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What Determines Residual Income?

Abstract

This paper investigates the determinants of residual income scaled by book value of equity, i.e., abnormal return on equity (ROE), by analyzing the impact of value-creation (economic rents) and value-recording (conservative accounting) processes on abnormal ROE. I rely on economic theories to characterize economic rents and develop an empirical measure—the conservative accounting factor—to capture the effect of conservative accounting. As expected, industry abnormal ROE increases with industry concentration, industry level barriers to entry, and industry conservative accounting factors. Also as expected, the difference between firm and industry abnormal ROE increases with market share, firm size, firm level barriers to entry, and firm conservative accounting factors. Integrating these determinants into the residual income valuation model significantly increases its explanatory power for the variation in the market-to-book ratio.

Key Words: equity valuation; the residual income valuation model; economic rents; conservative accounting.

Data Availability: The data used in this study are available from sources identified in the text.

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I. INTRODUCTION

The residual income valuation model (RIM) provides a parsimonious framework linking accounting information to firm value. It has been widely used to estimate firm value and the cost of equity.[1] The RIM model states that firm value is the sum of book value and the present value of expected future residual income. Thus, forecasting future residual income is critical to RIM implementations. Prior research often relies on the linear information dynamics proposed by Ohlson (1995) and Feltham and Ohlson (1995) for this purpose. However, Dechow et al. (1999) and Myers (1999) find that these information dynamics combined with the RIM fail to capture firm value effectively. This failure calls for a better understanding of the determinants of residual income (Beaver 1999).

To this end, this paper first investigates the impact of value-creation (economic rents) and value-recording (conservative accounting) processes on residual income scaled by book value of equity, i.e., abnormal return on equity (ROE). It then examines whether integrating economic and accounting determinants of abnormal ROE into the RIM can improve its ability to explain firm value.

This paper hypothesizes that abnormal ROE increases with economic rent proxies and conservative accounting factors. It relies on theories of competition to identify proxies for economic rents. These proxies measure the extent of imperfect competition, under which firms can price products above marginal costs and earn positive abnormal ROE. Conservative accounting, such as expensing investments with future benefits, can cause *recorded* earnings and book value of equity to differ from economic measures and lead to nonzero abnormal ROE. To capture the impact of conservatism on abnormal ROE, I develop an empirical measure, the conservative accounting factor. This factor takes into consideration the impact of conservatism on both net income and book value of equity.

This paper assumes that abnormal ROE follows a first-order autoregressive (AR(1)) process and allows the AR(1) parameter (i.e., persistence) to vary with economic rent proxies and conservative accounting factors. Because industry abnormal ROE is likely to have different persistence from firm differential abnormal ROE (the difference between firm and industry abnormal ROE), the empirical analyses are conducted separately at the industry level and the firm level. The industry level analysis suggests that the persistence of industry abnormal ROE increases with industry concentration, industry level barriers to entry, and industry conservative accounting factors. The firm level analysis suggests that the persistence of firm differential abnormal ROE increases with market share, firm size, firm level barriers to entry, and firm conservative accounting factors.

Like the persistence of abnormal ROE, its permanent level (i.e., the unconditional mean) might also vary systematically across industries and firms, especially over finite horizons analyzed in empirical studies (Mueller 1977; Zhang 2000). The abnormal ROE analyses are then extended to explain the permanent level of abnormal ROE. The results suggest that the permanent level increases with economic rent proxies and conservative accounting factors as well.

Lastly, this paper conducts market-to-book ratio analyses to investigate the extent to which economic and accounting determinants of abnormal ROE improve RIM implementations. Integrating these determinants into a model with current abnormal ROE and other factors examined in prior research increases the explanatory power (i.e., the adjusted R^2) by 40 percent and 33 percent for industry and firm market-to-book ratio, respectively. Additional analyses indicate that these determinants have incremental explanatory power over models analyzed in prior studies (Fairfield et al. 1996; Bhojraj and Lee 2002).

This study contributes to the valuation literature in three ways. First, it provides a framework for forecasting future residual income and improves our understanding of the link between current and future accounting information. It decomposes abnormal ROE into an economic rent component and a conservative accounting component, and finds that both components significantly improve forecasts of abnormal ROE and the ability of the RIM to explain firm value.[2] Such evidence is important for both valuation studies and studies that rely on the RIM valuation framework, such as value relevance studies, by suggesting a list of economic and accounting variables that can capture the cross-sectional variation in firm value.

Second, it provides insights into the impact of economic rents on abnormal ROE. Extending prior research, including Lev (1983) and Baginski et al. (1999), this paper studies both the persistence of abnormal ROE and its permanent level. This paper also uses a more comprehensive set of economic rent proxies. This is important given that different economic rent proxies likely correlate with each other (Porter 1980). The analyses suggest that industry concentration, firm size, market share, and barriers to entry all positively affect future abnormal ROE.

Third, while prior research recognizes the impact of conservatism on accounting numbers (e.g., Zhang 2000), there is limited research on how to empirically capture such impact. This paper develops an empirical measure to capture the impact of conservatism on abnormal ROE for individual firms. This measure reflects the notion that the conservative accounting effect is contingent on the growth of investments recorded conservatively: the effect is negative when the growth is high and positive when the growth is low. Empirical results indicate that this measure helps *forecast future* abnormal ROE of *individual* firms and industries. Thus, this paper extends prior empirical studies on conservative accounting, such as Lev et al. (1999) and Monahan (1999), which use a *portfolio* approach to demonstrate the effect of capitalizing R&D expenditures on *contemporaneous* performance measures and returns-earnings associations, among other things.

The remainder of the paper is organized as follows. Section II analyzes economic and accounting factors that affect abnormal ROE and presents hypotheses. Section III describes sample selection and variable measurement. Section IV reports the abnormal ROE analyses and Section V reports the market-to-book ratio analyses. Section VI concludes.

II. HYPOTHESIS DEVELOPMENT

Assuming that accounting satisfies the clean surplus relation (the change in book value of equity equals net income minus net dividends) and that the intrinsic value of equity equals the present value of future net dividends, one can represent the intrinsic value of equity (V_t) by the residual income valuation model (RIM):

$$V_t = BV_t + E_t[\sum_{\tau=1}^{\infty} \frac{X^a_{t+\tau}}{(1+r)^\tau}] , \quad (1)$$

where BV_t is book value of equity, $E_t(.)$ is the expectation at time t, X^a_t is residual income, and r is the cost of equity, which is used to discount all future payoffs to equity holders. Residual income denotes the difference between net income (X_t) and the required return from beginning-of-period book value of equity, i.e., $X_t^a = X_t - rBV_{t-1}$. Basically, the RIM model states that firm value is the sum of book value and the present value of expected future residual income.

Accordingly, forecasting residual income is critical to implementations of the RIM model. To improve the forecasts, this paper investigates the determinants of residual income. Since analysis of residual income is potentially subject to scale problems (Brown et al. 1999), this paper focuses on abnormal ROE (ROE_t^a), residual income scaled by book value of equity, or the difference between ROE and the cost of equity. In terms of abnormal ROE, the RIM model can be rewritten as:

$$V_t = BV_t + E_t[\sum_{\tau=1}^{\infty} \frac{ROE_{t+\tau}^a \cdot BV_{t+\tau-1}}{(1+r)^\tau}] . \qquad (1')$$

The RIM model holds under both unbiased accounting and conservative accounting. Under unbiased accounting, a firm's ROE equals its cost of equity if the firm operates under perfect competition. However, if the competition is imperfect, the firm can charge prices higher than its costs; accordingly, economic rents arise and abnormal ROE is no longer zero.

Under conservative accounting, accounting measures deviate from economic measures. As a result, accounting ROE is different from economic rate of return, and a firm's abnormal ROE can be nonzero even if the firm operates under perfect competition. That is, conservative accounting is also an important determinant of abnormal ROE (Ohlson 1995; Feltham and Ohlson 1995, 1996; Zhang 2000). Below, I first decompose abnormal ROE under conservative accounting into a conservative accounting component and an economic rent component, and then discuss these two components in detail.

Economic Rents, Conservative Accounting, and Abnormal ROE

Suppose that the clean surplus relations under unbiased and conservative accounting are:

$$BV_t^{'} = BV_{t-1}^{'} + X_t^{'} - d_t ,$$
$$BV_t = BV_{t-1} + X_t - d_t ,$$

where d is net dividends, which are assumed to be the same under the two accounting systems, i.e., net dividends are not affected by accounting policies. Accounting numbers under unbiased accounting are denoted by " ' ".

