The Valuation Accuracy of Equity Value Estimates Inferred from Conventional Empirical Implementations of the Abnormal Earnings Growth Model: US Evidence

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Abstract: We compare the valuation accuracy of the equity value estimates inferred from empirical implementations of the abnormal earnings growth model (Ohlson and Juettner-Nauroth 2005; the OJ estimates) with the residual income model (Ohlson 1995; the RIV estimates). We find that the OJ estimates generally underperform the RIV estimates. Increasing the forecast horizon for the OJ estimates from two to five years significantly improves their valuation accuracy. However, relative to the RIV estimates, the valuation accuracy of the OJ estimates remains lower even using a five-year forecast horizon. Finally, we compare predicted accounting profitability with actual accounting profitability and find that the lower valuation accuracy of the OJ estimates is attributable to the empirical assumptions regarding future earnings growth beyond the forecast horizon.

Keywords: abnormal earnings growth, equity valuation, residual income, valuation accuracy

1. INTRODUCTION

Ohlson (1995) led accounting researchers to reinvestigate Edwards and Bell’s residual income valuation model (hereafter, the RIV model). The wide acceptance of the RIV model is mainly due to the clean surplus relation which systematically links accounting information to equity value. The RIV model expresses equity value as the reported

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book value of equity and the sum of all discounted future expected earnings net of the required returns from the usage of net assets.

Ohlson and Juettner-Nauroth (2005) offer an alternative approach to valuation, which relaxes the assumption of clean surplus (under current accounting standards, we expect deviations from the clean surplus relation). According to their abnormal earnings growth valuation model (hereafter, the OJ model), equity value can be measured as the sum of two components: capitalized next-period earnings and the present values of all future abnormal earnings growth defined as the capitalized expected changes in earnings adjusted for dividends.

Although both the RIV and OJ models are derived from the same dividend discount model and should yield the same valuation with infinite horizons, empirical implementations of these models employ different assumptions about the forecast horizon and future earnings growth after the finite forecast horizon. For example, while implementations of the OJ model assume an economy-wide earnings growth rate after the two-year forecast horizon, implementations of the RIV model incorporate industry-specific earnings growth rates after the five-year forecast horizon. These differences in empirical implementations may cause the valuation accuracy of the resulting equity value estimates to vary across models. Thus, the relative valuation accuracy of equity value estimates from empirical implementations of these valuation models is an open empirical question.

This paper extends the existing literature by examining the valuation accuracy of the equity value estimates inferred from empirical implementation of the OJ model (hereafter, the OJ estimates) relative to the RIV model (hereafter the RIV estimates). Prior studies have compared the OJ model with the RIV model only for the purpose of inferring a more reasonable cost of equity capital. These studies generally infer the cost of equity capital by first substituting stock price and analysts’ earnings forecasts into an equity valuation equation. Second, they impute the cost of equity capital as the internal rate of return that equates stock price with the expected future sequence of residual incomes or abnormal earnings growth. These studies then evaluate the empirical implementations of valuation models by examining the degree to which the inferred cost of equity capital correlates with frequently cited risk proxies (e.g., systematic risk, leverage, size, etc.). Accordingly, the major findings of these studies depend crucially on the relevance and reliability of their risk proxies (see Hughes et al., 2009).

In a recent paper, Daske et al. (2010) employ a simulation-based approach to evaluate the performance of the implied cost of equity capital estimates from different valuation models. They find that the implied cost of equity capital from RIV models outperform the OJ models. Their simulation-based study cleverly avoids many well-known shortcomings of using empirical-archival data to estimate the implied cost of equity capital, such as the optimistic bias of analysts’ earnings forecasts. Nevertheless, their study suffers from other shortcomings. For example, a simulation-based study involves forecasting future financial statements that are subject to model specifications. Such specifications tend to be too simplified and may not resemble actual financial statements. Further, simulations of market values presume a level of efficiency that may, or may not, be representative of observed market values leading to potentially lower external validity.

