Growth, Profitability and Equity Value

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Abstract

When conducting valuation analysis, practitioners and researchers typically predict growth and profitability separately, implicitly assuming that these two value drivers are uncorrelated. However, due to economic and accounting effects, profitability shocks increase both growth and subsequent profitability, resulting in a strong positive correlation between growth and subsequent profitability. This correlation increases the expected value of future earnings and thus contributes to equity value. We show that the value effect of the growth-profitability covariance on average explains more than 10% of equity value, and its magnitude varies substantially with firm size (-), volatility (+), profitability (-), and expected growth (+). The covariance value effect is driven by both operating and financing activities, but large effects are due primarily to operating shocks. One implication of our findings is that conducting scenario analysis or using other methods that incorporate the growth-profitability correlation (e.g., Monte Carlo simulations, decision trees) is particularly important when valuing small, high volatility, low profitability, or high growth companies. In contrast, for mature, high profitability companies, covariance effects are typically small and their omission is not likely to significantly bias value estimates.

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1. Introduction

In a typical fundamental valuation, one predicts the expected values of growth and profitability measures, derives the implied earnings or cash flow series, and discounts the flow series to obtain an estimate of intrinsic value. For example, expected earnings can be calculated as the product of current sales, one plus the expected rate of sales growth, and the expected margin. Alternatively, expected earnings can be measured as the product of total assets, one plus the expected rate of asset growth, and the expected return on assets. These calculations implicitly assume that growth and profitability are uncorrelated. However, in most cases growth is positively related to subsequent profitability, implying that value estimates that ignore this correlation understate equity value.[1] This study evaluates the impact of the covariance between growth and subsequent profitability on equity value and identifies the circumstances under which this effect is particularly large.

Expected earnings in any given future year are equal to the expected value of the product of book value at the beginning of that year and the profitability rate for the year. Because the

[1] Several studies have documented a *negative* correlation between future profitability and current growth after controlling for current profitability (e.g., Fairfield et al. 2003, Fama and French 2006). However, the unconditional correlation between future profitability and growth (i.e., without controlling for current profitability)—on which we focus—is strongly and consistently positive. In addition, Li (2014) shows that although the conditional correlation between future profitability and growth was negative in the 60s, 70s and 80s, that correlation changed sign during the last twenty years. The negative conditional correlation between growth and subsequent profitability has been attributed to (1) diminishing marginal returns to capital, or the tendency of incremental investments to earn lower profitability than exiting investments (Fairfield et al. 2003a, 2003b, Zhang 2007, Wu et al. 2010); (2) conservative accounting biases that accelerate expensing of investments and delay the recognition of revenue, leading to a negative correlation between investments and short-term profitability (Penman and Zhang 2002, Fairfield et al. 2003a, 2003b, Richardson et al. 2006); (3) earnings management activities, including accruals overstatement and excess capitalization of expenditures, which increase book value and reduce future earnings (e.g., Sloan 1996, Barton and Simko 2002, Hirshleifer et al. 2004); and (4) overinvestment, or investments in negative present value projects (e.g., Jensen 1986, Titman et al. 2004). Li (2014) attributes the change in the conditional correlation between growth and subsequent profitability in the 90s and 00s to economic changes in business (e.g., Donelson et al. 2011), the shift in accounting principles toward a balance sheet focus (e.g., Dichev and Tang 2008), changes in firm characteristics (e.g., Collins et al. 1997), and the increased importance of real options (e.g., Burgstahler and Dichev 1997).

expected value of a product of two random variables is equal to the product of the expected values of the two variables plus the covariance between them, i.e.,

$$E[X \times Y] = E[X] \times E[Y] + Cov[X, Y],$$

a positive covariance between growth in book value and subsequent profitability implies that the expected value of future earnings is larger than the product of the expected values of future beginning book value and future profitability. In other words, future profitability is likely to be particularly high when the book value on which it is earned is relatively large, resulting in high expected earnings.

The positive correlation between growth and subsequent profitability reflects an indirect relationship: a positive profitability shock increases both growth and subsequent profitability, resulting in a strong correlation between growth and subsequent profitability. The strong auto-correlation in profitability is well-documented (e.g., Freeman et al. 1982, Penman 1991, Fama and French 2000, Nissim and Penman 2001). It is due to both economics and accounting effect. Economically, existing projects generate earnings over multiple years, so a positive earnings shock in one year implies higher earnings in future years. The realization (accounting) principle strengthens the earnings auto-correlation as it requires that profits be recognized when realized and earned rather than immediately at the time of a positive economic shock.

To understand how profitability affects growth, consider a positive profitability shock. Because profitable companies typically reinvest much of their earnings, a positive profitability shock implies unexpected book value growth (additional retained earnings). Moreover, a positive profitability shock is likely to increase investments both by reducing the cost of capital and by increasing the perceived profitability of new investments, triggering the exercise of real options to expand existing projects or initiate new ones (e.g. Berk et al. 1999, Kogan and Papanikolaou 2012).

An increase in profitability reduces the cost of capital by increasing the availability of internal funds and decreasing the cost of obtaining external funds. Internal funds are cheaper than external funds because market frictions, such as transaction costs, taxes, and asymmetric information, which increase the cost of external funds, generally do not apply to internal funds. Profitable firms have better access to capital markets, obtain more operating credit, and pay less for capital infusions and operating credit. Thus, a positive profitability shock lowers the hurdle rates that companies use in making investment decisions, thereby leading to additional investments. High profitability makes options to expand more attractive also because it implies that investments are likely to generate higher profits than previously expected (e.g., Zhang 2000, Biddle at al. 2001, Chen and Zhang 2007). In other words, a positive profitability shock increases the demand for investment and the supply of funds, both boosting investments.

Similarly, a negative profitability shock reduces book value growth. When profitability is low, options to delay (e.g. McDonald and Siegel 1986, Quigg 1993) or abandon projects (e.g. Berger et al. 1996, Burgstahler and Dichev 1997, Barth et al. 1998) become especially valuable and are more likely to be exercised, leading to a reduction in investment. Thus, the exercise of real options, either to invest or disinvest, results in a positive correlation between profitability and book value growth.

We estimate the impact of the covariance between equity growth and subsequent ROE on equity value and find that on average—across all firm-year observations—it accounts for more than 10% of equity value. This effect is particularly large for small, low profitability, high volatility, or high growth firms. For example, the covariance effect accounts for more than 30 percent of equity value for firms at the bottom size quintile, implying that valuation models that omit the covariance effect significantly understate equity value for small firms.

We explain these findings as follows. All else equal, the magnitude of the covariance value effect is increasing in the long-term volatility of profitability and growth, in the correlation between profitability and growth, and in the auto-correlation in profitability. Small or low profitability firms have a relatively high potential for large positive growth or profitability shocks, which implies a large covariance value effect.[2] Firms with high past volatility have a high potential for large profitability or growth shocks (e.g., Grullon et al. 2012) and should therefore have a large covariance value effect. Growth firms should have a relatively large covariance value effect because they are more exposed to shocks and are more likely to invest following a positive profitability shock (Koller et al. 2005, Kogan and Papanikolaou 2012).

We also estimate the covariance value effect using an operations-based model. We find that while the operations-driven covariance value effect is significantly smaller than the equity-driven (overall) covariance value effect, it is highly significant and on average accounts for more than 5% of equity value. Moreover, the operations-driven covariance value effect is particularly large when the overall covariance value effect is large. These results can be explained as follows. Positive profitability shocks increase net operating assets and reduce net debt, and both effects contribute to equity growth. The operations-driven covariance value effect reflects only the first effect, while the overall covariance value effect reflects both effects. For example, an unexpected increase in operating profits that reduces net debt rather than being invested in operations will result in equity growth but not operating asset growth.

One implication of our results is that when valuing small, low profitability, high volatility, or high growth companies, it is important to consider alternative scenarios—primarily related to

[2] Compared to other companies, large or high profitability firms may have greater exposure to negative shocks to growth or profitability. However, the covariance value effect of negative shocks is small. When faced with negative profitability shocks, firms often exercise options to abandon or adapt existing projects, reducing the auto-correlation in profitability (e.g., Hayn 1995, Burgstahler and Dichev 1997, Barth et al. 1998).

operating activities (e.g., Koller et al. 2005)—or to otherwise adjust the valuation model to incorporate covariance effects (e.g., using Monte Carlo simulations or decision tress; e.g., Viebig et al. 2009). In contrast, when valuing large profitable companies, failure to account for covariance effects is not likely to significantly bias the valuation.

The paper proceeds as follows. Section 2 demonstrates how the covariance between growth and subsequent profitability affects equity value. Section 3 develops a methodology for estimating the magnitude of the covariance value effect. Section 4 contains the empirical analysis, and Section 5 concludes. Appendix A describes the variables used to predict profitability and growth, and explains the reasons for their inclusion in the model.

2. The covariance value effect

2.1 The relation between equity value, growth and profitability

We start with a generalization of the dividend discount model, which expresses the intrinsic value of equity (***EV***) as the present value of expected net flows to equity holders (Net Equity Flow or ***NEF***):

$$EV_0 = \frac{E[NEF_1]}{1+r_e} + \frac{E[NEF_2]}{(1+r_e)^2} + \cdots = \sum_{t=1}^{\infty} E[NEF_t] \times (1+r_e)^{-t} \tag{1}$$

where $\boldsymbol{r_e}$ is the cost of equity capital and *NEF* (dividends, net share repurchases, and the fair value of other distributions) is assumed to be paid at the end of each year. Using basic accounting relations, Equation (1) can be restated in terms of comprehensive income (***CI***) and the book value of equity (***E***):[3]

[3] See Ohlson (1995).

$$EV_0 = E_0 + \sum_{t=1}^{\infty} E[CI_t - r_e \times E_{t-1}] \times (1 + r_e)^{-t} \quad (2)$$

As shown, intrinsic equity value (*EV*) is equal to the sum of book value (*CE*) and the present value of expected residual income in all future years, where residual income is earnings (*CI*) in excess of the return required by investors given the amount (*E*) and cost (r_e) of equity capital, $CI_t - r_e \times E_{t-1}$.

