 2361–2379.

Stambaugh, Robert F., Jianfeng Yu, and Yu Yuan, 2015. Arbitrage asymmetry and the idiosyncratic volatility puzzle. Journal of Finance 70, 1903–1948.

Titman, Sheridan, K.C. John Wei, and Feixue Xie, 2004. Capital investments and stock returns. Journal of Financial and Quantitative Analysis 39, 677–700.

Watanabe, Akiko, Yan Xu, Tong Yao, and Tong Yu, 2013. The asset growth effect: insights from international equity markets. Journal of Financial Economics 108, 529–563.

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

Zhang, Lu, 2005. The value premium. Journal of Finance, 60, 67–103.

Appendix. Variable definitions

Age:	Firm age, measured as the number of years a stock has appeared in CRSP at the end of June of calendar year *t*+1. Data source: CRSP.
β:	Capital asset pricing model (CAPM) beta, estimated as the slope coefficient of the time series regression of monthly stock returns in excess of the risk free rate on the market return minus the risk free rate with a full history of 36 months of observations ending in June of calendar year *t*+1. Data source: CRSP and Kenneth French Data Library.
Bidask:	Average daily bid ask spread, which is calculated as 2×|(Price–(Ask+Bid)/2)|/Price at the end of a trading day, over the year ending in June of calendar year *t*+1. Price is the closing stock price and Ask (Bid) is the ask (bid) quote. Data source: CRSP.
CAR:	Six-month cumulative adjusted stock return, calculated as the compounded monthly size adjusted stock return from January of calendar year *t*+1 to June of calendar year *t*+1. The size adjusted return is the monthly raw return minus the monthly return on a benchmark portfolio matched to the stock by the market capitalization decile sorted at the end of December of calendar year *t*. Market capitalization is closing stock price times number of shares outstanding. Data source: CRSP.
CFVOL:	Cash flow volatility, measured as the standard deviation of cash flow from operations over the past five fiscal years ending in year *t*. A minimum of three years of observations is required. Cash flow from operations is earnings before extraordinary items (item IB) minus accruals, scaled by the average of total assets (item AT) over fiscal year *t*. Accruals is the change in current assets (item ACT) less the change in cash and short-term investments (item CHE) less the change in current liabilities (item LCT) less depreciations (item DP) plus the change in debt included in current liabilities (item DLC) plus the change in income taxes payable (item TXP) over fiscal year *t*. Data source: Compustat.
Coverage:	Analyst coverage, measured as the latest number of analysts following the stock available from the beginning of January of calendar year *t*+1 to the end of June of calendar year *t*+1. Data source: I/B/E/S.
Dispersion:	One period ahead analyst earnings forecast dispersion, calculated as the latest standard deviation of one year ahead earnings forecasts on the stock available from the beginning of January of calendar year *t*+1 to the end of June of calendar year *t*+1, scaled by the closing stock price at the end of June of calendar year *t*+1. Data source: I/B/E/S and CRSP.
Duration:	Da (2009) ex-post cash flow duration, calculated as $Duration_{i,t} = \sum_t \; e_i - \frac{\kappa}{1-\rho} - \xi_{i,t} - E_t\left(\sum_t \; \Delta c\right),$ with ρ and κ set to 0.95 and 0.1985, respectively. The discounted sum of all future

accounting earnings $\sum_t e_i = \sum_{n=[0,\infty)} \rho^n e_i(t,n+1)$ is approximated by breaking it down into a finite sum and the terminal value, i.e.,

$$\sum_t e_i = \sum_{n=0}^{6} \rho^n e_i(t,n+1) + \sum_{n=7}^{\infty} \rho^n E_t[e_i(t,n+1)].$$

The term in the finite sum is the discounted natural logarithm of one plus return on equity in the future. Specifically, $\rho^n e_i(t,n+1) = \rho^n Ln(1+Earnings_{i,t+n+1}/BE_{i,t+n})$ and *Earnings* is net income (item NI) for fiscal year $t+n+1$ and *BE* is book value of equity at the end of fiscal year $t+n$. The terminal value is $\hat{e}_i \times \rho^7 / (1 - \rho)$, where $\hat{e}_i$ is the average of $e_i(t,n+1)$ over n from 0 to 6. $\xi_{i,t} = Ln(CF_{i,t}/BE_{i,t})$. *CF* is cash flow, which is common dividend (item DVC) plus common share repurchase for fiscal year t. Common share repurchase is the expenditure on the purchase of common and preferred stocks (item PRSTKC, set to 0 if missing) minus reduction in the book value of preferred stock (item PSTKRV) if any. We exclude firms with negative cash flow. We deflate all money variables to the year 2009 using the personal consumption expenditure deflator from the Bureau of Economic Analysis. For the results we present in Table 6, we ignore the expectation of the discounted sum of all future log aggregate consumption growth $E_t(\sum_t \Delta c)$ as it is not firm specific. Adding it does not change our findings. Data source: Compustat.