Subtracting the second equation from the first one yields:

$$BV_t^{'} - BV_t = BV_{t-1}^{'} - BV_{t-1} + X_t^{'} - X_t .$$

The difference in book value of equity between unbiased and conservative accounting is defined as the estimated reserve (*ER*), as in Penman and Zhang (2002). The estimated reserve can be interpreted as a measure of how conservative an accounting system is. As in Feltham and Ohlson (1996) and Gjesdal (1999), conservative accounting is defined such that the carrying value assigned to investments yields an expected accounting rate of return greater than the internal rate of return. Thus, the estimated reserve is positive under conservative accounting and the higher the estimated reserve, the more conservative the accounting system.

In terms of the estimated reserve, the above equation can be written as:

$$X_t^{'} - X_t = ER_t - ER_{t-1} . \quad (2)$$

That is, the difference in net income under the two accounting systems is the change in the estimated reserve. Net income under conservative accounting is lower than that under unbiased accounting if the estimated reserve increases, and vice versa.

Dividing both sides of equation (2) by beginning-of-period book value of equity under conservative accounting and after some algebra, one can obtain the relation between conservative accounting, economic rents, and abnormal ROE:

$$\begin{aligned} ROE_t^a &= \frac{(1+r)ER_{t-1} - ER_t}{BV_{t-1}} + ROE_t^{a'}(1+\frac{ER_{t-1}}{BV_{t-1}}) \\ &= CAF_t + ROE_t^{a'}(1+\frac{ER_{t-1}}{BV_{t-1}}). \end{aligned} \tag{3}$$

See Appendix A for the derivation. This equation suggests that abnormal ROE under conservative accounting consists of two components. The first component, referred to as the conservative accounting factor (*CAF*), captures the impact of conservatism on abnormal ROE. The second component captures the impact of economic rents—abnormal ROE under unbiased accounting.

Conservative Accounting Factor

Conservatism is "a prudent reaction to uncertainty to try to ensure that uncertainty and risks inherent in business situations are adequately considered (FASB 1980, 2)." One prime example of conservatism under U.S. accounting is the expensing of R&D expenditures. Because the benefits from R&D expenditures are uncertain, these investments are not recognized as assets and are required to be expensed.[3] Expensing an investment with future benefits has a negative impact on abnormal ROE in the investment period and a positive impact for the rest of its useful life. If the growth of investments is high, the negative impact of contemporaneous investments on current abnormal ROE dominates the positive impact of past investments, and if the growth is low, the positive impact dominates the negative impact. The quantitative impact of conservatism on abnormal ROE can be captured by the conservative accounting factor developed above (see equation 3):[4]

$$CAF_t = \frac{(1+r)ER_{t-1} - ER_t}{BV_{t-1}} = \frac{(ER_{t-1} - ER_t) + rER_{t-1}}{BV_{t-1}}.$$

Basically, *CAF* is the inverse change in the estimated reserve (i.e., the net income effect) after adjusting for the opportunity cost of the beginning-of-period estimated reserve (i.e., the book value effect).[5]

The above discussion and equation (3) lead to the first hypothesis (in alternative form):

H1: Abnormal ROE increases with conservative accounting factors.

Economic Rents

Competition within an industry can drive prices down to marginal costs so that the net present value of an investment and industry abnormal ROE under unbiased accounting are zero. However, imperfect competition can lead to economic rents, and the less competitive an environment is, the higher economic rents are.

Neo-classical economic theories suggest that the level of competition and economic rents depend on industry structure, i.e., industry concentration and industry level barriers to entry. Concentration can yield economic rents because firms in a concentrated industry can collude and set prices above marginal costs so that they can have positive abnormal ROE. As predicted by oligopoly theories, the effectiveness of collusion increases with concentration (Bain 1956; Strickland and Weiss 1976). Barriers to entry, on the other hand, can induce and sustain economic rents by reducing threats from outside competition. Product innovations (temporary monopoly power), product differentiation (buyer inertia and loyalty), capital intensity (minimum required capital), scarce resources, patents, and immobile management talents all could result in high barriers to entry (Eaton and Lipsey 1981; Mueller 1977).

These discussions lead to the second hypothesis (in alternative form):

H2: Abnormal ROE increases with industry concentration and industry level barriers to entry.

If firms in an industry are not homogeneous as assumed in neo-classical economic theories, then firm characteristics, such as market share, firm size, or firm level barriers to entry, can affect profitability as well (Brozen 1971; Martin 1983). Firms with large market share enjoy economic rents because large market share leads to economies of scale and increased bargaining power in an oligopoly. Similarly, large firms can enjoy economies of scale in both the product market and the financing market. Furthermore, Mueller (1986) argues that firm level barriers to entry are more important than industry level barriers to entry in protecting firms from outside competition.

These discussions lead to the last hypothesis (in alternative form):

H3: Abnormal ROE increases with market share, firm size, and firm level barriers to entry.

One can express firm abnormal ROE ($ROE^a_{i,t}$) as the sum of industry abnormal ROE ($ROE^a_{j,t}$) and firm differential abnormal ROE ($DROE^a_{i,t}$):

$$ROE^a_{i,t} = ROE^a_{j,t} + DROE^a_{i,t},$$

where *j* stands for the industry to which firm *i* belongs. Because industry abnormal ROE varies with industry characteristics and firm differential abnormal ROE varies with firm characteristics, these two components might have different persistence.[6] Accordingly, this paper analyzes them separately. The industry level analysis examines how industry characteristics affect industry abnormal ROE and the firm level analysis examines how firm characteristics affect firm differential abnormal ROE.[7]

III. SAMPLE SELECTION AND VARIABLE MEASUREMENT

Sample Selection

All firm-year observations in the period 1976-1997 with available data on abnormal ROE and firm characteristics from the 1998 Compustat database are used in the abnormal ROE analyses. The sample period begins with 1976, when there are enough observations to estimate the predicted future industry abnormal ROE (which is used in the firm abnormal ROE analyses, and the estimation of which is described in Section IV). The sample period ends with 1997 due to the need for one-year-ahead abnormal ROE. Regulated firms, including financial institutions (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4999), are excluded because their operations are markedly different from other firms.[8] Observations with book value of equity less than $1 million and those with abnormal ROE greater than 100 percent or less than -100 percent (2.2 percent of the original sample) are dropped to reduce the influence of extreme values. The final sample consists of 3,270 observations for the industry abnormal ROE analyses and 22,536 observations for the firm abnormal ROE analyses. The sample for the market-to-book ratio analyses is described in Section V.

Variable Measurement

Firm abnormal ROE

Firm abnormal ROE is measured as the difference between ROE and the industry cost of equity, where ROE is measured as net income before extraordinary items available for common equity deflated by beginning-of-period book value of equity. The industry cost of equity is the sum of the annualized one-month T-bill yield and the industry equity premium. This latter term is estimated from the conditional three-factor model as studied in Fama and French (1997). This paper uses the industry cost of equity because it contains smaller measurement errors than the firm cost of equity (Fama and French 1997).

Firm characteristics

Market share is measured as the ratio of a firm's sales to total industry sales. Firm size is measured as the natural logarithm of total assets. This paper uses three proxies for barriers to entry: R&D intensity (the ratio of R&D expenditures to sales) for product innovation, advertising intensity (the ratio of advertising expenditures to sales) for product differentiation, and capital intensity (the ratio of depreciation, depletion and amortization expenses to sales) for minimum required capital. However, high capital intensity could also result in low abnormal ROE due to high capacity adjustment costs (Lev 1983). Thus, the direction of the impact of capital intensity is unclear.

Conservative accounting factors are calculated for R&D and advertising expenditures. The R&D reserve is the unamortized portion of R&D assets generated by current and past R&D expenditures if these expenditures were capitalized. Similarly for the advertising reserve. R&D assets are amortized using the coefficients reported in Lev and Sougiannis (1996). Advertising assets are amortized using an accelerated method (sum-of-year digits over two years), as in Penman and Zhang (2002).

Note that economic rents and conservative accounting effects might be related. For example, successful R&D investments can affect abnormal ROE through both economic rents and conservative accounting factors. These two effects are conceptually distinguishable though. While abnormal ROE due to economic rents increases with the level of R&D expenditures, abnormal ROE due to conservative accounting depends on both the level and the growth of R&D expenditures. These effects are empirically distinguishable if their empirical proxies, R&D intensity and the R&D conservative accounting factor, are not highly correlated. The correlation between these two variables is low (-0.05) in the sample.[9] Similar arguments and correlation evidence apply to advertising expenditures.[10]

Industry abnormal ROE and industry characteristics

Industries are classified on the basis of 3-digit SIC codes. Industry abnormal ROE, economic rent proxies (except concentration), and conservative accounting factors are weighted averages of accompanying firm measures. The weight for an industry measure is the denominator used to calculate the accompanying firm measure. For example, the weight for industry abnormal ROE is beginning-of-period book value of equity. Industry concentration is proxied by the Herfindahl index, calculated as the sum of squared market shares of all firms in an industry. The higher the Herfindahl index, the more concentrated the industry is.