We shift the research question to the valuation models’ ability to generate equity value estimates closest to current stock prices. Instead of making assumptions about
risk proxies, our approach requires assumptions about the cost of equity capital in order to calculate equity value estimates. This allows us to provide new insights on the reliability of valuation models. We focus on valuation accuracy in order to provide guidance as to which valuation model implementation is preferred in the absence of observable market values, such as determining the offering price of privately held companies for their initial public offerings or determining equity value in management buyouts and hostile takeovers. To the best of our knowledge, our study is the first to examine the relative valuation accuracy of the OJ and RIV estimates.

Our empirical results indicate that the OJ estimates generally underperform the RIV estimates in terms of valuation accuracy. Although increasing the forecast horizon for the OJ estimates from two to five years significantly improves their valuation accuracy,¹ the OJ estimates with the five-year forecast horizon (hereafter, the five-period OJ estimates) still show lower valuation accuracy than any version of the RIV estimates.²

As argued by Nissim and Penman (2001), analysis of profitability is at the core of equity valuation. Accordingly, we investigate the low valuation accuracy of the OJ estimates by analyzing the evolution of the expected future return on equity (hereafter, ROE) implied by each implementation of valuation models. Given that ex post realized earnings can be an unbiased estimate of the market participants’ unbiased expectations of future earnings, we evaluate the trend of expected future ROE implied by each empirical implementation of the valuation models in terms of the fit with the trend of realized future ROE. If an empirical assumption for a valuation model on future earnings growth beyond the forecast horizon is more descriptive of the market’s unbiased expectations of future earnings, the resulting equity value estimates may also better approximate the observed stock prices.³ Since we follow prior studies and make their assumptions about future earnings growth beyond the forecast horizon, our analysis sheds some light on the reasonableness of those assumptions. Analysts may provide biased earnings forecasts due to skewness in the earnings distribution (Gu and Wu, 2003) or analysts’ asymmetric loss function (Clatworthy et al., 2005). However, optimism bias in analysts’ forecasts should have no impact on our estimates of relative valuation accuracy because we use the same forecasts as inputs for all models. Given

¹ Prior research using the OJ model generally assumes the two-year forecast horizon. However, Ohlson and Juettner-Nauroth (2005) suggest that a longer forecast horizon might set a more reasonable basis for the geometric decay of expected future earnings to a perpetual growth rate.

² In order to address the concern that contemporaneous stock price, our benchmark for the valuation accuracy, is a noisy measure of intrinsic value, we also investigate which valuation model’s implementation better predicts future stock returns. If the equity value estimate based on a specific valuation model more accurately captures the temporary discrepancy between contemporaneous stock price and intrinsic value, such equity value estimate from a valuation model will better predict future stock returns over the period where stock prices revert to fundamentals. Our untabulated results indicate that the RIV estimates predict future stock returns more accurately than the OJ estimates. Thus, we conclude that the RIV estimates perform better than the OJ estimates in terms of predicting both contemporaneous stock price and future stock returns.

³ For each implementation of valuation models we evaluate in this paper, we use the same analysts’ earnings forecasts to proxy for market expectations of future earnings until the forecast horizon. In addition, we control for the effects of noise in analysts’ earnings forecasts as the proxy for the market’s earnings expectations on the valuation accuracy of the OJ estimates by using the valuation accuracy of the RIV estimates as a benchmark. Thus, we have no ex-ante reason why noise (or optimism bias) in analysts’ earnings forecasts drives our main findings regarding relative valuation accuracy between the OJ and RIV estimates. Furthermore, please note that our application of multiple valuation approach may reduce the effect of average optimistic bias in analysts’ earnings forecasts on the relative valuation accuracy even within OJ estimates.
that future profitability analysis requires assumptions on both cost of equity capital and future earnings growth beyond the forecast horizon, our consideration of valuation accuracy—rather than reliability of the implied cost of equity capital—as the criterion for evaluating the performance of empirically implemented equity valuation models offers additional insights regarding the reasonableness of the implementation of these equity valuation models.

Our empirical results indicate that expected future ROE implied into the OJ estimates using the two-year forecast horizon (hereafter, the two-period OJ model) exhibits the worst fit with realized future ROE. The five-period OJ estimates result in a far better fit with realized future ROE than the two-period OJ estimates, although the five-period OJ estimates still exhibit a fit no better than any of the RIV estimates. As expected, the ranking of the fit with realized future ROE is consistent with the ranking according to valuation accuracy.