DVOL:	Average daily dollar trading volume, which is closing price times the trading day's share trading volume, over the year ending in June of calendar year $t+1$. Data source: CRSP.
GP/A:	The gross-profit-to-assets ratio, measured as gross profit (item GP) over fiscal year t scaled by total assets (item AT) at the end of fiscal year t. Data source: Compustat.
ILLIQ:	Amihud (2002) illiquidity, measured as the time-series average of absolute value of daily returns scaled by the trading day's dollar trading volume over the year ending in June of calendar year $t+1$. Data source: CRSP.
IO:	Institutional ownership, measured as the latest percentage of outstanding shares held by Dimensional Fund Advisors (DFA) or V500 available from the beginning of January of calendar year $t+1$ to the end of June of calendar year $t+1$. Data source: Thompson Reuters (13F) Institutional Holdings and CRSP.
IVOL:	Idiosyncratic volatility, estimated as the standard deviation of residuals from a market model with monthly stock returns as the dependent variable and the S&P 500 return as the independent variable with 36 months of observations ending in June of calendar year $t+1$. A full three-year history is required. Data source: CRSP.
M/B:	The market-to-book equity ratio, calculated as market capitalization at the end of calendar year t divided by the book value of equity at the end of fiscal year t. Market capitalization is closing stock price times number of shares outstanding. Book equity is total assets (item AT) minus liabilities (item LT), plus balance sheet deferred taxes (item TXDB) and investment tax credits (item ITCI), minus preferred stock liquidation value (item PSTKL) if available, or redemption value (item PSTKRV) if available, or carrying value (item PSTK) if available. Data source: CRSP and Compustat.

ME: Market capitalization, calculated as closing stock price times number of shares outstanding at the end of June of calendar year t+1. Data source: CRSP.

NEI: Negative earnings indicator, equals one if operating income before extraordinary items (item IB) over fiscal year t is negative and zero otherwise. Data source: Compustat.

OL: Operating leverage, is estimated in two steps. First, we estimate the regression

$$Ln(EBIT_{i,\tau}) = a_1 + b_1 \times \tau + \varepsilon_{i,\tau}, \tag{i}$$

where $Ln(EBIT)$ is the natural logarithm of earnings before interests and tax (item EBIT) of firm i, using data from fiscal year t–4 to fiscal year t and $\tau = \{0,1,2,3,4\}$. We use a transformation common in the accounting literature, $Ln(1+EBIT)$ if $EBIT \geq 0$ and $-Ln(1-EBIT)$ if $EBIT < 0$, to handle negative earnings. We then estimate the regression

$$Ln(Sales_{i,\tau}) = a_2 + b_2 \times \tau + \mu_{i,\tau}, \tag{ii}$$

where $Ln(Sales)$ is the natural logarithm of sales (item SALE) of firm i, using data from fiscal year t–4 to fiscal year t and $\tau = \{0,1,2,3,4\}$. Second, we regress the residuals of regression (i) on the residuals on regression (ii) without an intercept, i.e., we estimate the regression

$$\varepsilon_{i,\tau} = OL_{i,t} \times \mu_{i,\tau} + e_{i,\tau}.$$

Operating leverage is the estimated slope. Data source: Compustat.

O-score: Ohlson (1980) O-score for predicting bankruptcy, calculated as

$$O\text{-}score = -4.07\times Ln(A) + 6.03\times(L/A) - 1.43\times(CA-CL)/A + 0.0757\times CL/CA - 2.37\times NI/A$$
$$+ 0.285\times Loss - 1.72\times NegBook - 0.521\times\Delta NI - 1.83\times Op/L,$$

where $Ln(A)$ is the natural logarithm of total assets (item AT), L is total liabilities (item LT), A is total assets (item AT), CA is current assets (item ACT), and CL is current liabilities (item LCT) at the end of fiscal year t. NI is net income (item NI) for fiscal year t. *Loss* is equal to one if net income (item NI) for fiscal year t and net income (item NI) for fiscal year t–1 are negative and zero otherwise. *NegBook* is equal to one if L is greater than A and zero otherwise. ΔNI is the change in net income (item NI) from fiscal year t–1 to fiscal year t, scaled by the sum of the absolute values of the net income (item NI) for the two years. *Op*, funds from operations, is income before extraordinary items (item IB) plus income statement deferred tax (item TXDI), if available, plus equity's share of depreciation expenses for fiscal year t, which is depreciation expenses (item DP) multiplied by market capitalization and divided by total assets (item AT) minus book value of equity plus market capitalization at the end of fiscal year t. Book equity is total assets (item AT) minus liabilities (item LT), plus balance sheet deferred taxes (item TXDB) and investment tax credits (item ITCI), minus preferred stock liquidation value (item PSTKL) if available, or redemption value (item PSTKRV) if available, or carrying value (item PSTK) if available. Market capitalization is closing stock price times number of shares outstanding. Data source: Compustat and CRSP.

Payout: Payout terciles, ranked according to all distributions to equity holders including share repurchases (item PRSTKC), dividends to preferred stocks (item DVP), and dividends to common stock, scaled by operating income before depreciation (item OIBDP) for fiscal year t. Stocks with zero or negative earnings but positive distributions belong to the high payout tercile while stocks with zero or negative earnings and zero distributions belong to the low payout tercile. Data source: Compustat.