Other factors

Prior research suggests that special items, accruals, and the magnitude of abnormal ROE might negatively affect the persistence of firm performance (Brooks and Buckmaster 1976; Fairfield et al. 1996; Sloan 1996). Accordingly, the empirical analyses include these variables, referred to as other factors, as control variables when analyzing the incremental explanatory power of economic rent proxies and conservative accounting factors. These variables are measured in absolute values, and special items and total accruals are scaled by beginning-of-period book value of equity, as done in prior research.

Variable measurement is summarized in Appendix B.

Descriptive statistics

Panel A of Table 1 reports variable means and medians at the industry and firm levels. Industry abnormal ROE has a mean of -0.017 and firm abnormal ROE has a mean of -0.053.[11] The cost of equity is around 0.14. On average, a firm enjoys five percent of the product market and has about $130 million of assets (the table reports log values.) The Herfindahl index for an industry is around 0.24. R&D expenditures are around 1.5 percent of sales for average industries and three percent for average firms; advertising intensity is around two percent and capital intensity is around four percent.

[Insert Table 1 here]

At the firm level, unrecognized assets from R&D and advertising expenditures equal 16 percent and two percent of book value of equity, respectively. The ratios are nine percent and three percent at the industry level. As discussed in Section II, conservative accounting policies increase abnormal ROE for firms with high growth in investments and decrease abnormal ROE for those with low growth; thus the average conservative accounting factor is around zero.

While the magnitude of special items is relatively small, about two percent of book value of equity, the absolute value of total accruals is about 18 percent of book value of equity. The absolute value of industry abnormal ROE and firm differential abnormal ROE are on average 0.07 and 0.12, respectively.

Panel B reports the correlations between variables, the upper triangle for industry characteristics and the lower triangle for firm characteristics. Although most correlations are significantly different from zero, they are generally small and the regressions are not subject to multicollinearity based on the condition index (Belsley et al. 1980).[12]

IV. ABNORMAL ROE ANALYSES

Assuming that industry and firm differential abnormal ROE follows an AR(1) process, this section examines whether the AR(1) parameters vary with economic rent proxies and conservative accounting factors as hypothesized above.[13] I first report results when economic rent proxies and conservative accounting factors are used to explain the persistence of industry abnormal ROE and firm differential abnormal ROE. I then extend the analyses by allowing the permanent level of abnormal ROE to vary as well. A discussion of sensitivity tests concludes this section.

The Industry Abnormal ROE Analysis

This subsection investigates whether industry economic rent proxies and conservative accounting factors help predict future abnormal ROE using the following regression:

$$ROE^a_{t+1} = \phi_0 + \alpha_0 ROE^a_t + \alpha_1 ROE^a_t \times Concentration_t + \alpha_2 ROE^a_t \times Barriers\ to\ entry_t + \alpha_3 ROE^a_t \times Conservative\ accounting\ factors_t + \alpha_4 ROE^a_t \times Other\ factors_t + \varepsilon_{t+1} \quad (4)$$

The industry subscript is dropped from all variables for ease of notation. Industry characteristics are mean-adjusted within each year so that α_0 represents the average persistence of industry abnormal ROE. See Appendix B for variable measurement. H1 and H2 imply that coefficients on concentration, barriers to entry (except capital intensity), and conservative accounting factors are positive.

Table 2 reports yearly regression results. T-statistics of average coefficients are used to test significance levels (Fama and MacBeth 1973). As in the regressions presented below, all independent variables are winsorized at the 1st and 99th percentiles to reduce the influence of extreme values. For comparison purposes, Column A reports results when only the current industry abnormal ROE and other factors are included. The average persistence of industry abnormal ROE is 0.79. Consistent with prior research, special items, total accruals, and the magnitude of industry abnormal ROE have negative coefficients.

[Insert Table 2 here]

Column B reports the results from the full model. Although the impact of concentration is insignificant, the impact of barriers to entry is significantly positive, as expected. Also as expected, the R&D conservative accounting factor has a significantly positive impact. The advertising conservative accounting factor has an insignificant coefficient, probably due to the short useful life of advertising investments (Kothari et al. 2002). Overall, including industry economic rent proxies and conservative accounting factors significantly increases the explanatory power. The adjusted R^2 increases from 0.61 in Column A to 0.64 in Column B, significant at the 0.0257 level based on Wald tests.[14,15]

The Firm Abnormal ROE Analysis

This subsection investigates whether firm economic rent proxies and conservative accounting factors help predict firm abnormal ROE using the following regression:

$$ROE^a_{t+1} = \phi_0 + \phi_1 R\hat{O}E^a_{j,t+1} + \alpha_0 DROE^a_t + \alpha_1 DROE^a_t \times Market\ share_t + \alpha_2 DROE^a_t \times Firm\ size_t + \alpha_3 DROE^a_t \times Barriers\ to\ entry_t + \alpha_4 DROE^a_t \times Conservative\ accounting\ factors_t + \alpha_5 DROE^a_t \times Other\ factors_t + \varepsilon_{t+1} \quad (5)$$

The firm subscript is dropped from all variables except the *predicted* future industry abnormal ROE ($R\hat{O}E^a_{j,t+1}$), for which subscript *j* represents industry *j* to which the firm belongs. $R\hat{O}E^a_{j,t+1}$ is used to capture the industry component of future firm abnormal ROE.[16] Firm characteristics are mean-adjusted within each year so that α_0 represents the average persistence of firm differential abnormal ROE. See Appendix B for variable measurement. H1 and H3 suggest that coefficients on market share, firm size, barriers to entry (except capital intensity), and conservative accounting factors are positive.

Table 3 reports yearly regression results. For comparison purposes, Column A only includes predicted future industry abnormal ROE, current firm differential abnormal ROE, and other factors, and Column B reports the results from the full model. As expected, the impact of market share, firm size, and barriers to entry is significantly positive. The coefficient on the R&D conservative accounting factor is significantly positive as predicted, but that on the advertising conservative accounting factor is insignificant. Overall, incorporating firm economic characteristics and conservative accounting factors significantly increases the explanatory power. The adjusted R^2 increases from 0.30 in Column A to 0.34 in Column B, significant at the 0.0003 level based on Wald tests.

[Insert Table 3 here]

In sum, the results in this and the previous subsection suggest that as expected, economic rent proxies and conservative accounting factors are positively associated with the persistence of abnormal ROE. Allowing the persistence to vary with these determinants increases the explanatory power by five percent and 13 percent for industry and firm differential abnormal ROE, respectively.

Explaining the Permanent Level of Abnormal ROE

While allowing the persistence of the AR(1) process to vary, the above analyses assume its intercept, which captures the mean abnormal ROE, to be constant across industries and firms. Prior research suggests that this assumption might not hold. Mueller (1977) argues that because firms spend resources to maintain barriers to entry and economic rents, there might be permanent differences in profitability across industries and firms. Consistent with this argument, Mueller (1977) finds that firm profitability does not converge to the competitive rate of return. Mueller (1986) further argues that these differences vary systematically with industry and firm characteristics. Similarly, Zhang (2000) models the impact of conservative accounting on earnings in a *steady* state and shows that the impact could be nonzero and varies with industry and firm characteristics as well.

This subsection extends the above analyses by allowing the mean abnormal ROE, referred to as the permanent level, to vary with economic rent proxies and conservative accounting factors. Since the intercept of an AR(1) process is the product of the mean and one minus the persistence, the regression equation for industry abnormal ROE becomes:[17]

$$ROE^a_{t+1} = ROE^a(1-\rho) + \rho ROE^a_t + \varepsilon_{t+1},$$

where both the permanent level (ROE^a) and the persistence (ρ) are expressed as functions of economic rent proxies and conservative accounting factors:

$$ROE^a = \beta_0 + \beta_1 Concentration_t + \beta_2 Barriers\ to\ entry_t + \beta_3 Conservative\ accounting\ factors_t$$
$$\rho = \alpha_0 + \alpha_1 Concentration_t + \alpha_2 Barriers\ to\ entry_t + \alpha_3 Conservative\ accounting\ factors_t + \alpha_4 Other\ factors_t$$

Coefficients α's capture the impact on the persistence, as in equation (4), and coefficients β's capture the impact on the permanent level.

Table 4 reports yearly regression results. Since the regression equation is non-linear in the coefficients, the non-linear OLS regression method is used.[18] The results for persistence are similar to those reported in Table 2. The impact of industry concentration on the permanent level is significantly positive, suggesting that concentrated industries can earn positive abnormal ROE in the long run. R&D intensity and advertising intensity have a significantly positive impact, as expected. Capital intensity has a negative impact (marginally significant). Conservative accounting factors have a positive impact on the permanent level, as expected. Overall, controlling for the impact of industry characteristics on both the persistence and the permanent level increases the adjusted R^2 from 0.61 in Column A, when only current industry abnormal ROE and other factors are included, to 0.67 in Column B, significant at the 0.0012 level.