Our further analyses reveal that the valuation accuracy of the two-period OJ estimates is even lower for the firms in the lowest current ROE quintile. For these firms, increasing the forecast horizon up to five-years remarkably improves the valuation accuracy of the OJ estimates. Consistent with this result, the worse fit of the two-period OJ estimates with realized future ROE is more pronounced for the firms in the lowest current ROE quintile. Increasing the forecast horizon also significantly improves the fit with realized future ROE for the firms in the lowest current ROE quintile.

This empirical finding suggests that the lower valuation accuracy of the two-period OJ estimates may be due to noise in short-term earnings growth (calculated as two-year-ahead earnings expectations divided by one-year-ahead earnings expectations less one). Short-term earnings growth is typically high when one-year-ahead earnings includes negative transitory items, such as write-downs and restructuring charges to create a low base for short-term earnings growth (Penman, 2005). Increasing the forecast horizon, however, reduces the effects of short-term earnings growth on equity valuation, so the five-period OJ estimates show higher valuation accuracy than the two-period OJ estimates. In contrast, increasing the forecast horizon does not improve the valuation accuracy of the RIV estimates by as much. This is likely because the RIV model reduces the effect on future earnings expectations of the noise contained in current earnings by anchoring on current book value of equity and thus reducing the benefit of increasing the forecast horizon.

This study contributes to the literature in several ways. First, we evaluate the reliability of the empirical implementation of OJ and RIV models in terms of valuation accuracy instead of inferring a more reasonable cost of equity capital. Since prior literature examining which model’s implementation is more relevant for the estimation of cost of equity capital has presented mixed results, this study provides additional insights about the reliability of the implementation of OJ and RIV models. Second, although prior literature in this area does not further analyze the factors which lead to the varying reliability of the implementation of OJ and RIV models, this study suggests that the relative reliability of the implementation of OJ and RIV models are explained mainly by the differences on assumptions regarding future earnings growth

4 One alternative explanation for the improvement observed for the five-period OJ estimates relative to the two-period OJ estimates is that analysts make their five-year-ahead earnings growth forecasts agree with the level of current stock prices. If this were the case, we should observe a similar improvement for the RIV estimates when we increase the forecast horizon. However, our analyses do not suggest such improvements. Thus, this alternative explanation is a less compelling explanation for our empirical results.
beyond the forecast horizon. These results may be helpful for academic researchers to enhance the empirical validities of these models for various purposes, such as deriving equity value estimates or inferring the cost of equity capital. Lastly, this study informs practitioners as well as academics. We expect that valuation practitioners can rely on our results regarding the empirical reliability of equity valuation models when they need to select a specific model or to improve the implementation of a chosen model for various purposes, such as equity valuation or project evaluation.

The paper proceeds as follows. Section 2 reviews the OJ model and prior research. Section 3 discusses our empirical implementation of the valuation models and describes the sample and data. Section 4 presents the empirical results and Section 5 concludes.

2. LITERATURE REVIEW

(i) The Abnormal Earnings Growth Valuation Model

The RIV model substitutes the clean surplus relation into the dividend discount model to express equity value as the reported book value of equity and an infinite sum of the discounted future residual incomes (Ohlson 1995). However, Ohlson and Juettner-Nauroth (2005) provide an alternative model that allows for expected deviations from the clean surplus relation under current IFRS and US GAAP. According to their OJ model, equity value consists of (i) the capitalized next-period earnings and (ii) the present value of the capitalized expected changes in subsequent earnings adjusted for dividends (i.e., abnormal earnings growth). In addition, the OJ model uses \((\gamma - 1)\) as the perpetual growth rate of these capitalized abnormal earnings growth. The short-term growth is assumed to decay asymptotically to the perpetual growth rate, and the decay rate is also determined by \((\gamma - 1)\).