We next define Return On Equity (***ROE***) as the ratio of comprehensive income to beginning-of-period equity (i.e., $ROE_t = CI_t / E_{t-1}$), and Cumulative Equity Growth (***CEG_{t-1}***) as one plus the cumulative growth rate in equity from time zero through the beginning of future year *t* (i.e., $CEG_{t-1} = E_{t-1} / E_0$). Substituting into Equation (2), we get

$$EV_0 = E_0 \times \left(1 + \sum_{t=1}^{\infty} E[(ROE_t - r_e) \times CEG_{t-1}] \times (1 + r_e)^{-t}\right) \quad (3)$$

As shown, intrinsic equity value (*EV*) depends on current book value (E_0), the cost of equity capital (r_e), and expectations regarding a function of profitability (*ROE*) and cumulative equity growth (*CEG*) in all future years. Importantly, the expected value term increases in the covariance between profitability and growth because

$$E[ROE_t \times CEG_{t-1}] = E[ROE_t] \times E[CEG_{t-1}] + Cov[ROE_t, CEG_{t-1}] \quad (4)$$

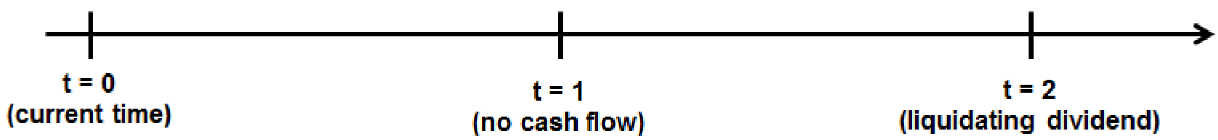
Substituting Equation (4) into Equation (3) and rearranging terms, we get

$$\begin{aligned} EV_0 = E_0 \times \Bigg(1 &+ \sum_{t=1}^{\infty} E[ROE_t - r_e] \times E[CEG_{t-1}] \times (1 + r_e)^{-t} \\ &+ \sum_{t=2}^{\infty} Cov[ROE_t, CEG_{t-1}] \times (1 + r_e)^{-t}\Bigg) \end{aligned} \quad (5)$$

Where the summation over the covariance terms starts in t=2 because CEG_0 is known at time zero.[4] If, as discussed earlier, ROE_t and CEG_{t-1} are positively correlated due to their mutual correlation with ROE_{t-1}, equity value is higher than implied by the expected values of ROE_t and CEG_{t-1}. We next provide a simple numerical example to demonstrate the covariance value effect and how it relates to the correlations between profitability, growth, and subsequent profitability.

2.2 Example: Impact of the covariance between growth and profitability on equity value

To demonstrate the impact of the covariance between growth (CEG_{t-1}) and subsequent profitability (ROE_t) consider the following example. At time t = 0 (current time), a firm is expected to exist for two periods (i.e. until t = 2), and pay no dividend until its liquidation at t = 2.



Book value of equity at time t = 0 (E_0) is \$100. The cost of equity capital is 0%. ROE_1 and ROE_2 have the same unconditional distribution: 0 with 50% probability and 0.2 with 50% probability. Because the firm pays no dividend in period 1, growth in equity in period 1 is equal to ROE_1, i.e., there is a perfect correlation between profitability and growth. We will analyze two cases regarding the auto-correlation of profitability: (a) no correlation between ROE_1 and ROE_2, and (b) perfect correlation between ROE_1 and ROE_2.

First note that under both cases, $E_0[ROE_1] = E_0[ROE_2] = 0\times50\% + 0.2\times50\% = 10\%$, and $EV_0 = E_0[D_2]$ (D_2 = dividend at time 2). However, as we demonstrate below, $E_0[D_2]$ and therefore EV_0 are different under the two cases. This follows because

[4] Equation (5) assumes that r_e is non-stochastic. We discuss the implications of this assumption in Section 5.

$$D_2 = E_0 \times (1 + ROE_1) \times (1 + ROE_2)$$

$$= E_0 \times (1 + ROE_1 + ROE_2 + ROE_1 \times ROE_2)$$

and so

$$EV_0 = E_0[D_2]$$

$$= E_0[E_0 \times (1 + ROE_1 + ROE_2 + ROE_1 \times ROE_2)]$$

$$= 100 \times (1 + E_0[ROE_1] + E_0[ROE_2] + E_0[ROE_1 \times ROE_2])$$

$$= 100 \times (1 + 0.1 + 0.1 + E_0[ROE_1] \times E_0[ROE_2] + Cov_0[ROE_1 , ROE_2])$$

$$= 100 \times (1.2 + 0.1 \times 0.1 + Cov_0[ROE_1 , ROE_2])$$

$$= 121 + 100 \times Cov_0[ROE_1 , ROE_2].$$

Therefore, if ROE_1 and ROE_2 are uncorrelated (case (a)), then $EV_0 = 121$. But if ROE_1 and ROE_2 are perfectly correlated (case (b)), we get

$$EV_0 = 121 + 100 \times Cov_0[ROE_1 , ROE_2]$$

$$= 121 + 100 \times [0.5 \times (0.2 - 0.1)^2 + 0.5 \times (0 - 0.1)^2]$$

$$= 121 + 100 \times [2 \times 0.5 \times 0.01] = 122.$$

As shown, the positive auto-correlation in *ROE* increases equity value. This follows because high ROE_1 both (1) increases the book value on which ROE_2 is earned (E_1), and (2) implies high ROE_2. If *ROE* is not auto-correlated (case (a)), or if ROE_1 is unrelated to equity growth in year 1, the covariance between growth and subsequent profitability will be zero and expected future flows (and hence equity value) will be determined by the expected values of profitability and growth (i.e., zero covariance value effect). To demonstrate the requirement of a positive correlation between ROE_1 and equity growth in year 1, note that if the firm follows a full payout policy, i.e., if $D_1 = CE_0 \times ROE_1$ and $D_2 = CE_0 \times (1 + ROE_2)$, then $EV_0 = E_0[D_1] + E_0[D_2] = 100 \times 0.1 + 100 \times (1 + 0.1) = 120$, independent of the auto-correlation of *ROE*.

3. Methodology for estimating the value impact of the growth-profitability covariance

The stylized example above demonstrates that the covariance between growth and subsequent profitability affects equity value. But how big is this effect? The example suggests that the effect is small—less than 1%—but this is due to the two-year horizon. As we demonstrate below, the value impact of the growth-profitability covariance increases with the horizon. Still, ROE is not perfectly auto-correlated and firms pay out a portion of their earnings, both reducing the value effect of the growth-profitability covariance. In this section we develop a methodology for estimating the magnitude of the growth-profitability covariance and its value effect.

Using the market value of equity (***MVE_0***) as a proxy for intrinsic equity value (EV_0), we can estimate the proportion of equity value attributable to the covariance between growth and subsequent profitability (***$CovEffect_{equity}$***) using the following expression:

$$CovEffect_{equity} = \frac{CE_0}{MVE_0} \times \sum_{t=2}^{\infty} Cov[ROE_t, CEG_{t-1}] \times (1 + r_e)^{-t}. \tag{6}$$

Where the summation term measures the covariance value effect per dollar of book value, as derived in Equation (5). Thus, to calculate the covariance value effect, we need to measure all future covariances. Because we cannot estimate an infinite series of covariances, we examine the time pattern of the covariance terms and set the horizon to cover all statistically significant future covariance terms.

As discussed earlier, the covariance between growth and subsequent profitability is likely driven by both operating and financing effects. To evaluate the contributions of the two types of activities, we also examine operations-related covariances. Based on Feltham and Ohlson (1995) and using similar substitutions as those described above for equity, we derive the following equation:

$$NOAV_0 = NOA_0 \times \left(1 + \sum_{t=1}^{\infty} E[RNOA_t - r_o] \times E[CNOAG_{t-1}] \times (1 + r_o)^{-t} + \sum_{t=2}^{\infty} Cov[RNOA_t, CNOAG_{t-1}] \times (1 + r_o)^{-t}\right) \quad (7)$$

Where ***NOA*** is Net Operating Assets (operating assets minus operating liabilities), ***NOAV*** is the intrinsic value of net operating assets, ***RNOA*** is Return on Net Operating Assets (defined below), ***$CNOAG_{t-1}$*** is one plus the cumulative growth rate in net operating assets from time zero through the beginning of future year *t* (i.e., $CNOAG_{t-1} = NOA_{t-1} / NOA_0$), and $\boldsymbol{r_o}$ is the discount rate for after-tax operating profit. We then estimate the proportion of equity value due to the covariance between operating growth and operating profitability (***$CovEffect_{oper}$***) using the following equation:

$$CovEffect_{oper} = \frac{NOA_0}{MVE_0} \times \sum_{t=2}^{\infty} Cov[RNOA_t, CNOAG_{t-1}] \times (1 + r_o)^{-t} \quad (8)$$

The difference between the overall covariance value effect on equity value ($CovEffect_{equity}$, defined in Equation (6)) and the effect of operating activities ($CovEffect_{oper}$, defined in Equation (8)) reflects the effect of financing activities, including the impact of market frictions and any indirect impact of operating shocks on financing activities. A positive profitability shock reduces the effects of market frictions on the cost of capital by reducing the need to obtain external funds, which involve asymmetric information, transaction and tax costs. A positive shock to operations is also likely to reduce the cost of debt (interest expense), further contributing to the increase in *ROE*. This benefit is reflected in $CovEffect_{equity}$ but not in $CovEffect_{oper}$.

To calculate the covariance-value effect variables ($CovEffect_{equity}$ and $CovEffect_{oper}$), we first need to estimate the covariance terms. The covariance between any two variables is the expected value of the product of shocks to the two variables:

$$Cov[X,Y] = E[(X - E[X]) \times (Y - E[Y])] = E[x \times y].$$

Thus, to estimate the covariance between growth and subsequent profitability, we need to estimate the expected values of these variables to be able to measure shocks or differences from expected values. The product of growth and profitability differences for each firm-year observation is an unbiased estimate of the covariance, albeit a noisy one given that it is based on one observation. Yet by averaging the product terms across observations, measurement error can be significantly reduced. We report results where we average the product terms across all sample observations as well as within groups of companies that are likely to have a similar covariance between growth and subsequent profitability.