PRet: Prior return, calculated as the compounded monthly stock return from June of calendar year t to May of calendar year $t+1$. Data source: CRSP.

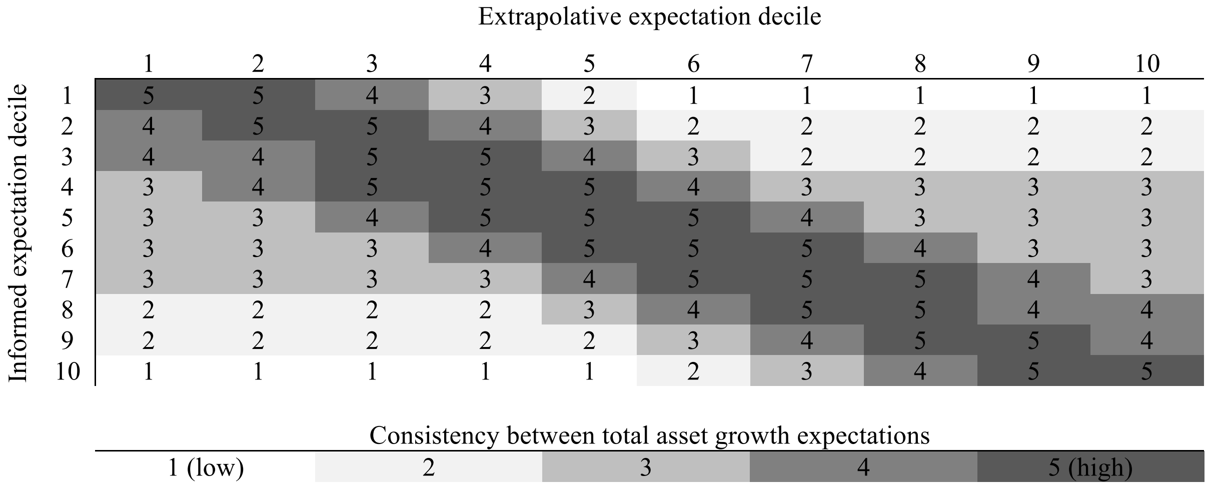
Price: Closing stock price, or the average of bid and ask prices if the closing price is unavailable, at the end of June of calendar year $t+1$. Data source: CRSP.

RDI: Research and development intensity, calculated as R&D expenditures (item XRD) over fiscal year t scaled by total assets (item AT) at the end of fiscal year $t-1$. Data source: Compustat.

TAG: One-year total asset growth, calculated as total assets (item AT) at the end of fiscal year t minus total (item AT) assets at the end of fiscal year $t-1$, scaled by total assets (item AT) at the end of fiscal year $t-1$. Data source: Compustat.

*TAG*2: Two-year total asset growth, calculated as total assets (item AT) at the end of fiscal year t minus total assets (item AT) at the end of fiscal year $t-2$, scaled by total assets (item AT) at the end of fiscal year $t-2$. Data source: Compustat.

Figure 1
Definition of consistency between total asset growth expectations



	Extrapolative expectation decile									
Informed expectation decile	1	2	3	4	5	6	7	8	9	10
1	5	5	4	3	2	1	1	1	1	1
2	4	5	5	4	3	2	2	2	2	2
3	4	4	5	5	4	3	2	2	2	2
4	3	4	5	5	5	4	3	3	3	3
5	3	3	4	5	5	5	4	3	3	3
6	3	3	3	4	5	5	5	4	3	3
7	3	3	3	3	4	5	5	5	4	3
8	2	2	2	2	3	4	5	5	4	4
9	2	2	2	2	2	3	4	5	5	4
10	1	1	1	1	1	2	3	4	5	5

Consistency between total asset growth expectations				
1 (low)	2	3	4	5 (high)

Table 1
Descriptive statistics and sample correlations

This table presents time series averages of the annual cross sectional mean, standard deviation (SD), and correlation of firm characteristics. *M*/*B* is the market-to-book equity ratio, *TAG* is one-year total asset growth, *TAG*2 is two-year total asset growth, *Consistency* is consistency between two total asset growth expectations, *O-score* is the Ohlson (1980) O-score for predicting bankruptcy, *OL* is operating leverage, *Duration* is cash flow duration, *GP*/*A* is the gross-profit-to-assets ratio, and *LTA* is limits to arbitrage. The sample covers fiscal years 1972 to 2014.