More formally, the two-period OJ model is derived from the following assumptions:

**Assumption 1:** \(V_0 = \sum_{t=1}^{\infty} \frac{E_0[dp_{st}]}{(1+r)^t}\) where \(V_0\) is the equity value at time 0, \(dp_{st}\) is the dividends per share at time \(t\), and \(r > 0\) is the cost of equity capital.

**Assumption 2:** The sequence \(\{z_t\}_{t=1}^{\infty}\) satisfies \(z_{t+1} = \gamma \times z_t, t = 1, 2, \ldots, \) where \(1 \leq \gamma < 1 + r\), \(z_t = \frac{E_0[eps_{t+1} + \gamma \times (1+r) \times eps_t]}{r} > 0\), and \(eps_t\) is the earnings per share during time \(t\).

Based on Assumptions 1 and 2, the two-period OJ model \((OJ2)\) yields the following equation:

\[
V_0(OJ2) = \frac{E_0[eps_1]}{r} + \frac{z_1}{r - \gamma + 1}. \tag{1}
\]

The PEG model is a special case of the OJ model. Specifically, assuming \(\gamma = 1\) and \(dp_{s1} = 0\) (i.e., no changes in abnormal earnings growth beyond the forecast horizon and no dividend payments) in the two-period OJ model, we obtain the two-period PEG model \((PEG2)\) as follows:

\[
V_0(PEG2) = \frac{E_0[eps_2 - eps_1]}{\gamma^2}. \tag{2}
\]
Ohlson and Juettner-Nauroth (2005), who focus on the two-period OJ model, note that the two-period OJ model has a ‘degrees-of-freedom problem.’ That is, the two-period OJ model has only two degrees of freedom: short- and long-term growth in abnormal earnings measured by $g_2 = E_0[eps_s + r \times dp s_1 - (1 + r) \times eps_s] / E_0[eps_s]$ and $(\gamma - 1)$, respectively. The authors suggest that the two-period OJ model may be inadequate under more complex scenarios as to the evolution of expected earnings per share. To deal with this problem, they propose that a longer forecast horizon be considered as a more reasonable basis for the geometric decay to $(\gamma - 1)$. Specifically, they allow $T$ additional degrees of freedom in the following equation, which has a practical appeal due to its flexibility:

$$V_o(OJT - 2) = \frac{E_0[eps_s]}{r} + \sum_{t=1}^{T-2} \frac{z_t}{(1 + r)^t} + \frac{\pi_{T-2}}{(1 + r)^{T-2}}$$

where $\pi_T = z_{T+1}/(r - \gamma + 1)$. Setting $T = 5$ in equation (3) yields the five-period OJ model (OJ5).

Just as the two-period PEG model is a special case of the two-period OJ model, we can derive a five-period version of the PEG model from the five-period OJ model. Specifically, assuming $\gamma = 1$ and $dp s_t = 0$ in equation (3) yields the five-period PEG model (PEG5) as follows:

$$V_o(PEG5) = \frac{E_0[eps_s]}{r} + \sum_{t=1}^{3} \frac{E_0[eps_{t+1} - (1 + r) \times eps_t]}{r(1 + r)^t}$$

$$+ \frac{E_0[eps_5 - (1 + r) \times eps_4]}{r^2(1 + r)^3}.$$  (4)

The aforementioned four variations of the OJ model make different assumptions on the forecast horizon and/or future earnings growth, so the relative valuation accuracy of these empirical variations is an open empirical question. Thus, we examine the valuation accuracy of equity value estimates from empirical implementations of all four variations of the OJ model.5

(ii) Empirical Evaluation of the OJ Model

Prior research evaluates the empirical validity of the OJ model in terms of inferring more reasonable cost of equity capital. Moreover, prior studies consider only the two-period OJ (and PEG) model despite the potential ‘degrees-of-freedom problem’ within the two-period OJ (and PEG) model. Gode and Mohanram (2003) offer some evidence that the empirical implementation of the RIV model reflecting industry-specific information outperforms that of the two-period OJ model in terms of the correlations of the inferred cost of equity capital with frequently-cited risk proxies. Further, Guay et al. (2003) show that the implied cost of equity capital inferred from the empirically implemented RIV model reflecting industry-specific information