[Insert Table 4 here]

The regression equation for firm abnormal ROE is constructed similarly and Table 5 reports regression results. The results for persistence are similar to those reported in Table 3. The impact of both market share and firm size on the permanent level is significantly positive. The impact of barriers to entry is mixed—marginally significantly positive for

R&D intensity, insignificant for advertising intensity, and significantly negative for capital intensity. The impact of the R&D conservative accounting factor is significantly positive, but that of the advertising conservative accounting factor is insignificant. Overall, the adjusted R^2 increases from 0.31 in Column A to 0.37 in Column B, significant at the 0.0001 level.

[Insert Table 5 here]

Comparing the results in Table 4 with those in Table 2, or Table 5 with Table 3, suggests that controlling for the cross-sectional variation in the permanent level further increases the explanatory power. Untabulated results suggest that the increases are significant. In sum, compared to a model with current abnormal ROE and other factors, using economic rent proxies and conservative accounting factors to explain the variation in both the persistence of abnormal ROE and its permanent level increases the adjusted R^2 by ten percent and 20 percent for industry and firm abnormal ROE analyses, respectively.

Sensitivity Tests

Industry classification. Industry classification involves a trade-off between homogeneity of firms in the same industry and appropriate classification for diversified firms. The more detailed the industry classification, the more homogenous the non-diversified firms in an industry are, but the more problematic is the classification for diversified firms. Unfortunately, there is no agreement on appropriate industry classification. Using 4-digit SIC industries or the industry classification in Fama and French (1997) yields similar results.

Variable measurement. First, using total market share of the four largest firms in an industry, instead of the Herfindahl index, to proxy for industry concentration yields similar results. Second, the results based on alternative estimates of the industry equity premium are similar: (1) the average historical equity premium for all industries (0.0516, as reported in Fama and French 1997), (2) Capital Asset Pricing Model (CAPM), and (3) the three-factor model. Using the firm cost of equity estimated from CAPM or the three-factor model also yields similar results. Third, the impact of market share and firm size could be confounded by diversification because market share and firm size might be correlated with diversification and diversification can result in a deviation of firm performance from the industry level (Mueller 1977). Controlling for diversification (measured as the sum of squared sales shares of all industry segments in the firm) does not change the inferences.

Finally, because the measurement of certain variables (capital intensity, firm size, special items, and total accruals) is affected by accounting choices, their coefficients might be confounded by conservative accounting effects. Using alternative measurements that are less likely to be affected by accounting choices—the ratio of plant, property, and equipment to sales as a proxy for capital intensity, natural logarithm of sales for firm size, and special items and total accruals scaled by sales—yields similar results.

Model estimation. This paper does not analyze the impact of financial leverage on abnormal ROE based on the notion that financial activities do not create abnormal profits and are accounted for unbiasedly (Feltham and Ohlson 1995). Controlling for financial leverage in the empirical analyses by adding a main effect and an interaction with current abnormal ROE does not affect the inferences. Also, estimating pooled regressions yields similar results.

V. MARKET-TO-BOOK RATIO ANALYSES

The abnormal ROE analyses suggest that the determinants of abnormal ROE can improve forecasts of one-period-ahead abnormal ROE. However, if the information dynamic of abnormal ROE differs from an AR(1) process, investigating only one-period-ahead abnormal ROE is insufficient for valuation purposes. For instance, untabulated analyses suggest that an AR(2) process is more descriptive than an AR(1) process for about 35 percent of the industries with at least 25 years of consecutive data. Thus, this section *directly* links the determinants of abnormal ROE to firm value, i.e., the market-to-book ratio, to examine the extent to which integrating these determinants improves valuation implementations.

Like the abnormal ROE analyses, the market-to-book ratio analyses are conducted at both the industry and firm levels. Market value is measured four months after fiscal-year-ends so that the capital markets can integrate the information in the current year's financial statements. It is calculated as market value at fiscal-year-ends multiplied by cumulated returns in the four months afterwards. Overall, 3,396 industry-year observations and 19,898 firm-year observations in the period 1976-1997 are used in the industry and the firm market-to-book ratio analyses, respectively.[19] As reported in Panel A of Table 1, the mean of industry market-to-book ratios is 1.947 and the mean of firm market-to-book ratios is 1.944.

The Industry Market-to-book Ratio Analysis

The regression specification for the market-to-book ratio analyses is derived from the RIM model. Scaling both sides of equation (1′) under unbiased accounting by book value of equity under conservative accounting indicates that the market-to-book ratio (a) increases with the difference in book value of equity between unbiased and conservative accounting, i.e., the estimated reserve, (b) decreases with the cost of equity, (c) increases with the growth of book value of equity, and (d) increases with future abnormal ROE under unbiased accounting, which in turn increases with current abnormal ROE and economic rent proxies.[20] Thus, the regression for the industry market-to-book ratio analysis is:

$$\frac{MV_t}{BV_t} = \phi_0 + \phi_1 \frac{ER_t}{BV_t} + \beta_1 Cost\,of\ equity_t + \beta_2 Growth_t + \beta_3 Concentration_t + \beta_4 Barriers\ to\ entry_t + \alpha_0 ROE_t^a + \alpha_1 ROE_t^a \times Cost\,of\ equity_t + \alpha_2 ROE_t^a \times Growth_t + \alpha_3 ROE_t^a \times Concentration_t + \alpha_4 ROE_t^a \times Barriers\ to\ entry_t + \alpha_5 ROE_t^a \times Other\ \ factors_t + \varepsilon_t \tag{6}$$

The industry subscript is dropped from all variables for ease of notation. The main effects of industry characteristics are included to capture the permanent level effect and their interactions with abnormal ROE are included to capture the persistence effect. Growth is defined as the percentage change in book value of equity. Other variables are defined as before (see Appendix B for variable measurement.)

Table 6 reports the yearly regression results from equation (6) and, for comparison purposes, the results from two simpler specifications.[21] Column A only includes current industry abnormal ROE and other factors. Column B controls for conservative accounting effects by adding estimated reserves. As expected, coefficients on estimated reserves are significantly positive. The adjusted R^2 increases from 0.25 to 0.29, significant at the 0.01 level. This suggests that incorporating conservative accounting effects helps explain the variation in the industry market-to-book ratio.

[Insert Table 6 here]

Column C reports the results from the full model. Although coefficients on estimated reserves become insignificant after controlling for other industry characteristics, coefficients on most other industry characteristics are significant in the predicted directions. The adjusted R^2 increases from 0.29 in Column B to 0.35 in Column C, significant at the 0.0036 level. Overall, these results suggest that incorporating economic and accounting characteristics helps explain the variation in the industry market-to-book ratio.

The Firm Market-To-Book Ratio Analysis

The regression for the firm market-to-book ratio analysis is constructed similarly:

$$\frac{MV_t}{BV_t} = \phi_0 + \phi_1 \frac{MV_{j,t-1}}{BV_{j,t-1}} + \phi_2 R\hat{O}E_j^a + \phi_3 \frac{ER_t}{BV_t} + \beta_1 Cost\ of\ equity_t + \beta_2 Growth_t + \beta_3 Market\ share_t +$$
$$\beta_4 Firm\ size_t + \beta_5 Barriers\ to\ entry_t + \alpha_0 DROE_t^a + \alpha_1 DROE_t^a \times Cost\ of\ equity_t +$$
$$\alpha_2 DROE_t^a \times Growth_t + \alpha_3 DROE_t^a \times Market\ share_t + \alpha_4 DROE_t^a \times Firm\ size_t +$$
$$\alpha_5 DROE_t^a \times Barriers\ to\ entry_t + \alpha_6 DROE_t^a \times Other\ \ factors_t + \varepsilon_t \tag{7}$$

The firm subscript is dropped from all variables except lagged industry market-to-book ratio ($MV_{j,t-1} / BV_{j,t-1}$) and the estimated industry permanent abnormal ROE ($R\hat{O}E_j^a$), for which subscript *j* represents industry *j* to which the firm belongs. These two industry variables are included to capture the industry level market-to-book variation.[22] The industry permanent abnormal ROE is estimated from rolling AR(1) regressions of abnormal ROE for individual industries, as explained in Section IV. Other variables are defined as before (see Appendix B for variable measurement.)

Table 7 reports the yearly regression results from equation (7) and from two simpler specifications to test the incremental explanatory power of conservative accounting and other firm characteristics separately. Column A includes lagged industry market-to-book ratio, the estimated industry permanent abnormal ROE, current firm differential abnormal ROE, and other factors. Column B controls for conservative accounting effects by adding estimated reserves. As expected, coefficients on estimated reserves are significantly positive. The adjusted R^2 increases from 0.33 to 0.38, significant at the 0.0001 level.