	M/*B*	*TAG*	*TAG*2	*Consistency*	*O-score*	*OL*	*Duration*	*GP*/*A*	*LTA*
Mean	2.543	0.176	0.395	3.694	0.013	2.588	4.945	0.400	1.987
SD	8.107	0.952	1.695	1.220	0.062	10.343	1.457	0.272	0.826
Correlation									
TAG	0.16								
*TAG*2	0.16	0.63							
Consistency	0.01	–0.08	–0.07						
O-score	0.16	–0.07	–0.04	0.01					
OL	–0.02	–0.03	–0.03	0.01	0.00				
Duration	0.08	0.18	0.17	0.01	0.01	–0.02			
GP/*A*	0.08	–0.04	–0.04	0.04	–0.05	–0.02	0.00		
LTA	–0.02	–0.02	–0.01	–0.10	0.19	0.01	0.01	0.09	

Table 2
Growth anomalies in portfolios

Panel A reports median growth and subsequent abnormal returns on quintile portfolios sorted by growth. Growth is either the market-to-book equity ratio (*M*/*B*), one-year total asset growth (*TAG*), or two-year total asset growth (*TAG*2) at the end of fiscal year *t*. Portfolios are sorted at the end of June of each calendar year *t*+1 and the holding period is from July of calendar year *t*+1 to June of calendar year *t*+2. Abnormal return on a portfolio is the estimated intercept of the monthly time series regression

$$Ret_{p,t} - R_{ft} = \alpha_p + \beta_{p,MKT}MKT_t + \beta_{p,SMB}SMB_t + \beta_{p,HML}HML_t + \beta_{p,MOM}MOM_t + \beta_{p,CMA}CMA_t + \epsilon_{p,t},$$

where Ret_p is the monthly return on a portfolio while R_f is the risk free rate. *MKT* is the market factor, *SMB* is the size factor, *HML* is the value factor, *MOM* is the momentum factor, and *CMA* is the investment factor. *HML* is omitted if sorting is by *M*/*B*. *CMA* is omitted if sorting is by *TAG* or *TAG*2. (1–5) is the difference in alpha between low (1) and high (5) growth quintiles. Time series *t*-statistics based on the Newey and West (1987) robust standard errors with autocorrelations up to 12 lags are shown in brackets. Panel B reports abnormal returns on five by five portfolios independently sorted by *M*/*B* and *TAG*. Panel C reports abnormal returns on five by five portfolios independently sorted by *M*/*B* and *TAG*2. Abnormal returns on double sorts are estimated without *HML* and *CMA*. The sample covers fiscal years 1972 to 2014 and monthly returns from July 1973 to December 2015.

Panel A. Growth characteristics and future alphas

Growth	Market-to-book equity ratio		One-year total asset growth		Two-year total asset growth	
	M/*B*	α	*TAG*	α	*TAG*2	α
1 (low)	0.55	0.34	–0.10	0.32	–0.14	0.30
2	0.92	0.21	0.01	0.29	0.05	0.29
3	1.31	0.18	0.08	0.22	0.18	0.21
4	1.94	0.15	0.17	0.14	0.36	0.16
5 (high)	3.75	–0.10	0.43	–0.31	0.93	–0.39
(1–5)		0.44		0.63		0.69
		[2.66]		[4.10]		[4.90]

Panel B. *M*/*B* and *TAG* portfolio alphas

	TAG						
M/*B*	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.46	0.56	0.52	0.46	0.03	0.43	[3.03]
2	0.39	0.53	0.44	0.28	–0.04	0.43	[4.06]
3	0.30	0.37	0.40	0.34	–0.12	0.42	[3.30]
4	0.17	0.35	0.21	0.16	–0.37	0.53	[4.96]
5 (high)	–0.40	–0.16	0.06	–0.15	–0.75	0.35	[2.58]
(1–5)	0.86	0.72	0.46	0.61	0.78		
	[3.17]	[3.56]	[2.50]	[2.86]	[3.32]		

Panel C. *M*/*B* and *TAG*2 portfolio alphas

	*TAG*2						
M/*B*	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.54	0.58	0.40	0.41	0.07	0.46	[4.11]
2	0.42	0.50	0.49	0.30	–0.05	0.48	[4.08]
3	0.24	0.53	0.34	0.45	–0.24	0.48	[4.30]
4	0.20	0.25	0.26	0.20	–0.34	0.53	[4.67]
5 (high)	–0.31	–0.11	–0.05	–0.16	–0.74	0.43	[3.43]
(1–5)	0.85	0.68	0.45	0.57	0.81		
	[3.35]	[3.05]	[2.52]	[2.27]	[3.22]		

Table 3
Growth anomalies in interactive cross sectional regressions

Panel A reports the slope estimates of the Fama and MacBeth (1973) regression

$$R_{i,t+1} = a + \gamma_1 M/B_{i,t} + \gamma_2 TAG_{i,t} + \gamma_3 M/B_{i,t} \times TAG_{i,t} + c_1 \beta_{i.t} + c_2 Ln(ME_{i.t}) + c_3 Ln(PRet_{i.t}) + \varepsilon_{i,t+1},$$

where R_{t+1} is monthly stock return from July of calendar year *t*+1 to June of calendar year *t*+2. *M*/*B* is the market-to-book equity ratio and *TAG* is one-year total asset growth at the end of fiscal year *t*. Control variables are the CAPM beta (*β*), logarithm of market capitalization (*ME*), and logarithm of gross stock return for the previous year ending May of calendar year *t*+1 (*PRet*). Panel B reports the slope estimates of the above regression with *TAG* being replaced by *TAG*2, the two-year total asset growth at the end of fiscal year *t*. Time series *t*-statistics (*t*) are computed with the Newey and West (1987) robust standard errors.