5 Theoretically, any forecast horizon is possible for the OJ model. However, since analysts’ earnings forecasts cover only five-year-ahead earnings for most firms, the five-year forecast horizon is the longest that can be implemented empirically. Unreported results indicate that the main conclusion of this paper remains unchanged with the inclusion of the OJ model using the three- or four-year forecast horizons. Thus, for brevity, we consider only the five-period as an alternative horizon for the two-period OJ model.
only exhibits a significant correlation with two- and three-year-ahead stock returns. Utilizing the fact that the two-period PEG model is a special case of the two-period OJ model, several prior studies compare the estimates of the cost of equity capital derived from empirical implementation of the two-period PEG model with those from the two-period OJ model or the RIV model. Botosan and Plumlee (2005) suggest that the cost of equity capital derived from the empirically implemented two-period PEG model dominates the empirical alternatives from the two-period OJ model and the RIV model. In contrast, Easton and Monahan (2005) conclude that the cost of equity capital empirically derived from the two-period PEG model is the worst performer while estimates drawn from a price-forward earnings model are as reliable as more sophisticated proxies. Based on the two-period OJ model, Easton (2004) describes the method for simultaneously estimating the expected rate of return and the long-run change in abnormal growth in earnings, arguing that the two-period PEG model is too simplistic when assuming that the short-run growth forecast captures the long-run future.6

While the aforementioned studies evaluate the empirical performance of valuation models in terms of inferring more reasonable cost of equity capital, we examine their empirical performance in terms of valuation accuracy. Prior research on valuation accuracy is, however, limited to the empirical implementation of the RIV model and its preceding valuation models. Courteau et al. (2001), Francis et al. (2000), Frankel and Lee (1998), Penman and Sougiannis (1998), Dechow et al. (1999) and Choi et al. (2006), among others, examine the ability of the RIV model to explain the cross-sectional distribution of stock prices and/or future stock returns. Several studies also document the effect of altering the forecast horizon in the RIV model (e.g., Frankel and Lee, 1998; Penman and Sougiannis, 1998; and Lee et al., 1999). However, only Liu et al. (2002) examine the valuation accuracy of the two-period PEG model.

Closely related to our study, Penman (2005) discusses the advantages and disadvantages of the OJ and RIV models. Using the equity value estimates empirically derived from the two-period OJ and RIV models, he shows that the median equity value estimate-to-stock price ratios are consistently higher for the OJ estimates than for the RIV estimates. Further, the OJ estimates exhibit higher variance in the equity value estimate-to-stock price ratios. This paper differs from Penman (2005) in three important ways. First, while Penman (2005) focuses on two-period valuation models, we increase the forecast horizon up to five years and show that increasing the forecast horizons improves the valuation accuracy of the OJ estimates. Second, Penman (2005) uses raw equity value estimates derived directly from the valuation models. In contrast, we rely on the multiple valuation approach, which restricts the analysis to ‘unbiased’ pricing errors (as detailed in Section 3(i) below). Third, by analyzing the implied future ROE assumed by the empirical implementations of valuation models, we provide additional insights into why the OJ estimates underperform relative to the RIV estimates.

6 Easton’s (2004) method parallels that of Easton et al. (2002) who use the RIV model and obtain simultaneous estimates of the implied expected rate of return and the growth in residual income beyond the forecast horizon on the portfolio basis. We cannot apply their approach to exclude one of our own assumptions either for cost of equity capital or earnings growth. This is because their approach equates stock prices to equity value estimates for their simultaneous estimates of those two factors, which makes our examination of pricing errors meaningless.
Collectively, prior studies evaluate the empirical validity of the OJ model exclusively in terms of inferring a more reasonable cost of equity capital, but offer mixed evidence on the reliability of the inferred cost of equity capital. Moreover, these studies only consider the two-period OJ and PEG models. Thus, the relative valuation accuracy of the OJ estimates over alternative forecast horizons remains an open empirical question.

3. RESEARCH DESIGN

(i) Empirical Implementation of the OJ and RIV Models

To evaluate the valuation accuracy of the OJ estimates relative to the RIV estimates, we consider the representative empirical implementations of the OJ and RIV models employed in prior research. We note several issues about our implementations.