[Insert Table 7 here]

Column C reports the results from the full model. As expected, coefficients on the cost of equity and on its interaction with firm differential abnormal ROE are significantly negative. Also as expected, coefficients on growth, market share, firm size, R&D intensity, and their interactions with firm differential abnormal ROE are significantly positive, except that firm size has an insignificant main effect and market share has an insignificant interaction effect. The adjusted R^2 increases further from 0.38 in Column B to 0.44 in Column C, significant at the 0.0001 level.

In sum, the market-to-book ratio analyses suggest that integrating determinants of abnormal ROE can significantly improve the RIM's explanatory power for the market-to-book ratio. Additional analyses are conducted to investigate how well this approach performs relative to models used in prior studies. For example, Fairfield et al. (1996) find that disaggregating earnings can improve forecasts of future ROE, and Bhojraj and Lee (2002) find that certain industry and firm characteristics, including industry market-to-book ratio, firm profit margin, and analysts' growth forecasts, can help explain the firm market-to-book ratio. The results, not reported for the sake of brevity, suggest that integrating determinants of abnormal ROE provides significant incremental explanatory power over models used in prior research, such as Fairfield et al. (1996) in predicting future ROE and Bhojraj and Lee (2002) in explaining the firm market-to-book ratio.[23]

VI. CONCLUSIONS

This paper investigates what determines abnormal ROE. It uses industry and firm characteristics suggested by economic theories to capture economic rents and develops an empirical measure—the conservative accounting factor—to capture the impact of conservative accounting. The empirical analyses examine whether these determinants help predict future abnormal ROE and help explain the market-to-book ratio.

As expected, industry abnormal ROE increases with industry concentration, industry level barriers to entry, and industry conservative accounting factors. Similarly, firm differential abnormal ROE increases with market share, firm size, firm level barriers to entry, and firm conservative accounting factors. The market-to-book ratio analyses further indicate that integrating these determinants of abnormal ROE into the RIM significantly increases its explanatory power for the variation in the market-to-book ratio. The adjusted R^2 increases by 40 percent and 33 percent at the industry and firm levels, respectively, compared with a model with current abnormal ROE and other factors suggested by prior research (i.e., special items, total accruals, and the magnitude of abnormal ROE). Additional analyses indicate that these determinants provide incremental explanatory power over models analyzed in prior studies (e.g., Bhojraj and Lee 2002; Fairfield et al. 1996).

Overall, this paper contributes to the valuation literature by investigating determinants of abnormal ROE and by linking these determinants to firm value. The analyses demonstrate the importance of these determinants in predicting future abnormal ROE and in explaining the market-to-book ratio. These results are important not only for improving valuation implementations, but also for studies relying on the RIM valuation framework, by suggesting a list of economic and accounting control variables that can capture the cross-sectional variation in firm value.

APPENDIX A
Derivation of the Decomposition Equation (Equation 3)

Equation (2) in the paper,

$$X_t^{'} - X_t = ER_t - ER_{t-1}, \tag{2}$$

links the difference in net income (*X*) under the two accounting systems (unbiased accounting and conservative accounting) to the change in the estimated reserve (*ER*). Accounting numbers under unbiased accounting are denoted by " ' ".

Dividing both sides of equation (2) by beginning-of-period book value of equity under conservative accounting yields:

$$\frac{X_t^{'}}{BV_{t-1}} - \frac{X_t}{BV_{t-1}} = \frac{ER_t - ER_{t-1}}{BV_{t-1}}. \tag{2′}$$

The first term on the left-hand side of equation (2′) can be expressed as:

$$\begin{aligned}\frac{X_t^{'}}{BV_{t-1}} &= \frac{X_t^{'}}{BV_{t-1}^{'}} \cdot \frac{BV_{t-1}^{'}}{BV_{t-1}} \\ &= \frac{X_t^{'}}{BV_{t-1}^{'}} \cdot \frac{BV_{t-1} + ER_{t-1}}{BV_{t-1}} \\ &= (ROE_t^{a'} + r) \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}),\end{aligned}$$

where $ROE_t^{a'}$ $(= X_t^{'} / BV_{t-1}^{'} - r)$ is abnormal ROE under unbiased accounting. (Recall that *ER* is defined as: $ER_t = BV_t^{'} - BV_t$.) The second term on the left-hand side of equation (2′), by the definition of abnormal ROE, can be expressed as: $X_t / BV_{t-1} = ROE_t^a + r$.

Thus, the left-hand side of equation (2′) can be written as:

$$\begin{aligned}\frac{X_t^{'}}{BV_{t-1}} - \frac{X_t}{BV_{t-1}} &= (ROE_t^{a'} + r) \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}) - (ROE_t^a + r) \\ &= ROE_t^{a'} \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}) + r \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}) - ROE_t^a - r \\ &= ROE_t^{a'} \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}) + r \cdot \frac{ER_{t-1}}{BV_{t-1}} - ROE_t^a\end{aligned}$$

Substituting the above equation into equation (2′) yields:

$$ROE_t^{a'} \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}) + r \cdot \frac{ER_{t-1}}{BV_{t-1}} - ROE_t^a = \frac{ER_t - ER_{t-1}}{BV_{t-1}},$$

After rearranging the terms of the above equation, one can obtain equation (3):

$$\begin{aligned}ROE_t^a &= r \cdot \frac{ER_{t-1}}{BV_{t-1}} - \frac{ER_t - ER_{t-1}}{BV_{t-1}} + ROE_t^{a'} \cdot (1 + \frac{ER_{t-1}}{BV_{t-1}}) \\ &= \frac{(1+r)ER_{t-1} - ER_t}{BV_{t-1}} + ROE_t^{a'}(1 + \frac{ER_{t-1}}{BV_{t-1}}) \\ &= CAF_t + ROE_t^{a'}(1 + \frac{ER_{t-1}}{BV_{t-1}}),\end{aligned}$$

where $CAF_t = \frac{(1+r)ER_{t-1} - ER_t}{BV_{t-1}}$, referred to as the conservative accounting factor.

APPENDIX B
Variable Measurement

Variable	Measurement (Compustat item numbers in parentheses)
Panel A: Firm abnormal ROE	
Firm abnormal ROE	Net income $(\#237)_t$/Book value of equity $(\#60)_{t-1}$ -cost of equity $_t$
Firm differential abnormal ROE	Firm abnormal ROE - industry abnormal ROE
Panel B: Firm market-to-book ratio	
Market-to-book ratio	(Market value four months after fiscal-year-ends)$_t$ / (Book value of equity)$_t$
Panel C: Firm characteristics - economic rent proxies	
Market share	Sales $(\#12)_t$ /[Σ(Sales)$_t$ over the industry]
Firm size	Log(Assets $(\#6)_t$)
Barriers to entry	
R&D intensity	R&D expenditures $(\#46)_t$ / Sales $_t$
Advertising intensity	Advertising expenditures $(\#45)_t$ / Sales $_t$
Capital intensity	Depreciation, depletion, and amortization expenses $(\#14)_t$ / Sales $_t$
Panel D: Firm characteristics - conservative accounting factors	
Conservative accounting factors are calculated as:	
[(1+cost of equity $_t$)(estimated reserve)$_{t-1}$– (estimated reserve)$_t$] /(Book value of equity)$_{t-1}$.	
Two conservative accounting factors are calculated and the estimated reserve for each factor is calculated as follows.	
Estimated reserve - R&D	The un-amortized portion of R&D assets generated by current and past R&D expenditures if these expenditures were capitalized. R&D assets are amortized using the coefficients reported in Lev and Sougiannis (1996). To reduce data restriction, the amortization period is chosen to be 5 years and the coefficients are adjusted proportionally such that they add up to one. Coefficients for "other industries" are used for an industry, unless coefficients for the industry are reported by Lev and Sougiannis.
Estimated reserve - Advertising	The un-amortized portion of advertising assets generated by current and past advertising expenditures if these expenditures were capitalized. As in Penman and Zhang (2002), advertising assets are amortized using an accelerated method (i.e., sum-of-year digits over two years).
Panel E: Firm characteristics - other factors	
Special items	|Special items $(\#17)_t$ | / (Book value of equity)$_{t-1}$
Total accruals	|Total accruals (#18-#308) $_t$ | / (Book value of equity)$_{t-1}$*
Magnitude of firm differential abnormal ROE	|Firm differential abnormal ROE|
Panel F: Industry variable measurement	
Industry measures, except the Herfindahl index and the magnitude of industry abnormal ROE, are weighted averages of accompanying firm measures. The weight used for each measure is specified below.	
Industry abnormal ROE	Beginning-of-period book value of equity is the weight.
Market-to-book ratio	Book value of equity is the weight.
Barriers to entry	Sales is the weight.
Conservative accounting factors	Beginning-of-period book value of equity is the weight.
Special items and total accruals	Beginning-of-period book value of equity is the weight.
Herfindahl Index	Sum of squared market shares in the industry.
Magnitude of industry abnormal ROE	|Industry abnormal ROE|

* If operating cash flows (#308) is missing or unavailable (prior to 1987), it is estimated as: funds from operations (#110) - change in current assets (#4) + change in current liabilities (#5) + change in cash and cash equivalents (#1) - change in current portion of long-term debt (#34). Current portion of long-term debt is set to be zero if it is reported as missing in the Compustat.