Panel A. Return regression with *M*/*B*, *TAG*, and interaction

M/*B*	*t*	*TAG*	*t*	*M*/*B*×*TAG*	*t*	*β*	*t*	*Ln*(*ME*)	*t*	*Ln*(*PRet*)	*t*
–0.043	–2.21					0.012	0.11	–0.103	–2.66	0.120	0.93
		–0.469	–5.96			0.023	0.21	–0.103	–2.65	0.132	1.02
–0.039	–2.11	–0.453	–5.96			0.031	0.28	–0.095	–2.50	0.124	0.97
–0.036	–2.19	–0.373	–4.40	–0.059	–1.98	0.034	0.31	–0.094	–2.46	0.123	0.96

Panel B. Return regression with *M*/*B*, *TAG*2, and interaction

M/*B*	*t*	*TAG*2	*t*	*M*/*B*×*TAG*2	*t*	*β*	*t*	*Ln*(*ME*)	*t*	*Ln*(*PRet*)	*t*
–0.043	–2.21					0.012	0.11	–0.103	–2.66	0.120	0.93
		–0.237	–5.89			0.037	0.33	–0.102	–2.64	0.097	0.74
–0.038	–2.10	–0.225	–5.91			0.044	0.41	–0.095	–2.49	0.090	0.70
–0.032	–2.13	–0.196	–4.55	–0.026	–1.74	0.048	0.44	–0.094	–2.46	0.086	0.67

Table 4
Growth anomalies in subsample cross sectional regressions

Panel A reports the time series averages of cross sectional slopes, estimated from each of the terciles annually sorted by TAG or $TAG2$, of the Fama and MacBeth (1973) regression

$$R_{i,t+1} = a + \gamma_1 Growth_{i,t} + c_1\beta_{i.t} + c_2 Ln(ME_{i.t}) + c_3 Ln(PRet_{i.t}) + \varepsilon_{i,t+1},$$

where *Growth* is *M*/*B*. Panel B reports the time series averages of cross sectional slopes, estimated from each of the terciles annually sorted by *M*/*B*, of the above regression with *Growth* being *TAG* or *TAG*2. Time series *t*-statistics (*t*) are computed with the Newey and West (1987) robust standard errors.

Panel A. Return regression with *M*/*B* across terciles by *TAG*

	M/*B*	*t*	*β*	*t*	*Ln*(*ME*)	*t*	*Ln*(*PRet*)	*t*
TAG								
1 (low)	–0.025	–1.92	0.108	0.96	–0.151	–3.33	0.035	0.22
2	–0.062	–2.31	0.089	0.75	–0.076	–2.25	0.045	0.33
3 (high)	–0.062	–2.49	–0.078	–0.71	–0.013	–0.34	0.316	2.68
*TAG*2								
1 (low)	–0.010	–0.68	0.154	1.45	–0.141	–3.11	–0.005	–0.03
2	–0.062	–1.91	0.043	0.36	–0.078	–2.46	–0.003	–0.02
3 (high)	–0.069	–2.72	–0.056	–0.48	–0.019	–0.48	0.269	2.09

Panel B. Return regression with *TAG* across terciles by *M*/*B*

	TAG	*t*	*TAG*2	*t*	*β*	*t*	*Ln*(*ME*)	*t*	*Ln*(*PRet*)	*t*
M/*B*										
1 (low)	–0.546	–4.36			0.099	0.98	–0.139	–3.22	0.266	1.66
2	–0.541	–6.04			0.134	1.14	–0.084	–2.08	0.009	0.07
3 (high)	–0.474	–5.10			–0.077	–0.70	–0.030	–0.68	0.101	0.78
M/*B*										
1 (low)			–0.271	–3.95	0.111	1.09	–0.139	–3.23	0.233	1.45
2			–0.206	–4.28	0.138	1.18	–0.083	–2.05	–0.025	–0.20
3 (high)			–0.225	–5.11	–0.056	–0.51	–0.028	–0.65	0.058	0.44

Table 5
Ex-ante consistency between total asset growth expectations and growth anomalies in portfolios

Panel A reports subsequent abnormal returns on five by five portfolios independently sorted by total asset growth (*TAG*) at the end of fiscal year *t* and ex-ante consistency between total asset growth expectations (*Consistency*) at the end of June of calendar year *t*+1. Panel B reports abnormal returns on portfolios independently sorted by the market-to-book equity ratio (*M*/*B*) at the end of fiscal year *t* and *Consistency* at the end of June of calendar year *t*+1. Portfolios are sorted at the end of June of each calendar year *t*+1 and the holding period is from July of calendar year *t*+1 to June of calendar year *t*+2. Abnormal return on a portfolio is the estimated intercept of the monthly time series regression

$$Ret_{p,t} - R_{ft} = \alpha_p + \beta_{p,MKT}MKT_t + \beta_{p,SMB}SMB_t + \beta_{p,HML}HML_t + \beta_{p,MOM}MOM_t + \beta_{p,CMA}CMA_t + \epsilon_{p,t},$$

where Ret_p is the monthly return on a portfolio while R_f is the risk free rate. *MKT* is the market factor, *SMB* is the size factor, *HML* is the value factor, *MOM* is the momentum factor, and *CMA* is the investment factor. *CMA* is omitted if sorting involves *TAG*. *HML* is omitted if sorting involves *M*/*B*. (1–5) is the difference in alpha between low (1) and high (5) growth or *Consistency* quintiles. Time series *t*-statistics based on the Newey and West (1987) robust standard errors with autocorrelations up to 12 lags are shown in brackets. The sample covers fiscal years 1972 to 2014 and monthly returns from July 1973 to December 2015.