To estimate the expected values of growth and profitability for each future year *f*, we regress realized growth and profitability on relevant predictors, conducting the analysis both at the equity and operations level. Specifically, for each future year *f* = 1, …, *T* and each base year *t* = 1978, …, 2011-*f*, we regress the following models:

$$\begin{aligned} ROE_{t+f} &= \beta_0 + \beta_1 RecurringROE_t + \beta_2 TransitoryROE_t + \beta_3 \Delta_A RecurringROE_t \\ &+ \beta_4 \Delta_Q RecurringROE_t + \beta_5 BTM_t + \beta_6 Size_t + \beta_7 CostEquity_t \\ &+ \beta_8 \Delta_A Equity_t + \beta_9 \Delta_A NOA_t + \beta_{10} \Delta_A Sales_t + \epsilon_t \end{aligned} \tag{9}$$

$$\begin{aligned} CEG_{t+f} &= \beta_0 + \beta_1 RecurringROE_t + \beta_2 TransitoryROE_t + \beta_3 \Delta_A RecurringROE_t \\ &+ \beta_4 \Delta_Q RecurringROE_t + \beta_5 BTM_t + \beta_6 Size_t + \beta_7 CostEquity_t \\ &+ \beta_8 \Delta_A Equity_t + \beta_9 \Delta_A NOA_t + \beta_{10} \Delta_A Sales_t + \epsilon_t \end{aligned} \tag{10}$$

$$\begin{aligned} RNOA_{t+f} &= \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta_A RNOA_t + \beta_3 \Delta_Q RNOA_t + \beta_4 BTM\_NOA_t \\ &+ \beta_5 SizeNOA_t + \beta_6 WACC_t + \beta_7 \Delta_A NOA_t + \beta_8 \Delta_A Sales_t + \epsilon_t \end{aligned} \tag{11}$$

$$\begin{aligned} CNOAG_{t+f} &= \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta_A RNOA_t + \beta_3 \Delta_Q RNOA_t + \beta_4 BTM\_NOA_t \\ &+ \beta_5 SizeNOA_t + \beta_6 WACC_t + \beta_7 \Delta_A NOA_t + \beta_8 \Delta_A Sales_t + \epsilon_t \end{aligned} \tag{12}$$

Where

ROE	=	Return on Equity
CEG	=	Cumulative equity growth
RNOA	=	Return on net operating assets
CNOAG	=	Cumulative growth in net operating assets
Δ_A	=	Change in the adjacent variable compared to its level a year ago
Δ_Q	=	Change in the adjacent variable compared to its level a quarter ago
NOA	=	Net operating assets
BTM	=	Book-to-market ratio
BTM_NOA	=	Book-to-market ratio of net operating assets
Size	=	Log of market value of equity
SizeNOA	=	Log of the market value of net operating assets
CostEquity	=	Cost of equity capital
WACC	=	Weighted average cost of capital

The residuals from the four models serve as proxies for unexpected profitability and growth. We use the same predictors in each set of profitability and growth regressions (equity level – Equations (9) and (10), and operations level – Equations (11) and (12)), because profitability is the primary driver of growth and most predictors have implications for both profitability and growth (e.g., the book-to-market ratio reflects expectations regarding both growth and profitability). Appendix A explains the reasons for including the predictors of Equations (9) – (12).

4. Empirical Analysis

4.1 Sample and Data

The sample used in this study includes all observations that satisfy the following criteria: (1) accounting data are available from COMPUSTAT; (2) market data are available from CRSP for the 30 month period ending three months after the base year; (3) the base year is no earlier than 1978; (4) base year common equity and base year net operating assets are positive; (5) base year operating assets are at least 25 million USD in December 2011 prices; and (6) the firm is not a financial institution or a utility company (Global Industry Classification or GIC sector 40 or 55, respectively).

Financials and utilities are excluded because the impact of regulation in these industries may result in constraint on the behavior of profitability, and the distinction between operating and financing activities is not well-defined for financial firms.[5] Very small firms are omitted because the empirical distributions of their ratios are problematic. Base year common equity and base year net operating assets serve as the denominators of the cumulative growth measures and so are required to be positive. Pre-1978 observations are excluded because, according to Kothari et al. (1995) and Lakonishok et al. (1994), in 1978 COMPUSTAT had a major expansion of its annual database, from about 2,700 firms to about 6,000. The added firms were relatively small NASDAQ firms, and COMPUSTAT backed-filled up to 5 years of data. The requirement of stock return availability further mitigates back-filling biases.

We measure all variables as described in Section 3 using the most recently disseminated information as of April 15 each year. For most companies, this implies that we measure accounting variables using the previous year annual report. For non-December fiscal year companies, we measure accounting information using trailing four quarters data through the most recently reported quarter as of April 15. For post 1993 observations, we conservatively assume that financial information becomes available after the 10-Q/K filing date, which we obtain from SEC EDGAR.[6] For pre-1994 observations, and for post 1993 observations with unavailable filing dates,

[5] We merge the current and historical GIC classification files and fill up missing GICs by extrapolating from the closest available classification. For some companies that delisted prior to 1999, GIC classifications are not available. Because the sample period starts prior to 1999, omitting these firms would introduce survivorship bias. Therefore, we assign GIC to these companies based on an empirical mapping of SIC to GIC for firms with available classifications. This mapping is re-estimated each month (prior to 1999) to account for changes over time in SIC and GIC classifications. None of inferences of this study are affected by the inclusion of these companies.

[6] 10-Q / 10-K filing dates are available from Edgar for fiscal quarters ending after the third calendar quarter of 1993.

we estimate the availability date using the earnings announcement date (from COMPUSTAT) as follows: for fiscal quarters one through three, we assume that the filing occurs within 30 days after the earnings announcement date, while for the fourth fiscal quarter we assume that the filing occurs within 65 days after the earnings announcement date. We further assume that accounting information becomes available within 55 (100) days from quarter end for the first three (fourth) fiscal quarters, but no earlier than the earnings announcement date or the filing date (when available). These assumptions are based on a careful examination of the gaps between fiscal quarter end, earnings announcement date, and the 10-Q/K filing date over time. They are selected to assure that in at least 99 percent of cases, any error is on the conservative size. Moreover, in most cases financial information becomes available prior to the 10-Q/K filing date, either at the time of the earnings announcement or in 8-K filings (Lerman and Livnat 2010).

To mitigate the effects of outliers, we trim extreme values of all variables.[7] Table 1 presents summary statistics for the pooled time series cross-section distribution of the variables. As shown, *ROE* has a mean of 5 percent and a median of 10 percent. The difference between the mean and the median reflects the negative skewness of *ROE*, which is caused primarily by negative special items and other transitory items (e.g., Burgstahler et al. 2002). Indeed, *RecurringROE*, *ForecastedROE* (discussed in Section 4.6 below), and *RNOA*, which exclude special items, discontinued operations and extraordinary items, have more symmetric and less dispersed distributions. Because financial leverage magnifies the impact of operating shocks on reported

[7] Extreme values of the variables are identified using the following procedure. For each variable, we calculate the 5th and 95th percentiles of the empirical distribution (P5 and P95 respectively) and trim observations outside the following range: P5 – 2 × (P95 – P5) to P95 + 2 × (P95 – P5). For normally distributed variables, this range covers approximately 8.2 standard deviations from the mean in each direction (= 1.645 + 2 × (1.645 – (-1.645)), which is more than 99.9999% of the observations. For variables with relatively few outliers, the percentage of retained observations is also very high (often 100%). However, for poorly-behaved variables a relatively large proportion of the observations is deleted. Still, the overall loss of observations is much smaller than under the typical 1%-99% approach. Moreover, unlike the "traditional" 1%-99% range, which still retains some outliers, all extreme observations are removed.

profitability, the level of and change in *RNOA*, which excludes the impact of financial leverage, exhibit significantly lower variation than the corresponding *RecurringROE* statistics.

The mean values of *ROE* and *RNOA* are significantly smaller than the mean values of *CostEquity* and *WACC*, respectively, suggesting that average profitability is below the cost of capital. This is due in part to the negative skewness of reported profitability; the median values of the profitability and cost of capital measures are comparable. Still, both the mean and median values of the book-to-market ratios of equity and operations are significantly smaller than one. If on average firms do not generate a return above the cost of capital, why are investors paying more than book value? One possible explanation is that the covariance between growth and subsequent profitability increases the value of equity above the amount implied by average profitability. We next estimate and examine the covariance value effect.

4.2 Estimating shocks to profitability and growth

Table 2, Panels A through D, present summary statistics from cross-sectional regressions of Equations (9) through (12), respectively, for selected future years (f = 1, 3, 5, 10, 15). The estimated coefficients are generally consistent with expectations, and model fit as measured by R-squared is high, especially for the prediction of near-term profitability. Overall, model fit is higher for the operations model, suggesting that financing activities are less predictable than operating activities. As expected, the most significant explanatory variable for future profitability (ROE_{t+f} and $RNOA_{t+f}$) is current profitability ($RecurringROE_t$ and $RNOA_t$, respectively), and *TransitoryROE* has a much smaller coefficient than *RecurringROE*. Also consistent with expectations, profitability exhibits both mean-reversion and momentum (negative coefficients for the annual change in profitability but positive coefficients for the quarterly change), and the book-to-market ratio perform well in predicting future profitability. *Size* is positively related to subsequent profitability and, unlike other predictors, retains its high significance when predicting distant future years. The only variable that has consistently opposite sign to expectations is the cost of capital.

The coefficients in the growth regressions are also consistent with expectations, with the most significant variables being the book-to-market ratio and size (negative coefficients). Size performs particularly well in explaining long-term growth, reflecting the fact that it is very difficult for large companies to generate significant growth in the long-run. As expected, future growth is positively related to past growth, especially past sales growth. Similar to the profitability regressions, current profitability is highly significant in predicting short-term growth. However, unlike the profitability regressions, current profitability has insignificant effect on long-term growth. The R-squared statistics of the near-term growth regressions are substantially smaller than those of the corresponding profitability regressions, but unlike the latter they do not decline substantially over time. This is due to the cumulative nature of the dependent variable in the growth regressions. Indeed, most of the coefficients in the growth regressions increase over the horizon.