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[1] See Lee (1999) and Lo and Lys (2000) for reviews of RIM-based studies.

[2] Prior research generally focuses either on economic rents or on conservative accounting. One exception is a concurrent study, Jansen (2002), which also investigates both effects. Compared to Jansen (2002), this paper uses a more comprehensive set of economic rent proxies and allows both the persistence and the permanent level of firm performance to vary with economic rents and conservative accounting factors, instead of attributing the permanent level to conservative accounting effects and the persistence to economic rents, as done in Jansen (2002).

[3] An exception to this rule is that firms can capitalize R&D expenditures associated with computer software development incurred after the establishment of technological feasibility.

[4] Equation (3) suggests that conservative accounting also affects abnormal ROE through the lagged estimated reserve (the second term). Given that on average economic rents ($ROE_t^{a'}$) are zero due to competition, the lagged estimated reserve is not correlated with abnormal ROE in a cross-sectional setting; for simplicity, it is not considered in the empirical analyses. Explicitly controlling for the lagged estimated reserve does not affect the inferences.

[5] To see how the conservative accounting factor is contingent on growth, one can rewrite CAF_t as $(r - g_{ER,t})ER_{t-1} / BV_{t-1}$, where $g_{ER,t}$ ($= [ER_t - ER_{t-1}] / ER_{t-1}$) stands for the growth of the estimated reserve. Thus, a conservative accounting policy has a negative impact on abnormal ROE for firms with high growth in investments recorded conservatively and a positive impact for firms with low or no growth in those investments.

[6] This is empirically confirmed based on 219 industries and 1,052 firms with at least 25 consecutive years of data on abnormal ROE. The difference in abnormal ROE persistence (estimated from AR(1) processes) between a firm and the industry to which it belongs has a wide range. For an industry with a persistence of 0.55 (the sample average), half of the firms in the industry have a persistence higher than 0.65 or lower than 0.33.

[7] Combining the industry and firm analyses together, while still allowing the two components to have different persistence, does not change the inferences but makes result presentations cumbersome.

[8] Although certain industry characteristics are used to explain industry performance, special features of regulated industries, such as regulations on the rate of return, still warrant separate analyses. See Nwaeze (2000) for a detailed discussion of electric utilities.

[9] This low correlation reflects the underlying low association between the level and the growth of R&D expenditures.

[10] Nevertheless, readers should interpret the results with caution. Using R&D and advertising intensity to proxy for economic rents is somewhat arbitrary and might capture conservative accounting effects. Also, the CAF measure is sensitive to the amortization method and the cost of equity estimation.

[11] The reason for the negative mean abnormal ROE could be that: (1) the equity premium is overestimated; (2) bankrupt firms included in the Compustat Research file have low or negative ROE; or (3) firms with high growth in R&D or advertising expenditures in the sample period have negative abnormal ROE because of conservative accounting. Firms in the last two scenarios are generally small and have lower weight in calculating the mean industry abnormal ROE (book-value-weighted average of firm abnormal ROE) than in calculating the mean firm abnormal ROE (equal-weighted average). This explains why the mean firm abnormal ROE is more negative than the mean industry abnormal ROE.

[12] As reported in Panel B, firm size is highly correlated with market share. This high correlation could lead to insignificant coefficients on firm size and market share even if they jointly have significant explanatory power. Accordingly, the regression analyses use residuals from yearly regressions of firm size on market share to capture the incremental impact of firm size beyond market share. The underlying assumption of this approach is that market share is a more fundamental economic construct.

[13] Unlike this paper, prior research generally assumes the parameters to be constant across firms and over time.

[14] This paper uses Wald tests to compare explanatory power of alternative model specifications and reports median p-values of yearly Wald tests.

[15] This relatively small improvement partly results from not controlling for the variation in the permanent level, as discussed later.

[16] Using realized future industry abnormal ROE is inconsistent with forecasting purposes. Predicted future industry abnormal ROE is estimated from rolling AR(1) regressions of abnormal ROE for individual industries. For example, to predict an industry's abnormal ROE in 1990, all available abnormal ROE of the industry up to 1989 (since 1963) are used to estimate an AR(1) process. The estimated parameters and abnormal ROE in 1989 are then used to predict industry abnormal ROE in 1990. To ensure the accuracy of estimating AR(1), at least 12 time-series observations are used.

[17] To see this, one can write an AR(1) process as: $ROE^a_{t+1} = \phi_0 + \rho ROE^a_t + \varepsilon_{t+1}$. Taking expectations of both sides yields: $E(ROE^a_{t+1}) = \phi_0 + \rho E(ROE^a_t)$. Denoting the mean abnormal ROE as ROE^a and rearranging terms, one can obtain: $\phi_0 = ROE^a(1-\rho)$; that is, the intercept is the product of the mean and one minus the persistence. Expressing the intercept in the AR(1) process this way yields the regression equation.

[18] The idea of the non-linear OLS regression is similar to that of the OLS regression: minimizing the sum of squared errors. Basically, estimates of the coefficients are revised repeatedly to reduce the sum of squared errors; an optimal set of coefficient estimates is found when no further improvement can be obtained.

[19] The market-to-book ratio analyses have slightly different samples from the abnormal ROE analyses because the former require data on market value and the latter require data on future abnormal ROE.

[20] See Cheng (2002) for a detailed discussion of the link from determinants of abnormal ROE to the market-to-book ratio. Theoretically, conservative accounting effects should also be controlled for by adjusting abnormal ROE for CAF. For simplicity, the analyses here do not make such adjustments; doing so does not affect the inferences.

[21] All observations with an absolute value of R-student measure greater than three are identified as outliers and excluded (Belsley et al. 1980). Note that the abnormal ROE analyses do not identify or exclude outliers because doing so requires information about future abnormal ROE and is inconsistent with forecasting purposes.

[22] Using contemporaneous industry market-to-book ratio is inconsistent with valuation purposes.

[23] The adjusted R^2 after integrating determinants of abnormal ROE into the model used in Fairfield et al. (Bhojraj and Lee) is 0.06 (0.11) higher, a relative increase of 20 percent (31 percent). Both increases are significant at the 0.001 level based on Wald tests. See Cheng (2002) for details.

TABLE 1
Descriptive Statistics

Descriptive statistics on all variables, except the market-to-book ratio and estimated reserves, are based on the sample for the abnormal ROE analysis: 22,536 firm-year observations in the period 1976-1997 for firm level analyses and 3,270 industry-year observations in the same period for industry level analyses. Descriptive statistics on the market-to-book ratio and estimated reserves are based on the sample for the market-to-book ratio analysis: 19,898 firm-year observations for firm level analyses and 3,396 industry-year observations for industry level analyses. See Appendix B for variable measurement.

Panel A: Descriptive statistics on industry and firm characteristics

	Industry level		Firm level	
Variable	Mean	Median	Mean	Median
Abnormal ROE	-0.017	-0.010	-0.053	-0.031
Firm differential abnormal ROE	NA	NA	-0.024	-0.006
Cost of equity	0.136	0.140	0.139	0.142
Market-to-book ratio	1.947	1.848	1.944	1.374
Market share	NA	NA	0.049	0.008
Firm size	NA	NA	4.961	4.835
Concentration	0.236	0.208	NA	NA
Barriers to entry				
R&D intensity	0.015	0.007	0.034	0.012
Advertising intensity	0.020	0.012	0.019	0.010
Capital intensity	0.040	0.032	0.039	0.030
Estimated reserves (scaled by book value of equity)				
R&D	0.088	0.080	0.161	0.069
Advertising	0.025	0.021	0.021	0.007
Conservative accounting factors				
R&D	0.005	0.001	0.005	0.000
Advertising	0.000	0.000	0.001	0.000
Other factors				
Special items	0.025	0.012	0.023	0.000
Total accruals	0.174	0.152	0.184	0.123
Magnitude of industry or firm differential abnormal ROE	0.069	0.050	0.122	0.076

TABLE 1 (continued)

Panel B Correlations between variables

The upper (lower) triangle reports Spearman correlations between variables at the industry (firm) level. Abnormal ROE refers to industry abnormal ROE in the upper triangle and firm differential abnormal ROE in the lower triangle. Unless noted, the correlation is significant at the 0.05 level.