Panel A. *TAG* portfolio alphas across *Consistency*

Growth			*Consistency*				
TAG	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.34	0.41	0.39	0.29	0.12	0.22	[1.02]
2	0.54	0.41	0.20	0.18	0.25	0.29	[1.61]
3	–0.11	0.11	0.31	0.16	0.25	–0.36	[–2.04]
4	–0.66	0.04	0.15	0.15	0.20	–0.85	[–3.06]
5 (high)	–1.26	–0.49	–0.34	–0.31	0.04	–1.30	[–4.99]
(1–5)	1.60	0.90	0.72	0.60	0.08	–1.52	
	[5.89]	[4.91]	[6.12]	[3.00]	[0.34]	[–3.83]	

Panel B. *M*/*B* portfolio alphas across *Consistency*

Growth			*Consistency*				
M/*B*	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.05	0.37	0.43	0.29	0.34	–0.29	[–1.55]
2	–0.05	0.24	0.24	0.14	0.24	–0.30	[–1.60]
3	–0.26	0.20	0.21	0.18	0.18	–0.44	[–2.88]
4	–0.29	0.11	0.06	0.19	0.21	–0.50	[–2.75]
5 (high)	–0.73	–0.37	–0.12	–0.08	0.08	–0.80	[–3.48]
(1–5)	0.77	0.75	0.55	0.37	0.26	–0.51	
	[3.60]	[3.43]	[2.79]	[1.74]	[1.41]	[–2.18]	

Table 6
Ex-ante consistency between total asset growth expectations and growth anomalies in cross sectional regressions

This table reports the slope estimates of the Fama and MacBeth (1973) regression

$$R_{i,t+1} = a + \gamma_1 Growth_{i,t} + c_1 \beta_{i.t} + c_2 Ln(ME_{i.t}) + c_3 Ln(PRet_{i.t}) + \varepsilon_{i,t+1},$$

where R_{t+1} is monthly stock return from July of calendar year *t*+1 to June of calendar year *t*+2. *Growth* is total asset growth (*TAG*) or the market-to-book equity ratio (*M*/*B*) at the end of fiscal year *t*. Control variables are the CAPM beta (β), logarithm of market capitalization (*ME*), and logarithm of gross stock return for the previous year ending May of calendar year *t*+1 (*PRet*). The cross sectional regression is estimated separately from each of the quintiles sorted by ex-ante consistency between total asset growth expectations (*Consistency*) at the end of June of calendar year *t*+1. (1–5) is the difference in the slope estimate between low (1) and high (5) *Consistency* quintiles. Time series *t*-statistics (*t*) are computed with the Newey and West (1987) robust standard errors with autocorrelations up to 12 lags.

Panel A. *Growth* is total asset growth

Consistency	*TAG*	*t*	*β*	*t*	*Ln*(*ME*)	*t*	*Ln*(*PRet*)	*t*
1 (low)	–1.240	–4.22	0.012	0.09	–0.037	–0.69	0.523	2.74
2	–0.987	–6.89	–0.079	–0.73	–0.099	–2.30	0.172	1.36
3	–0.579	–4.95	0.089	0.73	–0.099	–2.71	0.097	0.63
4	–0.659	–3.72	0.034	0.29	–0.097	–2.63	–0.042	–0.29
5 (high)	–0.004	–0.02	0.046	0.39	–0.109	–2.60	–0.111	–0.71
(1–5)	–1.236	–3.36	–0.034	–0.36	0.072	1.52	0.635	2.85

Panel B. *Growth* is the market-to-book equity ratio

Consistency	*M*/*B*	*t*	*β*	*t*	*Ln*(*ME*)	*t*	*Ln*(*PRet*)	*t*
1 (low)	–0.152	–3.17	0.039	0.30	–0.022	–0.42	0.751	4.01
2	–0.111	–4.02	–0.088	–0.80	–0.089	–2.15	0.293	2.22
3	–0.046	–1.97	0.076	0.64	–0.097	–2.65	0.133	0.85
4	–0.054	–2.06	0.021	0.18	–0.097	–2.55	–0.110	–0.75
5 (high)	–0.049	–1.60	0.057	0.51	–0.101	–2.36	–0.115	–0.71
(1–5)	–0.103	–3.00	–0.017	–0.18	0.079	1.60	0.867	3.93

Table 7
Ex-ante consistency between total asset growth expectations and the market-to-book anomaly: risk characteristics