4.3 The covariance value effect

Having estimated shocks to profitability and cumulative growth (the residuals from regressions (9) through (12)), we next calculate for each firm/base year the product of the profitability shock in future year f and the shock to cumulative growth through year f-1, for f = 2, …, 16 or until the most distant future year available for that firm/base year. Each product term is an estimate of the realized covariance between growth and subsequent profitability for future year f:

$$Cov\left[ROE_f, CEG_{f-1}\right] \quad \text{and} \quad Cov\left[RNOA_f, CNOAG_{f-1}\right] \quad \text{for } f = 2, \ldots, 16$$

To calculate the value impact of these covariances (Equations (6) and (8)), we apply a discount factor to each such term, calculated using the corresponding cost of capital measure (*CostEquity* or r_e for the equity model and *WACC* or r_o for the operations model), as well as a market factor (*CE*/*MVE* for the equity model and *NOA*/*MVE* for the operations model):

$$Cov\left[ROE_f, CEG_{f-1}\right] \times (1 + r_e)^{-f} \times \frac{CE}{MVE} \quad \text{for } f = 2, \ldots, 16, \quad \text{and}$$

$$Cov\left[RNOA_f, CNOAG_{f-1}\right] \times (1 + r_o)^{-f} \times \frac{NOA}{MVE} \quad \text{for } f = 2, \ldots, 16$$

We then calculate the cross-sectional mean of each discounted covariance term (f = 2, …, 16) across all firms for each base-future year:

$$mean_{base\ year}\left(Cov\left[ROE_f, CEG_{f-1}\right] \times (1 + r_e)^{-f} \times \frac{CE}{MVE}\right) \quad \text{for } f = 2, \ldots, 16, \text{ and}$$

$$mean_{base\ year}\left(Cov\left[RNOA_f, CNOAG_{f-1}\right] \times (1 + r_o)^{-f} \times \frac{NOA}{MVE}\right) \quad \text{for } f = 2, \ldots, 16$$

Finally, for each future year we calculate the time-series means and standard deviations of the cross-sectional mean discounted covariance terms:

$$grand\ mean\left(Cov\left[ROE_f, CEG_{f-1}\right] \times (1 + r_e)^{-f} \times \frac{CE}{MVE}\right) \quad \text{for } f = 2, \ldots, 16,$$

$$grand\ mean\left(Cov\left[RNOA_f, CNOAG_{f-1}\right] \times (1 + r_o)^{-f} \times \frac{NOA}{MVE}\right) \quad \text{for } f = 2, \ldots, 16,$$

$$StdDev\left\{mean_{base\ year}\left(Cov\left[ROE_f, CEG_{f-1}\right] \times (1 + r_e)^{-f} \times \frac{CE}{MVE}\right)\right\} \quad \text{for } f = 2, \ldots, 16, \text{ and}$$

$$StdDev\left\{mean_{base\ year}\left(Cov\left[RNOA_f, CNOAG_{f-1}\right] \times (1 + r_o)^{-f} \times \frac{NOA}{MVE}\right)\right\} \quad \text{for } f = 2, \ldots, 16$$

Figure 1 presents the average (grand mean) discounted covariance terms for each future year f = 2, …, 16 along with a confidence interval, which is derived using the estimated time-series standard deviations. The y-axis measures the percentage of equity value attributable to the covariance between profitability in the future year f = 2, .., 16 (x-axis) and cumulative growth through the beginning of that year. The median line represents the average discounted covariance while the upper and lower lines capture the 95% confidence interval. The area under the median line is an estimate of the overall covariance effect. Panel A presents the value effect of the covariance between growth and shareholders' profitability, which reflects the impact of both operating and financing activities, while Panel B provides the value effect of the covariance between growth and operating profitability.

Each of the fifteen average discounted covariance terms (*f* = 2, .., 16) in Panel A (equity level) and each of the first ten terms (*f* = 2, .., 11) in Panel B (operations level) are positive and statistically significant. In both cases, the average discounted covariance terms increase over the first seven years (*f* = 2, .., 8) and then decline monotonically. This pattern reflects two offsetting effects – the increase in the average magnitude of shocks to cumulative growth over the horizon, and the reduction in the correlation between cumulative growth and subsequent profitability. The first effect dominates in the early years, while the second dominates in the later years. By future year 16, the covariance terms appear to converge to zero, and we therefore focus on years 2 through 16.[8]

The average overall covariance effect—i.e., the area under the median line—is:

$$\sum_{f=2}^{16} grand\ mean\left(Cov\left[ROE_f, CEG_{f-1}\right] \times (1+r_e)^{-f} \times \frac{CE}{MVE}\right) = 14.3\%$$

and

$$\sum_{f=2}^{16} grand\ mean\left(Cov\left[RNOA_f, CNOAG_{f-1}\right] \times (1+r_o)^{-f} \times \frac{NOA}{MVE}\right) = 6.1\%$$

and both estimates are highly significant (bootstrap standard error, discussed below, is 0.3% in each case). These results suggest that, as hypothesized, the covariance between growth and subsequent profitability has a significant positive effect on equity value and is driven by both operating and financing activities. As discussed in Section 3, the difference between the two estimates reflects the impact of profitability shocks on the availability and cost of funds. For

[8] As discussed in Section 3.6 below, our inferences are not sensitive to increasing or reducing the horizon by a few years.

example, a positive profitability shock is likely to reduce the need to obtain external funds, which involve asymmetric information, transaction and tax costs, and may also reduce the cost of borrowing and thus further increase *ROE* (but not *RNOA*).

4.4 Determinants of the covariance value effect

In Figure 1 and related calculations we focus on the average value impact of the covariance between growth and subsequent profitability. However, the covariance effect is likely to vary systematically across firms. All else equal, the covariance between variables increases in their correlation and volatility:

$$Cov[X, Y] = Corr[X, Y] \times StdDev[X] \times StdDev[Y]$$

Thus, we expect the covariance value effect to be particularly large for firms with high expected long-term volatility in profitability and growth. While expected long-term volatility is unobservable, past volatility may serve as a proxy for future volatility. In addition, Grullon et al. (2012) show that firms with high stock return volatility have a high potential for large profitability and growth shocks.

We also expect the covariance value effect to increase with expected growth. Kogan and Papanikolaou (2012) argue that growth opportunities behave as a levered claim on assets in place; for growth firms, positive shocks to profitability are likely to lead to expansion, while for mature firms, this may not be the case. In other words, for growth firms the correlation between growth and profitability is likely to be relatively large, further increasing the covariance. Accordingly, Koller et al. (2005) argues that the optionality associated with growth opportunities implies that high growth companies should be valued with special attention paid to alternative scenarios or using other methods that incorporate uncertainty and covariance effects.

In addition to volatility and growth, we expect the covariance value effect to be large for small and low profitability firms, because the potential for large positive profitability or growth shocks is relatively high for these firms. A high potential for large positive shocks implies both high volatility and high correlation (positive shocks are relatively persistence), and therefore large covariance effect.[9] In addition, size is a proxy for growth opportunities, and may therefore capture the growth-related effects discussed above.

To test the above hypotheses regarding the relationship between the covariance value effect and firm characteristics (size, profitability, volatility, and growth), we repeat the analysis for subsamples partitioned based on each of these characteristics. Specifically, for each firm characteristic, we create five subsamples by sorting firms based on that characteristic. We then conduct the analysis described in Section 4.3 for each of the five subsamples, generating estimates of the covariance value effects for each subsample. Panel A of Table 3 presents the results using size as the partitioning variable; Panel B reports the results for the profitability partition; Panels C and D report the results for two alternative volatility measures; and Panel E presents the results for the growth partition. Size is measured using the market value of equity as of April 15 subsequent to the corresponding base year, expressed in December 2011 prices. Profitability is measured using

[9] While large or high profitability firms may have greater exposure to negative shocks to growth or profitability, negative shocks tend to have low persistence (e.g., Hayn 1995, Burgstahler and Dichev 1997, Barth et al. 1998), limiting their value impact. Negative profitability shocks are likely to have relatively low persistence due to real options and accounting effects, including conservatism and some forms of earnings management. Adaptation, abandonment, and other real options allow firms to restructure or discontinue low profitability projects, reducing the duration of negative profitability shocks. In contrast, firms generally do not restructure or discontinue successful projects. Accounting conservatism requires the immediate recognition of losses (e.g., impairment charges) but gradual recognition of profits, implying differential persistence for positive and negative profitability shocks. Some large negative profitability shocks result from "big bath" charges, a practice whereby managers write down assets or create reserves in periods of particularly low performance, or following management change, to facilitate the reporting of higher earnings in subsequent periods. Such charges induce negative covariance in profitability shocks because they are followed by subsequent earnings increases. For example, a firm may overstate a restructuring reserve and later release it into earnings, or it may write down fixed assets to lower future depreciation. Write downs also reduce assets and equity—the denominators used in measuring future profitability—further contributing to the subsequent increase in reported profitability.

RecurringROE in the base year. The first volatility measure is the standard deviation of monthly stock returns over the sixty months prior to the partition date (a minimum of thirty months is required). The second volatility measure is the standard deviation of *RecurringROE* over the five years ending in the base year. The growth measure is the consensus (mean) long-term EPS growth forecast as of April of the year subsequent to the base year.

To evaluate the significance of the estimated covariance value effects, we conduct the following analysis. Each base year we randomly draw, with replacement, a sample of the same size as the number of observations for that year. We then repeat the analysis of Table 3 and save the estimated covariance value effects. We repeat the process many times, and then calculate the standard deviation of each estimated covariance value effect across the bootstrapping iterations. These standard deviations are bootstrapping estimates of the standard errors of the estimated covariance value effect, and thus facilitate statistical testing of the significance of the covariance value effect.

As hypothesized, the covariance value effect is strongly negatively related to size. On average, the covariance effect accounts for more than 30 percent of equity value for small firms, but has a slight negative effect on large firms. A similar pattern is observed in the *RecurringROE* partition of Panel B, where the covariance value effect for low profitability firms is about three times larger than the average effect. The results of the volatility partitions (Panels C and D) are also consistent with expectations, demonstrating a strong positive correlation between each of the volatility measures and the covariance value effect. Finally, as hypothesized, there is a strong positive correlation between long-term growth and the covariance value effect (Panel E).