								Conservative accounting factor			
	Abnormal ROE	Market share	Firm size	Concentration	R&D intensity	Advertising intensity	Capital intensity	R&D	Advertising	Special items	Total accruals
Abnormal ROE		NA	NA	0.03[#]	-0.01[#]	0.15	-0.14	0.15	0.16	-0.25	-0.17
Market share	0.15		NA	NA	NA	NA	NA	NA	NA	NA	NA
Firm size	0.18	0.72		NA	NA	NA	NA	NA	NA	NA	NA
Concentration	NA	NA	NA		-0.02[#]	-0.07	-0.04	0.05	0.03[#]	-0.13	-0.09
R&D intensity	-0.03	-0.21	0.04	NA		-0.10	0.36	0.30	-0.01[#]	0.11	-0.05
Advertising intensity	0.03	0.01	0.02	NA	0.05		-0.21	-0.09	-0.02[#]	0.08	-0.08
Capital intensity	-0.18	-0.09	0.16	NA	0.29	-0.12		0.15	-0.04	0.23	0.21
Conservative accounting factor- R&D	0.22	0.05	0.00[#]	NA	-0.05	-0.08	0.03		0.22	0.09	0.02[#]
Conservative accounting factor- advertising	0.15	0.02	0.00[#]	NA	-0.02	0.01[#]	0.01	0.07		0.03[#]	-0.01[#]
Special items	-0.24	0.03	0.12	NA	0.08	0.03	0.16	0.10	0.06		0.30
Total accruals	-0.09	-0.05	-0.02	NA	-0.05	-0.03	0.12	0.04	0.01	0.17	

[#] The correlation is insignificant at the 0.05 level.

TABLE 2
The Industry Abnormal ROE Analysis

$$ROE^a_{t+1} = \phi_0 + \alpha_0 ROE^a_t + \alpha_1 ROE^a_t \times Concentration_t + \alpha_2 ROE^a_t \times Barriers\ to\ entry_t + \alpha_3 ROE^a_t \times Conservative\ accounting\ factors_t + \alpha_4 ROE^a_t \times Other\ factors_t + \varepsilon_{t+1} \quad (4)$$

ROE^a_t is industry abnormal ROE. The industry subscript is dropped from all variables for ease of notation. See Appendix B for variable measurement. The analysis is based on 3,270 industry-year observations in the period 1976-1997. Regressions are estimated yearly and industry characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. T-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

	Predicted	Column A		Column B	
	signs	Coefficient	t	Coefficient	t
Intercept	?	-0.00	-3.06	-0.00	-4.88
ROE^a	+	0.79	27.29	0.79	25.40
ROE^a × Concentration	+			0.05	0.48
ROE^a × Barriers to entry					
R&D intensity	+			0.62	1.69
Advertising intensity	+			2.75	3.04
Capital intensity	?			1.17	2.28
ROE^a × Conservative accounting factors					
R&D	+			0.69	1.88
Advertising	+			-2.49	0.74
ROE^a × Other factors					
Special items	-	-3.21	-2.33	-3.45	-2.85
Total accruals	-	-0.31	-1.96	-0.21	-1.66
Magnitude of industry abnormal ROE	-	-0.14	-0.78	-0.07	-0.29
Adjusted R^2		0.61		0.64	
P-value of Wald test				0.0257	

TABLE 3
The Firm Abnormal ROE Analysis

$$ROE^a_{t+1} = \phi_0 + \phi_1 \hat{ROE}^a_{j,t+1} + \alpha_0 DROE^a_t + \alpha_1 DROE^a_t \times Market\ share_t + \alpha_2 DROE^a_t \times Firm\ size_t + \alpha_3 DROE^a_t \times Barriers\ to\ entry_t + \alpha_4 DROE^a_t \times Conservative\ accounting\ factors_t + \alpha_5 DROE^a_t \times Other\ factors_t + \varepsilon_{t+1} \quad (5)$$

ROE^a_t is firm abnormal ROE, $\hat{ROE}^a_{j,t+1}$ is predicted future industry abnormal ROE, and $DROE^a_t$ is firm differential abnormal ROE. The firm subscript is dropped from all variables except $\hat{ROE}^a_{j,t+1}$, for which subscript *j* represents industry *j* to which the firm belongs. See Appendix B for variable measurement. The analysis is based on 22,536 firm-year observations in the period 1976-1997. Regressions are estimated yearly and firm characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. T-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

	Predicted	Column A		Column B	
	signs	Coefficient	t	Coefficient	t
Intercept	?	-0.04	-5.40	-0.03	-5.27
Predicted future industry abnormal ROE	+	0.78	18.27	0.79	18.28
$DROE^a$	+	0.62	34.77	0.61	29.44
$DROE^a$ × Market share	+			0.17	2.00
$DROE^a$ × Firm size	+			0.01	1.98
$DROE^a$ × Barriers to entry					
R&D intensity	+			0.45	2.07
Advertising intensity	+			1.07	2.66
Capital intensity	?			0.82	2.41
$DROE^a$ × Conservative accounting factors					
R&D	+			0.31	2.30
Advertising	+			-0.38	-0.42
$DROE^a$ × Other factors					
Special items	-	-0.84	-10.33	-0.94	-10.94
Total accruals	-	-0.19	-4.07	-0.15	-3.16
Magnitude of firm differential abnormal ROE	-	-0.20	-2.37	-0.26	-3.01
Adjusted R^2		0.30		0.34	
P-value of Wald test				0.0003	

TABLE 4
The Industry Abnormal ROE Analysis
– Explaining Both the Persistence and the Permanent Level

This table reports the results from the following regression that allows both the persistence of industry abnormal ROE and its permanent level to vary with economic rent proxies and conservative accounting factors:

$$ROE^a_{t+1} = ROE^a(1-\rho) + \rho ROE^a_t + \varepsilon_{t+1},$$

where the permanent level (ROE^a) and the persistence (ρ) are expressed as:

$$ROE^a = \beta_0 + \beta_1 Concentration_t + \beta_2 Barriers\ to\ entry_t + \beta_3 Conservative\ accounting\ factors_t$$

$$\rho = \alpha_0 + \alpha_1 Concentration_t + \alpha_2 Barriers\ to\ entry_t + \alpha_3 Conservative\ accounting\ factors_t + \alpha_4 Other\ factors_t$$

ROE^a_t is industry abnormal ROE. The industry subscript is dropped from all variables for ease of notation. See Appendix B for variable measurement. The analysis is based on 3,270 industry-year observations in the period 1976-1997. Regressions are estimated yearly using the non-linear OLS regression method and industry characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. T-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

	Predicted	Column A		Column B	
	signs	Coefficient	t	Coefficient	t
Explaining the persistence ($\alpha_0, \alpha_1, \ldots, \alpha_4$)					
Intercept	+	0.82	27.80	0.82	22.80
Concentration	+			0.02	0.17
Barriers to entry					
R&D intensity	+			2.12	2.84
Advertising intensity	+			1.92	2.85
Capital intensity	?			0.78	2.21
Conservative accounting factors					
R&D	+			0.94	1.97
Advertising	+			1.60	0.46
Other factors					
Special items	-	-2.99	-2.03	-2.77	-5.87
Total accruals	-	-0.25	-1.42	-0.34	-2.84
Magnitude of industry abnormal ROE	-	-0.03	-0.92	-0.12	-2.54
Explaining the permanent level ($\beta_0, \beta_1, \ldots, \beta_3$)					
Intercept	?	0.06	1.23	0.03	1.99
Concentration	+			0.06	2.25
Barriers to entry					
R&D intensity	+			2.47	2.06
Advertising intensity	+			0.92	2.55
Capital intensity	?			-1.48	-1.58
Conservative accounting factors					
R&D	+			2.61	1.73
Advertising	+			7.27	2.97
Adjusted R^2		0.61		0.67	
P-value of Wald test				0.0012	

TABLE 5
The Firm Abnormal ROE Analysis
– Explaining Both the Persistence and the Permanent Level

This table reports the results from the following regression that allows both the persistence of firm differential abnormal ROE and its permanent level to vary with economic rent proxies and conservative accounting factors:

$$ROE^a_{t+1} = \phi_1 R\hat{O}E^a_{j,t+1} + DROE^a(1-\rho) + \rho DROE^a_t + \varepsilon_{t+1},$$

where the permanent level ($DROE^a$) and the persistence (ρ) are expressed as

$$DROE^a = \beta_0 + \beta_1 Market\ share_t + \beta_2 Firm\ size_t + \beta_3 Barriers\ to\ entry_t + \beta_4 Conservative\ accounting\ factors_t$$

$$\rho = \alpha_0 + \alpha_1 Market\ share_t + \alpha_2 Firm\ size_t + \alpha_3 Barriers\ to\ entry_t + \alpha_4 Conservative\ accounting\ factors_t + \alpha_5 Other\ factors_t$$

ROE^a_t is firm abnormal ROE, $R\hat{O}E^a_{j,t+1}$ is predicted future industry abnormal ROE, and $DROE^a_t$ is firm differential abnormal ROE. The firm subscript is dropped from all variables except $R\hat{O}E^a_{j,t+1}$, for which subscript *j* represents industry *j* to which the firm belongs. See Appendix B for variable measurement. The analysis is based on 22,536 firm-year observations in the period 1976-1997. Regressions are estimated yearly using the non-linear OLS regression method and firm characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. T-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in Column B is higher than that in Column A. The median p-value of yearly Wald tests is reported.