First, as mentioned in Section 2, we consider four different variations of the OJ model: the two-period OJ model, the two-period PEG model, the five-period OJ model, and the five-period PEG model, as presented in equations (1) through (4) above, respectively. Since Sougiannis and Yaekura (2001) find that firm-specific growth rates do not improve valuation accuracy for the earnings capitalization model, we follow Gode and Mohanram (2003) and assume a common growth rate for all firms, \((\gamma - 1)\), equal to the risk-free rate less 3%.

Second, for the RIV model, we consider three types of implementations employed in prior research. The first-type implementation of RIV model (RIVIT) assumes that the ROE trends linearly from the level implied by analysts’ earnings forecasts for the end of the forecast horizon (year \(T\)) to the industry median ROE\(^8\) by the 12th year and thereafter the residual incomes are constant in perpetuity (e.g., Lee et al., 1999; Gebhardt et al., 2001; and Liu et al., 2002):

\[
V_o^{(RIVIT)} = b_{v_0} + \sum_{t=1}^{T} E_0[ep_{s_t} - r \times b_{v_{t-1}}] \frac{1}{(1 + r)^t} + \sum_{t=T+1}^{11} E_0[(\text{ROE}_{t} - r) b_{v_{t-1}}] \frac{1}{(1 + r)^t} + E_0[(\text{ROE}_{12} - r) b_{v_{11}}] \frac{1}{r(1 + r)^{11}}
\]

where \(b_{v_t}\) is the book value of equity per share at time \(t\); \(ep_{s_t}\) is the earnings per share during time \(t\); \(r\) is the cost of equity capital; and \(\text{ROE}_t\) is return on equity during time \(t\).

The second-type implementation of RIV model (RIVCT) assumes that the residual incomes remain constant after year \(T\) (e.g., Frankel and Lee 1998; Lee et al., 1999;

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\(^7\) In practice, cash flow (or dividend) discount model is broadly used. But, since previous studies (e.g., Penman and Sougiannis, 1998) suggest that accrual earnings based valuation model performs better than cash flow (dividend) discount model within finite forecast horizon, we consider only accrual earnings based valuation models in this study.

\(^8\) The industry-median ROE is calculated by the moving median of the previous 10 years’ ROE of the firms within the same industry. We use the middle industry category, ‘Industry’, among the three levels of I/B/E/S industry classification as the criterion to calculate the industry-median ROE. To mitigate the effects of outliers, we follow Liu et al. (2002) and winsorize the industry-median ROE at the risk-free rate and 20%.
Liu et al., 2002; and Ali et al., 2003):

\[ V_0(\text{RIVCT}) = b v_0 + \sum_{t=1}^{T} \frac{E_0[\epsilon ps_t - r \times b v_{t-1}]}{(1 + r)^t} + \frac{E_0[\epsilon ps_T - r \times b v_{T-1}]}{r(1 + r)^T}. \]  

(6)

The third-type implementation of RIV model (RIVGT) assumes that the residual incomes grow after year \( T \) (e.g., Claus and Thomas, 2001):

\[ V_0(\text{RIVGT}) = b v_0 + \sum_{t=1}^{T} \frac{E_0[\epsilon ps_t - r \times b v_{t-1}]}{(1 + r)^t} + \frac{E_0[\epsilon ps_T - r \times b v_{T-1}]}{(r - \gamma + 1)(1 + r)^T}. \]  

(7)

where \( (\gamma - 1) \) is set to the risk-free rate less 3%.

To compare the RIV model with the OJ model for the same forecast horizons, we consider two- and five-period forecast horizons for the RIV model. Thus, we implement six different variations of the RIV model; i.e., two forecast horizons for each of the RIVIT, RIVCT, and RIVGT models. The RIVCT model corresponds to the PEGT model, because RIVCT (PEGT) assumes residual income (abnormal earnings growth) to remain constant after the forecast horizon. Similarly, the RIVGT model corresponds to the OJT model in that RIVGT (OJT) assumes residual income (abnormal earnings growth) to grow at the rate of \( (\gamma - 1) \) after the forecast horizon.\(^9\)

Third, we use analysts’ earnings forecasts to proxy for market expectations of future earnings until each forecast horizon. Following Liu et al. (2002), we calculate three-year-ahead earnings forecasts, if these forecasts are not available, as two-year-ahead earnings forecasts multiplied by one plus five-year earnings growth forecasts. We compute four- and five-year-ahead earnings forecasts in a similar manner.