The average covariance value effect estimated using all firms (the last row in each panel) differs from the average across the quintiles due in part to systematic differences in survival rates across the quintiles. In addition, the quintile covariance value effects in Panels D and E are relatively small, as the firms used in these partitions—which requires a five year history (Panel D) or the availability of long-term growth forecasts (Panel E)—are relatively large and profitable.

In all panels, operations contribute significantly to the covariance value effect, especially when the overall covariance effect is large. These results suggest that while financing activities contribute significantly to the covariance value effect, their impact is limited, and large covariance value effects are driven primarily by operations.

4.5 Firm-specific estimates of the covariance value effect

Thus far, to estimate the covariance value effect we first averaged covariance terms across all firms and base years for each future year, and then aggregated the averages across the future years. An alternative approach is to reverse the order, that is, to first aggregate firm-specific estimates of the covariance terms over the future years (f = 2, 3, …):

Firm/base year-specific covariance value effect =

$$\frac{CE}{MVE} \times \sum_{f=2}^{\max(16, survival)} Cov\left[ROE_f, CEG_{f-1}\right] \times (1 + r_e)^{-f},$$

and then calculate the mean and other distribution statistics of the firm-specific covariance value effect for each base year. This approach avoids the assumption that the covariance terms are similar in the cross-section, but it is likely to understate the overall covariance value effect because many firms did not survive the entire sixteen years period. Nevertheless, as a robustness check we present in Figure 2 statistics from the cross-sectional distribution of the firm-specific estimates of the covariance value effect for each base year.

The median line in Figure 2 represents the mean covariance value effect across all firms in the base year, while the upper and lower lines capture the 95% confidence interval. We use up to fifteen subsequent realizations (f = 2, …, 16) of the discounted covariance terms in measuring the firm-specific estimates of the covariance value effect, but in many cases the number of realizations is substantially smaller due to firm exit from the dataset as a result of bankruptcy, acquisition, or other delisting events. For the base years 1978 through 1995 used in this analysis, the average number of subsequent covariance terms is about 11. Accordingly, the average firm-specific estimate of the covariance value effect, which is about 8%, is substantially smaller than the 14% estimate derived by aggregating the mean discounted covariance terms over the subsequent sixteen years. Importantly, similar to the previous analysis, the estimated covariance value effect is highly significant, and its magnitude is consistent with the previous estimate (considering the shorter average horizon).

In Table 3 we showed that the covariance value effect is negatively related to size and profitability, and positively related to stock return volatility, the volatility of profitability, and expected long-term growth. We next test whether the same results hold when using the firm-specific estimates of the covariance value effect, and also examine the incremental explanatory power of the five firm-characteristics relative to each other in explaining the covariance value effect. To this end, we report in Table 4 summary statistics from cross-sectional regressions of the estimated covariance value effect on each of the five firm-specific characteristics separately, as well as on two subsets of the variables and on all variables simultaneously. For each set of regressions we report the time-series means and t-statistics of the cross-sectional coefficients. As shown, similar to the analysis of Table 3, each of the five firm-characteristics has the expected coefficient and is highly significant. Moreover, except the standard deviation of *RecurringROE*, the characteristics have significant incremental explanatory power relative to each other.

4.6 Robustness checks

In specifying the forecasting models for profitability and growth, we attempted to include all relevant predictors. An important source of information about expected profitability and growth is analysts' earnings forecasts. However, because these forecasts are available only for a subset of the firm/year observations, we omitted them in the primary analysis. Analysts' earnings forecasts are generally unavailable for small firms, for which the covariance effect is particularly strong (see Panel A, Table 3), as well as for the early sample years. As a robustness check, we rerun the analysis supplementing the forecasting models with ***ForecastedROE***, measured as the ratio of consensus (mean) earnings per share forecast for the year subsequent to the base year to book value per share at the end of the base year. Consistent with the definitions of the other variables, we use the consensus forecast as of April of the year subsequent to the base year. The distribution of *ForecastedROE* is presented in Table 1.

We find that although *ForecastedROE* is highly significant in explaining future profitability and growth, its inclusion has little impact on the estimated covariance value effect. The average magnitude of the covariance value effect drops significantly when using *ForecastedROE,* but this is due to the large average size of firms with available analysts' forecasts. For the subsample of observations with available analysts' earnings forecasts, the results with and without *ForecastedROE* are similar.

To estimate the covariance value effect we sum the discounted covariance terms over future years 2 through 16. This choice is consistent with the estimated pattern of the average discounted covariance terms (see Figure 1). As a robustness check, we rerun the analysis measuring the covariance value effect over longer (2-19 years) and shorter (2-13 years) horizons. In both cases the results are similar to those reported above, except a slight increase in the average covariance value effect when using the longer horizon (from 14.3% to 15.0%), and a decrease when using the shorter horizon (from 14.3% to 12.1%).

In measuring the cost of equity capital and the weighted average cost of capital, we made several assumptions and adjustments. We assumed that the equity risk premium is 4 percent, we adjusted market beta to reduce the impact of estimation error, and we used the Moody's Seasoned Baa Corporate Bond Yield as a proxy for the pre-tax cost of debt. To evaluate the robustness of the results to alternative choices, we reran all analyses with alternative proxies for the equity risk premiums (2 and 6 percent), with unadjusted market beta, and using the ten year treasury rate as a proxy for the pre-tax cost of debt.[10] In all cases the impact on the results was small, and the inferences remained unchanged.

5. Conclusion

In this study we evaluate the value impact of the covariance between growth and subsequent profitability. To the extent that profitability shocks are associated with unexpected growth and persist into future years, the expected value of future earnings and hence equity value should be greater than the values implied by expected growth and profitability. We estimate the covariance value effect for a large sample of firm-year observations and find that it contributes significantly to equity value, more than 10 percent on average. As expected, the covariance value effect—reflecting exercise of real options—is positively related to volatility. The covariance value effect is particularly large for small, low profitability, or high growth firms, for which the potential for large positive profitability and growth shocks is relatively high. We also find that the covariance

[10] The Baa yield likely overstates the ex-ante pre-tax cost of debt as it is measured using contractual rather than expected cash flow. For the Treasury rate, any difference between contractual and expected cash flows is likely to be trivial.

value effect is due to both operating and financing activities, but the contribution of operating activities is particularly large when the covariance effect is overall large. One implication of our findings is that when valuing high volatility, small, low profitability, or high growth companies, it is important to consider alternative scenarios, primarily operating ones, or to otherwise adjust the valuation model to incorporate covariance effects through the use Monte Carlo simulations, decision trees, or other methods.

We conclude with two caveats. First, the dividend discount model—the starting point for the analysis—assumes non-stochastic discount rates. While this simplifying assumption is standard in accounting research, in our case it may be problematic because we examine the impact of future shocks. The bias from this simplifying assumption is likely to reduce the covariance effect. A positive shock to profitability and growth is likely to reduce the discount rate, further increasing equity value. Indeed, the estimated overall covariance effect, which reflects the impact of future profitability and growth shocks on the cost of debt (as reflected in *ROE*), is larger than the estimated operations-driven covariance value effect, which does not capture any portion of the impact on the cost of capital (debt or equity).

Another caveat concerns our use of net income as a proxy for comprehensive income. The residual income model is based on the assumption that income is comprehensive, but comprehensive income is not available for most of our sample period. Because we require a long time-series to measure the covariance effect, we cannot estimate the covariance value effect using comprehensive income for any of the observations. Still, other comprehensive income is relatively small and highly transitory (e.g., Chambers et al. 2007), so its impact on the covariance value effect is likely to be small.

Appendix A: Predictors of Profitability and Growth

This appendix describes the variables used to predict profitability and growth, and explains the reasons for their inclusion in the model.

The current level of profitability (*RecurringROE*$_t$ or *RNOA*$_t$) is included because profitability varies substantially across companies and is highly persistent over time (e.g., Nissim and Penman 2001). Yet changes in profitability tend to partially reverse (e.g., Fairfield and Yohn 2001); the annual change ($\boldsymbol{\Delta_A}$) in profitability is included to capture the mean-reversion tendency of profitability. Because profitability shocks decay gradually (e.g., Bernard and Thomas 1990), the strength of the mean reversion in annual earnings depends on the timing of the earnings shock. In particular, if the shock occurred in the most recent quarter, its persistence into the future is likely to be higher than shocks that occurred in prior quarters; the quarterly change ($\boldsymbol{\Delta_Q}$) in annual profitability is included to capture the incremental persistence of recent shocks.

We decompose return on equity into recurring and transitory components to allow the model to capture the differential implications of these components for future profitability and growth (e.g., Fairfield at al. 1996). ***TransitoryROE*** is measured as the ratio of tax-adjusted special items, discontinued operations and extraordinary items to beginning-of-period common equity.[11] ***RecurringROE*** is measured as the difference between *ROE* and *TransitoryROE,* where ***ROE*** is measured as the ratio of net income available to common (i.e., after deducting non-controlling interest and preferred dividends) to beginning-of-period common equity. Operating profitability (***RNOA***) is measured as the ratio of income before tax-adjusted interest expense, tax-adjusted

[11] The tax adjustment is calculated by multiplying the pretax item by one minus the marginal tax rate, estimated as the top federal statutory tax rate in that year plus 2%, an estimate of the average incremental effect of state taxes.

special items, discontinued operations and extraordinary items, to net operating assets at the beginning of the period.

Market value reflects investors' expectations of future earnings, so the book-to-market ratio (*BTM* or *BTM_NOA*) reflects expectations regarding future profitability and growth (e.g., Penman 1996). ***BTM*** is measured as the ratio of common equity to the adjusted market value of common equity. Adjusted market value is calculated by multiplying the end-of-period market value of common equity by one plus the cumulative stock return through April 15. The reason for this adjustment is that end-of-period stock price is not likely to fully reflect the value implications of book value and other financial information as that information is reported several weeks or months after the fiscal period end. The book-to-market ratio of operations (***BTM_NOA***) is the ratio of net operating assets to the market value of operations, measured as the total of the book value of debt and the adjusted market value of equity.