TABLE 5 (continued)

	Predicted signs	Column A Coefficient	Column A t	Column B Coefficient	Column B t
Predicted future industry abnormal ROE (ϕ_1)	+	0.77	18.87	0.76	19.37
Explaining the persistence (α_0, α_1, …, α_5)					
Intercept	+	0.60	30.14	0.60	24.24
Market share	+			0.17	2.30
Firm size	+			0.02	2.00
Barriers to entry					
R&D intensity	+			0.15	1.82
Advertising intensity	+			0.14	2.16
Capital intensity	?			0.17	2.35
Conservative accounting factors					
R&D	+			0.58	2.40
Advertising	+			-0.89	-0.79
Other factors					
Special items	-	-0.84	-9.03	-1.06	-11.17
Total accruals	-	-0.16	-3.73	-0.16	-3.65
Magnitude of firm differential abnormal ROE	-	-0.24	-3.22	-0.25	-4.08
Explaining the permanent level (β_0, β_1, …, β_4)					
Intercept	?	-0.11	-5.28	-0.11	-4.40
Market share	+			0.48	4.67
Firm size	+			0.02	3.45
Barriers to entry					
R&D intensity	+			0.32	1.67
Advertising intensity	+			-0.31	-0.96
Capital intensity	?			-0.92	-2.95
Conservative accounting factors					
R&D	+			0.28	1.66
Advertising	+			0.72	0.63
Adjusted R^2		0.31		0.37	
P-value of Wald test				0.0001	

TABLE 6
The Industry Market-to-book Ratio Analysis

$$\frac{MV_t}{BV_t} = \phi_0 + \phi_1 \frac{ER_t}{BV_t} + \beta_1 Cost\,of\ equity_t + \beta_2 Growth_t + \beta_3 Concentration_t + \beta_4 Barriers\ to\ entry_t +$$
$$\alpha_0 ROE_t^a + \alpha_1 ROE_t^a \times Cost\,of\ equity_t + \alpha_2 ROE_t^a \times Growth_t + \alpha_3 ROE_t^a \times Concentration_t + \quad (6)$$
$$\alpha_4 ROE_t^a \times Barriers\ to\ entry_t + \alpha_5 ROE_t^a \times Other\ \ factors_t + \varepsilon_t$$

MV is market value, *BV* is book value of equity, *ER* is the estimated reserve, and ROE_t^a is industry abnormal ROE. The industry subscript is dropped from all variables for ease of notation. See Appendix B for variable measurement. The analysis is based on 3,396 industry-year observations in the period 1976-1997. Regressions are estimated yearly and industry characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. T-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald tests are used to test whether the explanatory power of the model specification in one column is higher than that in the previous column. The median p-value of yearly Wald tests is reported.

	Predicted	Column A		Column B		Column C	
	signs	Coefficient	t	Coefficient	t	Coefficient	t
Intercept	+	1.97	8.34	1.92	9.15	2.25	5.22
Estimated reserves							
R&D	+			0.61	2.28	-0.40	-0.88
Advertising	+			2.75	3.23	-0.27	-0.19
Cost of equity	-					-1.30	-1.99
Growth	+					0.01	0.05
Concentration	+					-0.62	-0.11
Barriers to entry							
R&D intensity	+					5.35	2.37
Advertising intensity	+					3.75	2.82
Capital intensity	?					-1.88	-2.80
ROE^a	+	5.33	15.61	6.50	17.20	5.05	13.09
ROE^a × Cost of equity	-					1.28	0.17
ROE^a × Growth	+					1.06	2.09
ROE^a × Concentration	+					0.41	1.63
ROE^a × Barriers to entry							
R&D intensity	+					24.62	1.93
Advertising intensity	+					11.22	1.63
Capital intensity	?					-9.74	-1.19
ROE^a × Other factors							
Special items	-	-12.04	-2.66	-10.30	-2.46	-7.09	-1.88
Total accruals	-	-5.34	-4.65	-5.12	-4.76	-4.26	-2.46
Magnitude of industry abnormal ROE	-	-5.91	-3.15	-4.77	-2.58	-7.85	-3.65
Adjusted R^2		0.25		0.29		0.35	
P-value of Wald test				0.0092		0.0036	

TABLE 7
The Firm Market-to-book Ratio Analysis

$$\frac{MV_t}{BV_t} = \phi_0 + \phi_1 \frac{MV_{j,t-1}}{BV_{j,t-1}} + \phi_2 \hat{ROE}_j^a + \phi_3 \frac{ER_t}{BV_t} + \beta_1 Cost\ of\ equity_t + \beta_2 Growth_t + \beta_3 Market\ share_t + \beta_4 Firm\ size_t + \beta_5 Barriers\ to\ entry_t + \alpha_0 DROE_t^a + \alpha_1 DROE_t^a \times Cost\ of\ equity_t + \alpha_2 DROE_t^a \times Growth_t + \alpha_3 DROE_t^a \times Market\ share_t + \alpha_4 DROE_t^a \times Firm\ size_t + \alpha_5 DROE_t^a \times Barriers\ to\ entry_t + \alpha_6 DROE_t^a \times Other\ factors_t + \varepsilon_t \quad (7)$$

MV is market value, *BV* is book value of equity, $\hat{ROE}_j^a$ is the estimated industry permanent abnormal ROE, *ER* is the estimated reserve, and $DROE_t^a$ is firm differential abnormal ROE. The firm subscript is dropped from all variables except $MV_{j,t-1} / BV_{j,t-1}$ and $\hat{ROE}_j^a$, for which subscript *j* represents industry *j* to which the firm belongs. See Appendix B for variable measurement. The analysis is based on 19,898 firm-year observations in the period 1976-1997. Regressions are estimated yearly and firm characteristics are mean-adjusted within each year. Reported coefficients and adjusted R^2 are yearly averages. T-statistics for the average coefficients are reported (Fama and MacBeth 1973). Wald test is used to test whether the explanatory power of the model specification in one column is higher than that in the previous column. The median p-value of yearly Wald tests is reported.

	Predicted	Column A		Column B		Column C	
	signs	Coefficient	t	Coefficient	t	Coefficient	t
Intercept	+	1.16	7.70	0.97	7.44	1.06	7.96
Lagged industry market-to-book ratio	+	0.36	14.04	0.35	14.51	0.33	12.85
Industry permanent abnormal ROE	+	4.31	7.68	3.33	7.06	2.68	6.11
Estimated reserves							
R&D	+			1.33	10.93	0.60	4.60
Advertising	+			1.23	2.26	1.90	2.95
Cost of equity	-					-2.74	-3.01
Growth	+					0.15	2.35
Market share	+					0.55	2.14
Firm size	+					0.02	1.32
Barriers to entry							
R&D intensity	+					3.77	5.32
Advertising intensity	+					0.04	0.06
Capital intensity	?					0.14	0.20
$DROE^a$	+	5.21	16.01	5.27	15.21	5.10	18.67
$DROE^a$ × Cost of equity	-					-26.44	-5.85
$DROE^a$ × Growth	+					0.50	3.27
$DROE^a$ × Market share	+					-3.03	-0.74
$DROE^a$ × Firm size	+					0.40	4.33
$DROE^a$ × Barriers to entry							
R&D intensity	+					3.90	3.40
Advertising intensity	+					7.17	2.96
Capital intensity	?					-10.72	-3.25
$DROE^a$ × Other factors							
Special items	-	-1.96	-2.71	-2.11	-3.62	-2.36	-2.64
Total accruals	-	0.07	0.21	-0.22	-0.58	-0.84	-2.14
Magnitude of firm differential abnormal ROE	-	-9.24	-10.65	-8.09	-10.42	-6.98	-9.86
Adjusted R^2		0.33		0.38		0.44	
P-value of Wald test				0.0001		0.0001	