Panel A reports median risk characteristics of quintile portfolios sorted by the market-to-book equity ratio (*M*/*B*) at the end of fiscal year *t*. The firm level risk characteristics are the followings. *O-score* is the Ohlson (1980) O-score for predicting bankruptcy, multiplied by 100. *OL* is operating leverage. *Duration* is ex post cash flow duration. (1–5) is the difference in characteristic between low (1) and high (5) *M*/*B* quintiles. Time series *t*-statistics based on the Newey and West (1987) robust standard errors with autocorrelations up to 12 lags are shown in brackets. Panel B reports median risk characteristics of five by five portfolios independently sorted by ex-ante consistency between total asset growth expectations (*Consistency*) at the end of June of calendar year *t*+1 and the market-to-book equity ratio (*M*/*B*) at the end of fiscal year *t*. The sample covers fiscal years 1972 to 2014.

Panel A. Risk characteristics across *M*/*B*

M/*B*	*O-score*	*OL*	*Duration*
1 (low)	0.213	1.973	4.785
2	0.128	1.662	4.748
3	0.099	1.563	4.785
4	0.074	1.415	4.871
5 (high)	0.082	1.194	4.930
(1–5)	0.132	0.779	–0.145
	[5.15]	[13.97]	[–1.67]

Continued – Table 7

Panel B. Risk characteristics across *Consistency* and *M*/*B*

Consistency	*M*/*B*	*O-score*	*OL*	*Duration*
1 (low)	1 (low)	0.358	2.032	5.350
	2	0.291	2.002	4.822
	3	0.301	1.660	4.978
	4	0.373	1.500	4.986
	5 (high)	1.175	1.150	4.737
	(1–5)	–0.817	0.882	0.613
		[–4.06]	[2.52]	[3.18]
2	1 (low)	0.178	1.764	4.913
	2	0.132	1.737	4.761
	3	0.113	1.639	4.848
	4	0.097	1.498	4.791
	5 (high)	0.221	1.102	4.844
	(1–5)	–0.043	0.662	0.069
		[–1.01]	[6.87]	[1.40]
3	1 (low)	0.174	1.708	4.875
	2	0.119	1.552	4.793
	3	0.096	1.460	4.748
	4	0.074	1.343	4.947
	5 (high)	0.077	1.135	4.952
	(1–5)	0.097	0.574	–0.076
		[4.76]	[6.61]	[–0.64]
4	1 (low)	0.220	2.080	4.677
	2	0.126	1.670	4.763
	3	0.096	1.573	4.790
	4	0.071	1.433	4.863
	5 (high)	0.068	1.200	4.961
	(1–5)	0.153	0.879	–0.284
		[6.50]	[18.64]	[–2.73]
5 (high)	1 (low)	0.246	2.280	4.743
	2	0.125	1.762	4.712
	3	0.091	1.614	4.790
	4	0.059	1.476	4.894
	5 (high)	0.060	1.284	4.942
	(1–5)	0.186	0.996	–0.199
		[5.78]	[9.69]	[–1.93]

Table 8
Ex-ante consistency between total asset growth expectations and the market-to-book anomaly: the role of gross profitability

Panel A reports subsequent abnormal returns on five by five portfolios independently sorted by the market-to-book equity ratio (*M*/*B*) and the gross-profit-to-assets ratio (GP/A) at the end of fiscal year t. Portfolios are sorted at the end of June of each calendar year *t*+1 and the holding period is from July of calendar year *t*+1 to June of calendar year *t*+2. Abnormal return on a portfolio is the estimated intercept of the monthly time series regression

$$Ret_{p,t} - R_{ft} = \alpha_p + \beta_{p,MKT}MKT_t + \beta_{p,SMB}SMB_t + \beta_{p,MOM}MOM_t + \beta_{p,CMA}CMA_t + \epsilon_{p,t},$$

where Ret_p is the monthly return on a portfolio while R_f is the risk free rate. *MKT* is the market factor, *SMB* is the size factor, *MOM* is the momentum factor, and *CMA* is the investment factor. Panel B reports abnormal returns on five by five portfolios independently sorted by *M*/*B* and *Consistency* using *GP*/*A* as the only instrument. Panel C reports abnormal returns on five by five portfolios independently sorted by *M*/*B* and *Consistency* augmented by *GP*/*A* as an additional instrument. (1–5) is the difference in alpha between low (1) and high (5) M/B, GP/A, or *Consistency* quintiles. Time series *t*-statistics based on the Newey and West (1987) robust standard errors with autocorrelations up to 12 lags are shown in brackets. The sample covers fiscal years 1972 to 2014 and monthly returns from July 1973 to December 2015.