Unlike the other predictors, firm size (***Size*** – log of the market value of equity, or ***Size_NOA*** – log of the market value of operations) has different implications for profitability and growth. Size is positively related to profitability because large firms often enjoy economies of scale or have unique advantages such as bargaining power, strong market positions, first mover's advantage, or innovative products (e.g., Brozen 1971, Martin 1983). Size is negatively related to subsequent growth due to diminishing returns to scale, finite demand (small firms start from a small scale of operations and so have more room for potential growth, while large firms are more likely to face limits on their growth), life cycle effects (large firms are more likely to have products at the maturity or decline stages), and diminishing returns to learning (for large—typically old—firms there is less scope for further efficiency gains from learning).

To the extent that the estimated cost of capital (*CostEquity* or *WACC*) captures the hurdle rate that the firm uses in making investment decisions, it should be positively related to subsequent profitability. The cost of equity capital is measured as the sum of the 10-year Treasury rate and the product of adjusted market beta and 4 percent (assumed equity risk premium). Market beta is the slope coefficient from a regression of monthly stock return on the S&P500 total return using up to five years of data but no less than 30 monthly observations. To mitigate measurement error, beta is winsorized at 0 and 2, and is adjusted by applying a “shrinkage factor” of ½ (i.e., it is calculated as the simple average of one and market beta).[12] To estimate the weighted average cost of capital, we measure the pretax cost of debt using the Moody’s Seasoned Baa Corporate Bond Yield, and we calculate the debt tax shield using the top federal statutory tax rate plus 2% average incremental effect of state taxes.

To the extent that growth rates are auto-correlated, historical growth rates in equity and net operating asserts (*NOA*) may help predict future growth. However, growth rates are not particularly persistent (e.g., Chan et al. 2003) and, as discussed below, growth in accounting measures is often negatively related to earnings quality.

While past growth is generally expected to be positively correlated with future growth, its implications for subsequent profitability are mostly negative. Financial economic theory suggests that marginal investments are on average less profitable than existing investments, so large increases in equity or net assets predict a reduction in overall profitability due to the lower profitability of the new investments (e.g., Fairfield et al. 2003, Richardson et al 2006). The low profitability of incremental investments does not necessarily imply inefficient behavior, as it may

[12] To select the shrinkage factor, we regressed market beta on its sixty month lagged value. The estimated intercept and slope were both close to ½.

still be in excess of the cost of capital. This is especially likely when the investment is triggered by a reduction in the cost of capital (e.g., Wu et al. 2010) or is less risky than other investments (e.g., Zhang 2007). The negative effect on profitability is exacerbated when the investments are in negative present value projects or "perks" (e.g., Jensen 1986, Titman et al. 2004).

Timing differences between investments and realized profits contribute to the negative correlation between growth and profitability. Investments imply a reduction in near term profitability because it typically takes significant time for expected profits to be realized. This timing gap is widened by conservative accounting principles, which accelerate expense recognition and delay revenue recognition (Penman and Zhang 2002).

Equity and asset growth ratios are negatively related to subsequent profitability also due to accounting distortions such as excess capitalization (Barton and Simko 2002, Hirshleifer et al. 2004) and accruals overstatement (Sloan 1996). Excess capitalization increases current earnings by reducing reported expenses, but the capitalized cost is subsequently depreciated, amortized or otherwise expensed, thus reducing future earnings.[13] Net asset growth partially reflects accruals (noncash earnings), which are generally lower quality than cash earnings due to both accounting and economic effects (Sloan 1996, Thomas and Zhang 2002). Unlike cash flow, most accruals are based on assumptions and estimates and may therefore contain measurement error and bias. In addition, because accruals increase net assets, and firms are restricted in their ability to inflate net asset, earnings due to accruals overstatement are less likely to recur. Moreover, overstatement of

[13] Firms often increase reported earnings by designating period costs as directly related to the acquisition of an asset or its preparation for use. For example, management may classify general training expenditures as part of the cost of a new machine. Excess capitalization may also occur after the initial acquisition of an asset. Firms have substantial discretion in classifying expenditures as improvements, additions or replacements—which improve the asset or extend its life and are therefore considered capital expenditures—versus repairs, maintenance or other operating expenditures—which enable the asset to perform according to original expectations and are therefore considered period costs.

current accruals implies understatement of future accruals, because over the long-run earnings equal net cash flow, and total accruals (properly defined) equal zero. Abnormal accruals may also reflect some forms of real earnings management activities or deteriorating financial conditions. For example, firms may engage in "channel stuffing" to increase reported revenue or over-production to reduce reported costs, or they may experience difficulties collecting receivables or selling goods, all leading to increases in accruals.

Sales growth is likely to be positively related to both future profitability and future growth. Sales growth often leads to short-term improvements in profitability due to operating leverage (the same fixed costs are spread over a larger volume) and price increases (when the sales increase is at least partially due to price increases that are not fully offset by cost increases). Sales growth rates provide incremental information about future growth rates because they are less volatile than growth rates in assets or other balance sheet items. This follows because business combinations and other investing activities have a more gradual effect on revenue growth compared to asset growth. Investments are fully and immediately reflected on the balance sheet, while the related revenues are recognized only from the date of acquisition. Thus, shocks to revenue growth rates are more moderate and persistent than shocks to balance sheet numbers, which in turn implies that historical revenue growth rates are likely to perform better than balance sheet growth rates in predicting future growth.[14]

[14] Business combinations and other investments induce positive autocovariance in revenue growth because the income statement for the year subsequent to the business combination reports the full year revenue of the acquired firm while the income statement in the year of the combination reports revenue only from the acquisition date.

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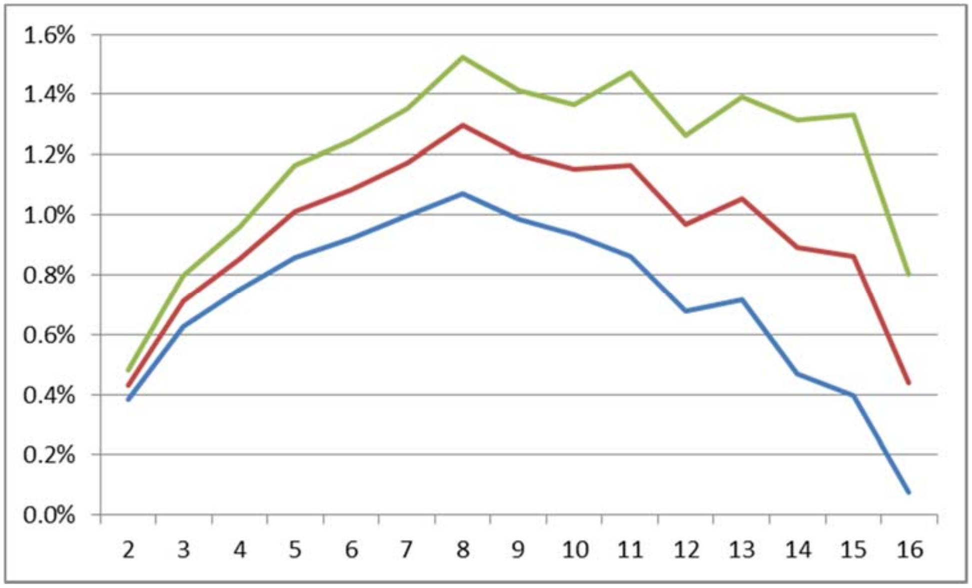
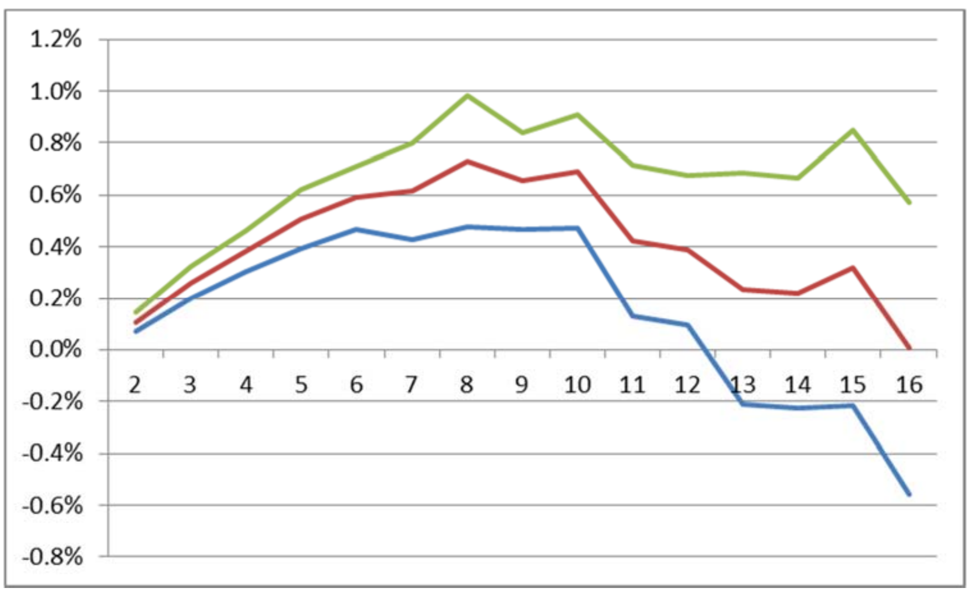
Figure 1
Average contribution to the overall covariance value effect by future year

Panel A: Contribution of both operating and financing activities

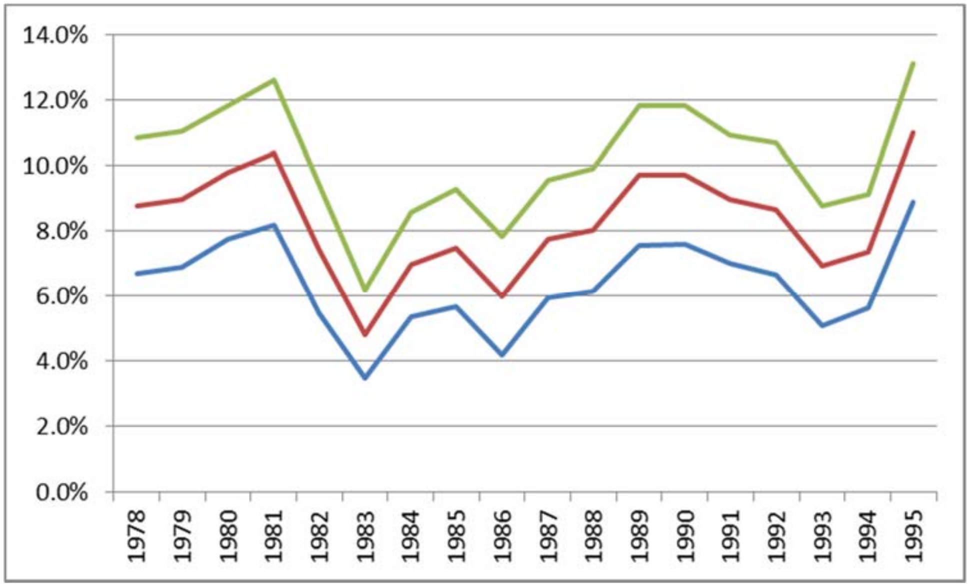


Panel B: Contribution of operating activities



The figures present the percentage of equity value attributable to the covariance between profitability in each future year $f = 2, .., 16$ and cumulative growth through the beginning of year f. The median line represents the covariance while the upper and lower lines capture the 95% confidence interval. The area under the median line is an estimate of the overall covariance effect.

Figure 2
Average firm-specific estimates of the covariance value effect over time



The figure presents statistics from the cross-sectional distribution of firm-specific estimates of the covariance value effect for each base year. The covariance value effect is the percentage of equity value attributable to the covariance between growth and subsequent profitability. The median line in the figure represents the mean covariance value effect while the upper and lower lines capture the 95% confidence interval. The covariance value effect is estimated for each firm/base year using up to fifteen subsequent realizations of growth and profitability shocks (f = 2, .., 16). Because many firms did not survive the entire sixteen years period, the estimated covariance value effect understates the overall effect.

Table 1
Summary Statistics

	Obs.	*Mean*	*Std Dev*	*P5*	*Q1*	*Median*	*Q3*	*P95*
ROE	93,385	5%	31%	-49%	-2%	10%	19%	40%
TransitoryROE	92,860	-2%	8%	-14%	-1%	0%	0%	4%
RecurringROE	93,385	7%	28%	-39%	0%	10%	19%	38%
ForecastedROE	63,714	11%	21%	-19%	6%	12%	19%	35%
Δ_A*RecurringROE*	90,048	-2%	22%	-34%	-7%	-1%	5%	26%
Δ_Q*RecurringROE*	90,872	-1%	10%	-14%	-2%	0%	2%	10%
RNOA	94,348	6%	18%	-24%	2%	8%	14%	28%
Δ_A*RNOA*	91,578	-1%	14%	-21%	-5%	0%	3%	18%
Δ_Q*RNOA*	92,054	0%	6%	-9%	-2%	0%	1%	7%
Δ_A*Equity*	93,719	13%	43%	-39%	-3%	8%	20%	82%
Δ_A*NOA*	94,532	14%	39%	-27%	-4%	7%	21%	80%
Δ_A*Sales*	91,863	13%	33%	-26%	-1%	9%	22%	67%
BTM	98,608	0.73	0.63	0.13	0.33	0.56	0.92	1.90
BTM_NOA	99,067	0.73	0.41	0.19	0.43	0.68	0.96	1.43
MVE	99,230	2,642	13,487	10	48	192	927	9,802
MarketLeverage	99,230	0.25	0.24	0.00	0.04	0.19	0.40	0.74
RetVolat	99,174	0.15	0.07	0.07	0.10	0.13	0.18	0.28
Beta	99,230	1.04	0.28	0.54	0.83	1.03	1.24	1.50
CostEquity (r_e)	99,230	11%	3%	7%	8%	10%	13%	17%
BAA	99,230	9%	3%	6%	7%	8%	10%	14%
WACC (r_o)	99,230	9%	3%	6%	7%	9%	11%	15%

The table presents statistics from the pooled time-series cross-section distributions of the variables. ***TransitoryROE*** is the ratio of tax-adjusted special items, discontinued operations and extraordinary items to beginning-of-year common equity. ***ROE*** is the ratio of net income available to common equity (i.e., after deducting non-controlling interest and preferred dividends) to beginning-of-year common equity. ***RecurringROE*** is the difference between *ROE* and *TransitoryROE*. ***ForecastedROE*** is the ratio of consensus (mean) earnings per share forecast for the year subsequent to the base year to book value per share at the end of the base year. ***%Δ_A*** (***%Δ_Q***) is the percentage change in the adjacent variable compared to its level a year (quarter) ago. ***RNOA*** is the ratio of income before tax-adjusted interest expense, tax-adjusted special items, discontinued operations, and extraordinary items to net operating assets (NOA) at the beginning of the year. ***NOA*** is measured by subtracting operating liabilities from total assets. ***BTM*** is the ratio of common equity to the adjusted market value of common equity, where book value is measured from the most recently disseminated annual or quarterly report as of April 15, and adjusted market value is calculated by multiplying the reporting date market value of common equity by one plus the cumulative stock return through April 15. ***MVE*** is the market value of common equity in $MM on April 15 of the year subsequent to the base year. ***BTM_NOA*** is the ratio of net operating assets to the market value of operations, measured as the total of the book value of debt and the adjusted market value of equity. ***MarketLeverage*** is the ratio of debt to the total of the book value of debt and the adjusted market value of equity. ***Beta*** is estimated using the 60 most recent monthly stock returns (a minimum of 30 observations is required) and the total return on the S&P 500. ***RetVolat*** is the standard deviation of the monthly stock returns. To mitigate measurement error, beta is winsorized at 0 and 2, and is adjusted by applying a "shrinkage factor" of ½ (i.e., it is calculated as the simple average of one and market beta). The cost of equity capital (***CostEquity***) is estimated as the sum of the 10-year Treasury rate and the product of adjusted market beta and 4 percent (assumed equity risk premium). ***BAA*** is the Moody's Seasoned Baa Corporate Bond Yield rate. ***WACC*** is measured as *MarketLeverage* × *BAA* × (1 - *t*) + (1 - *MarketLeverage*) × *CostEquity*, where ***t*** is the top federal statutory tax rate plus 2% average incremental effect of state taxes.

Table 2
Summary statistics from cross-sectional regressions for forecasting profitability and growth

Panel A: Forecasting shareholders' profitability

$$ROE_{t+f} = \beta_0 + \beta_1 RecurringROE_t + \beta_2 TransitoryROE_t + \beta_3 \Delta_A RecurringROE_t + \beta_4 \Delta_Q RecurringROE_t + \beta_5 BTM_t + \beta_6 Size_t + \beta_7 CostEquity_t + \beta_8 \Delta_A Equity_t + \beta_9 \Delta_A NOA_t + \beta_{10} \Delta_A Sales_t + \epsilon_t$$

f	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_{10}	Mean R^2	Mean obs.
1	0.221	0.694	0.124	-0.063	0.240	-0.084	0.007	-1.716	-0.040	-0.049	0.013	0.368	2,301
	7.0	35.0	3.5	-3.6	7.0	-13.0	5.7	-7.2	-4.2	-6.6	2.2		
3	0.272	0.459	0.081	-0.048	-0.004	-0.044	0.012	-2.271	-0.084	-0.040	-0.009	0.172	1,935
	5.4	16.0	1.8	-2.9	-0.1	-5.8	7.5	-8.9	-8.6	-4.5	-0.8		
5	0.250	0.354	-0.017	-0.073	-0.007	-0.016	0.016	-2.287	-0.085	-0.021	-0.016	0.112	1,661
	4.0	13.0	-0.6	-3.3	-0.2	-2.1	8.0	-6.2	-8.7	-2.6	-1.7		
10	0.244	0.285	0.049	-0.054	-0.123	0.009	0.021	-2.306	-0.060	-0.019	-0.022	0.110	1,187
	3.7	13.5	0.8	-1.5	-1.5	0.9	8.3	-7.0	-3.9	-1.4	-0.9		
15	0.276	0.265	-0.059	-0.128	-0.062	-0.008	0.021	-2.187	-0.086	0.011	-0.011	0.096	872
	3.4	5.8	-0.9	-3.6	-0.6	-0.8	8.7	-4.2	-3.3	0.5	-0.4		

Panel B: Forecasting cumulative equity growth

$$CEG_{t+f} = \beta_0 + \beta_1 RecurringROE_t + \beta_2 TransitoryROE_t + \beta_3 \Delta_A RecurringROE_t + \beta_4 \Delta_Q RecurringROE_t + \beta_5 BTM_t + \beta_6 Size_t + \beta_7 CostEquity_t + \beta_8 \Delta_A Equity_t + \beta_9 \Delta_A NOA_t + \beta_{10} \Delta_A Sales_t + \epsilon_t$$

f	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_{10}	*Mean* R^2	*Mean obs.*
1	1.180	0.252	-0.028	0.058	0.219	-0.159	-0.009	0.126	0.059	0.004	0.112	0.163	2,315
	38.8	10.8	-0.6	3.0	3.9	-17.2	-4.6	0.4	4.7	0.4	11.7		
3	1.682	0.222	-0.445	0.077	0.265	-0.463	-0.047	1.391	0.094	0.027	0.330	0.119	1,982
	16.5	3.6	-4.2	1.5	2.0	-19.2	-9.5	1.4	2.5	1.0	11.3		
5	2.389	0.034	-0.661	-0.067	0.333	-0.736	-0.100	2.016	0.171	0.119	0.537	0.106	1,714
	11.1	0.2	-2.7	-0.7	1.4	-17.1	-12.1	1.1	1.9	2.3	11.1		
10	4.990	-0.369	-0.829	-0.234	0.670	-1.344	-0.291	2.516	-0.047	0.584	1.147	0.079	1,237
	7.1	-1.2	-1.4	-0.7	1.0	-9.8	-18.9	0.5	-0.2	3.1	6.5		
15	7.109	-1.581	-4.186	-0.925	1.063	-2.117	-0.646	16.643	0.668	0.789	2.972	0.086	913
	6.9	-1.7	-2.5	-1.0	0.7	-6.0	-14.5	1.8	1.3	1.4	7.2		