Panel A. *M*/*B* and *GP*/*A* portfolio alphas

			GP/*A*				
M/*B*	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.14	0.25	0.49	0.43	0.66	–0.52	[–2.82]
2	–0.05	0.03	0.35	0.41	0.55	–0.60	[–3.39]
3	–0.22	–0.08	0.20	0.33	0.50	–0.72	[–4.73]
4	–0.21	–0.17	0.02	0.37	0.43	–0.64	[–3.40]
5 (high)	–0.72	–0.40	–0.26	–0.08	0.15	–0.87	[–4.33]
(1–5)	0.86	0.65	0.75	0.50	0.51		
	[4.19]	[3.57]	[3.89]	[2.44]	[2.18]		

Panel B. *M*/*B* portfolio alphas across *Consistency* using *GP*/*A* as the only instrument

			Consistency				
M/*B*	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.53	0.37	0.40	0.28	0.25	0.28	[1.83]
2	0.20	0.20	0.24	0.17	0.22	–0.02	[–0.18]
3	0.30	0.16	0.22	0.12	0.16	0.14	[1.00]
4	0.14	0.17	0.04	0.16	0.24	–0.10	[–0.90]
5 (high)	–0.14	–0.23	–0.14	–0.07	0.02	–0.16	[–1.22]
(1–5)	0.67	0.60	0.54	0.34	0.22	–0.45	
	[2.80]	[3.36]	[2.92]	[1.69]	[1.16]	[–1.98]	

Panel C. *M*/*B* portfolio alphas across *Consistency* augmented by *GP*/*A* as an additional instrument

			Consistency				
M/*B*	1 (low)	2	3	4	5 (high)	(1–5)	
1 (low)	0.09	0.42	0.43	0.29	0.35	–0.25	[–1.45]
2	–0.05	0.30	0.21	0.17	0.24	–0.29	[–1.59]
3	–0.34	0.21	0.25	0.20	0.19	–0.53	[–3.36]
4	–0.30	0.08	0.09	0.19	0.23	–0.53	[–2.98]
5 (high)	–0.84	–0.33	–0.13	–0.03	0.08	–0.92	[–4.66]
(1–5)	0.93	0.74	0.57	0.33	0.27	–0.66	
	[3.66]	[3.45]	[3.64]	[1.58]	[1.48]	[–2.75]	

Table 9

Ex-ante consistency between total asset growth expectations and the market-to-book anomaly: the effect of limits of arbitrage

Panel A reports subsequent abnormal returns on three by three portfolios independently sorted by the market-to-book equity ratio (M/B) at the end of fiscal year *t* and limits to arbitrage (LTA) at the end of June of calendar year *t*+1. Portfolios are sorted at the end of June of each calendar year *t*+1 and the holding period is from July of calendar year *t*+1 to June of calendar year *t*+2. Abnormal return on a portfolio is the estimated intercept of the monthly time series regression

$$Ret_{p,t} - R_{ft} = \alpha_p + \beta_{p,MKT}MKT_t + \beta_{p,SMB}SMB_t + \beta_{p,MOM}MOM_t + \beta_{p,CMA}CMA_t + \epsilon_{p,t},$$

where Ret_p is the monthly return on a portfolio while R_f is the risk free rate. *MKT* is the market factor, *SMB* is the size factor, *MOM* is the momentum factor, and *CMA* is the investment factor. Panel B reports abnormal returns on three by three by three portfolios independently sorted by *LTA*, *M*/*B* and *Consistency* augmented by *GP*/*A* as an additional instrument. (1–3) is the difference in alpha between low (1) and high (3) *M*/*B* or *Consistency* quintiles. Time series *t*-statistics based on the Newey and West (1987) robust standard errors with autocorrelations up to 12 lags are shown in brackets. The sample covers fiscal years 1972 to 2014 and monthly returns from July 1973 to December 2015.

Panel A. *M*/*B* portfolio alphas across *LTA*

		LTA			
M/*B*	1 (low)	2	3 (high)	(1–3)	
1 (low)	0.17	0.25	0.37	–0.19	[–0.96]
2	0.23	0.19	0.15	0.08	[0.68]
3 (high)	0.22	–0.02	–0.27	0.49	[3.65]
(1–3)	–0.05	0.27	0.64	–0.69	
	[–0.43]	[1.75]	[3.61]	[–4.79]	

Panel B. *Consistency* and *M*/*B* portfolio alphas across *LTA*

			Consistency			
LTA	*M*/*B*	1 (low)	2	3 (high)	(1–3)	
1 (low)	1 (low)	0.26	0.18	0.13	0.13	[1.94]
	2	0.20	0.23	0.24	–0.04	[–0.47]
	3 (high)	0.19	0.15	0.31	–0.12	[–1.22]
	(1–3)	0.07	0.03	–0.19	–0.25	
		[0.43]	[0.33]	[–1.39]	[–2.22]	
2 (medium)	1 (low)	0.23	0.36	0.13	0.10	[0.83]
	2	0.14	0.26	0.11	0.03	[0.25]
	3 (high)	–0.23	–0.02	0.08	–0.31	[–2.31]
	(1–3)	0.46	0.38	0.06	0.41	
		[2.33]	[2.23]	[0.34]	[2.36]	
3 (high)	1 (low)	0.35	0.38	0.36	–0.02	[–0.12]
	2	0.02	0.15	0.19	–0.17	[–1.48]
	3 (high)	–0.72	–0.29	–0.05	–0.67	[–3.76]
	(1–3)	1.07	0.67	0.41	0.66	
		[4.50]	[3.25]	[2.10]	[2.92]	