Panel C: Forecasting operating profitability

$$RNOA_{t+f} = \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta_A RNOA_t + \beta_3 \Delta_Q RNOA_t + \beta_4 BTM\_NOA_t + \beta_5 Size\_NOA_t + \beta_6 WACC_t + \beta_7 \Delta_A NOA_t + \beta_8 \Delta_A Sales_t + \epsilon_t$$

f	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	*Mean* R^2	*Mean obs.*
1	0.089	0.670	-0.096	0.186	-0.074	0.004	-0.454	-0.054	0.016	0.511	2,377
	8.4	44.8	-7.0	6.7	-15.7	6.9	-3.5	-16.7	5.6		
3	0.092	0.481	-0.103	0.039	-0.045	0.007	-0.713	-0.062	-0.005	0.248	2,016
	8.5	24.9	-6.3	1.4	-8.2	7.7	-5.2	-14.0	-0.8		
5	0.087	0.392	-0.109	0.054	-0.031	0.008	-0.729	-0.053	-0.010	0.164	1,739
	6.7	25.1	-5.4	1.6	-5.5	9.1	-5.1	-13.7	-1.5		
10	0.083	0.296	-0.088	-0.028	-0.019	0.009	-0.687	-0.043	-0.011	0.123	1,250
	2.5	13.3	-2.9	-0.4	-1.8	8.4	-2.9	-8.6	-1.6		
15	0.060	0.269	-0.119	0.074	-0.016	0.010	-0.277	-0.033	-0.014	0.118	921
	1.5	6.1	-5.7	1.2	-1.1	5.3	-1.3	-2.9	-1.1		

Panel D: Forecasting cumulative growth in net operating assets

$$CNOAG_{t+f} = \beta_0 + \beta_1 RNOA_t + \beta_2 \Delta_A RNOA_t + \beta_3 \Delta_Q RNOA_t + \beta_4 BTM\_NOA_t + \beta_5 Size\_NOA_t + \beta_6 WACC_t + \beta_7 \Delta_A NOA_t + \beta_8 \Delta_A Sales_t + \epsilon_t$$

f	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	*Mean* R^2	*Mean obs.*
1	1.120	0.261	0.025	0.229	-0.197	-0.007	1.151	0.028	0.151	0.180	2,388
	37.7	10.2	1.1	6.0	-16.8	-5.9	5.0	3.5	15.8		
3	1.638	0.401	0.098	0.346	-0.597	-0.036	2.842	0.055	0.356	0.160	2,035
	19.4	6.3	1.8	3.0	-23.6	-8.2	4.1	2.2	15.8		
5	2.437	0.370	0.117	0.458	-0.991	-0.079	3.101	0.084	0.552	0.127	1,755
	17.7	2.8	0.9	1.9	-22.4	-10.1	3.0	1.6	17.6		
10	4.474	0.492	0.061	1.574	-1.886	-0.238	10.213	0.235	0.969	0.085	1,265
	13.8	1.3	0.1	2.0	-12.6	-21.2	3.8	1.5	5.7		
15	7.268	1.497	-1.684	3.467	-2.863	-0.523	20.578	0.363	2.386	0.076	929
	10.4	1.3	-2.0	2.2	-9.6	-13.3	3.2	0.9	6.6		

The table reports the time-series means (first row of each regression) and t-statistics (second row) of the corresponding cross-sectional regression coefficients. The sample period is t = 1978 through 2011-f. Thus, for example, for next year profitability (f = 1), the statistics are based on 33 cross sectional regressions (1978-2010). CEG_{t+f} ($CNOAG_{t+f}$) is one plus cumulative equity (net operating assets) growth from year t to year t+f. All other variables are defined in Table 1.

Table 3
Covariance value effect by firm Characteristics

Panel A: Covariance value effect by size

Market Value (in current dollars)		*Covariance effect*		*Impact of operations*	
Portfolio	*Mean*	*Mean*	*Std Err*	*Mean*	*Std Err*
Lowest quintile each year	35	39.2%	1.6%	26.3%	1.8%
2th quintile each year	124	24.3%	1.1%	11.4%	1.1%
3th quintile each year	347	17.1%	0.8%	8.3%	1.0%
4th quintile each year	1,084	9.4%	0.5%	4.2%	0.6%
Highest quintile each year	14,335	-1.4%	0.3%	-6.3%	0.4%
All firms	3,184	14.3%	0.4%	6.1%	0.4%

Panel B: Covariance value effect by profitability

Recurring ROE		*Covariance effect*		*Impact of operations*	
Portfolio	*Mean*	*Mean*	*Std Err*	*Mean*	*Std Err*
Lowest quintile each year	-28.3%	41.6%	1.7%	22.0%	1.7%
2th quintile each year	2.9%	23.1%	1.1%	15.4%	1.4%
3th quintile each year	10.4%	10.3%	0.6%	2.8%	0.7%
4th quintile each year	16.9%	7.0%	0.5%	1.1%	0.6%
Highest quintile each year	35.0%	3.7%	0.5%	-1.1%	0.6%
All firms	7.4%	14.3%	0.4%	6.1%	0.4%

Panel C: Covariance value effect by stock return volatility

Volatility of Monthly Stock Returns		*Covariance effect*		*Impact of operations*	
Portfolio	*Mean*	*Mean*	*Std Err*	*Mean*	*Std Err*
Lowest quintile each year	7.6%	-2.3%	0.5%	-6.9%	0.5%
2th quintile each year	10.5%	10.4%	0.7%	2.0%	0.8%
3th quintile each year	13.2%	17.2%	0.9%	7.8%	0.8%
4th quintile each year	16.6%	29.0%	1.4%	15.1%	1.8%
Highest quintile each year	24.3%	33.5%	2.2%	26.0%	2.1%
All firms	14.4%	14.3%	0.4%	6.1%	0.4%

Panel D: Covariance value effect by the volatility of profitability

Volatility of Recurring ROE		*Covariance effect*		*Impact of operations*	
Portfolio	*Mean*	*Mean*	*Std Err*	*Mean*	*Std Err*
Lowest quintile each year	2.0%	3.6%	0.5%	-0.1%	0.7%
2th quintile each year	4.3%	5.4%	0.8%	0.7%	1.1%
3th quintile each year	7.0%	7.7%	0.8%	0.8%	0.9%
4th quintile each year	11.6%	11.0%	1.3%	4.2%	1.4%
Highest quintile each year	29.0%	21.9%	2.1%	8.3%	2.0%
All firms	10.8%	14.3%	0.4%	6.1%	0.4%

Panel E: Covariance value effect by consensus (mean) long-term earnings growth forecast

Long-term EPS Growth		*Covariance effect*		*Impact of operations*	
Portfolio	*Mean*	*Mean*	*Std Err*	*Mean*	*Std Err*
Lowest quintile each year	7.6%	4.5%	0.7%	-4.3%	1.0%
2th quintile each year	11.9%	3.9%	0.6%	-2.8%	0.8%
3th quintile each year	14.8%	6.9%	1.2%	1.9%	1.2%
4th quintile each year	18.6%	10.5%	1.0%	4.2%	0.8%
Highest quintile each year	29.3%	19.3%	1.6%	11.5%	1.6%
All firms	16.4%	14.3%	0.4%	6.1%	0.4%

The table presents the time-series means of the cross-sectional (quintile) means of the partitioning variables, the covariance value effect, and the operations-related covariance value effect. The standard errors are calculated using bootstrapping (see Section 4.3). The partitioning variables are the market value of equity as of April 15 of the year subsequent to the base year, measured in December 2011 prices (Panel A); *RecurringROE* in the base year (Panel B); stock return volatility, measured using the standard deviation of monthly stock returns over the 60 month ending in March of the year subsequent to the base year (Panel C); the volatility of profitability, measured using the standard deviation of *RecurringROE* over the five years ending in the base year (Panel D); and consensus (mean) analysts' long-term EPS growth forecasts as of April of the year subsequent to the base year (Panel E). The "covariance effect" measures the percentage of equity value attributable to the growth-profitability covariance. The "impact of operations" measures the portion of the covariance effect that is due to operating activities. The average covariance value effect estimated using all firms (the last row in each panel) differs from the average across the quintiles due to unavailability of some partitioning variables (primarily past volatility and analysts' forecasts) as well as to differences in survival rates across the quintiles.

Table 4
Summary statistics from cross-sectional regressions of firm-specific estimates of the covariance value effect on firm characteristics

$$CovEffect_t = \beta_0 + \beta_1 SIZE_t + \beta_2 RecurringROE_t + \beta_3 RetVolat_t + \beta_4 ProfVolat_t + \beta_5 LTG_t + \epsilon_t$$

β_0	β_1	β_2	β_3	β_4	β_5	*Mean* R^2	*Mean obs.*
0.224	-0.030					0.027	2,162
12.8	-11.3						
0.090		-0.212				0.015	2,162
11.9		-9.8					
-0.037			0.812			0.015	2,161
-3.7			7.9				
0.023				0.247		0.007	1,450
7.2				7.6			
-0.001					0.283	0.006	1,393
-0.2					6.7		
0.140	-0.021	-0.117	0.366			0.037	2,161
5.4	-7.2	-7.4	3.2				
0.037	-0.012	-0.142	0.822	0.001		0.042	1,450
1.7	-8.9	-7.8	5.2	0.0			
0.067	-0.016	-0.104	0.664		0.071	0.040	1,393
3.0	-8.1	-5.9	5.3		2.2		
0.053	-0.014	-0.123	0.789	-0.001	0.041	0.046	969
1.9	-8.0	-6.3	4.3	0.0	1.4		

The table presents the time-series means (first row of each regression) and t-statistics (second row) of estimated coefficients from cross-sectional regressions of firm-specific estimates of the covariance value effect on firm characteristics. The covariance value effect (***CovEffect***$_t$) is estimated for each firm/base year (year *t*) using up to sixteen subsequent realizations of growth and profitability shocks (see Section 4.5). ***Size*** is the log of the market value of equity as of April 15 of year *t*+1. ***RecurringROE*** is the ratio of income before tax-adjusted special items, discontinued operations and extraordinary items (but after non-controlling interest and preferred dividends) to beginning-of-year common equity. ***RetVolat*** is the standard deviation of monthly stock returns over the 60 months ending in March of year *t*+1 (a minimum of 30 observations is required). ***ProfVolat*** is the standard deviation of *RecurringROE* over the years *t*-4 through *t*. ***LTG*** is consensus (mean) analysts' long-term EPS growth forecasts as of April of year *t*+1.