Fourth, we estimate the future dividend-payout ratio by dividing actual dividends paid by earnings of the most recent year. For firms with negative earnings, we divide dividends for the most recent year by analysts’ one- or two-year-ahead earnings forecast. When both earnings forecasts are negative, we set the future dividend-payout ratio to zero. When the estimated dividend-payout ratio exceeds 0.5, we cap the payout ratio at 0.5.

Fifth, we estimate the cost of equity capital based on the Capital Asset Pricing Model (CAPM).\(^10\) We use at least 30 prior monthly stock returns to estimate market beta. The resulting market beta estimate is used in conjunction with realized ten-year treasury-bill rates as risk-free rates and 5% as the market risk premium.\(^11\) To mitigate the effect of extreme market beta estimates, we use the median decile market beta when calculating the cost of equity capital.

Sixth, if the terminal value of any variation of the valuation models is negative, we set the corresponding terminal value to be zero. This is because it is unreasonable to

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\(^9\) However, we are unable to come up with an OJ version of the RIVIT model. One may suggest that the industry median abnormal earnings growth can be used to construct an OJ model that incorporates industry information. But, given the decreasing trend of earnings during our sample period, such approach generally yields the negative industry-median abnormal earnings growth, which violates Assumption 2 of the OJ model.

\(^10\) For the cost of equity capital based on the Fama and French (1997) three-factor model, we obtain the same ranking of valuation accuracy between the OJ and RIV estimates.

\(^11\) In unreported sensitivity tests, we also use 3% and 7% as our alternative market risk premiums. In both cases, the rankings of valuation accuracy between the OJ and RIV estimates remain unchanged.
assume that negative abnormal earnings growth or residual income grows at a positive perpetual growth rate.

Lastly, we apply the multiple valuation approach to the original equity value estimates derived directly from our implementation of the valuation models. According to the conventional multiple valuation approach, a value driver is converted into an equity value estimate through the multiplication of the corresponding valuation multiple, as follows:

$$AEV_{it} = \left( \frac{P}{X} \right)_{COMit} \times X_{it}$$

where $AEV_{it}$ is the adjusted equity value estimate for firm $i$ in year $t$, $(P/X)_{COMit}$ is the harmonic mean of the ratio of stock price $(P)$ to value driver $(X)$ of the comparable firms for firm $i$ in year $t$, and $X_{it}$ is the corresponding value driver of firm $i$ in year $t$.

In this paper, we consider the original equity value estimates derived directly from our implementation of the valuation models (hereafter, unadjusted equity value estimates) as the value driver in the above formula, as in Liu et al. (2002). One advantage of the multiple valuation approach is that it produces unbiased estimates of equity values compared to stock prices. In contrast, the unadjusted equity value estimates may have an average bias relative to stock price due to the overall biases on some assumptions, which are applied uniformly to all firms. For example, if our assumption of $(\gamma - 1)$, calculated as risk-free rate less 3%, is overestimated, the unadjusted equity value estimates will be biased upward on average. Since the average bias may distort our statistics to measure the valuation accuracy, we reduce any such average bias by applying the multiple valuation approach rather than by changing the assumptions in our implementations.\(^{12}\)

The multiple valuation approach requires selecting comparable firms. For this purpose, we use the membership within the middle industry category (‘Industry’) among the three levels of I/B/E/S industry classification. After selecting comparable firms from the same ‘Industry’ as the valued firms, we compute the valuation multiple as the out-of-sample harmonic mean of the comparable firms’ ratios of stock prices to the unadjusted equity value estimates. Multiplying the multiple by the valued firms’ corresponding unadjusted equity value estimates yields the adjusted equity value estimates.

(ii) Sample and Data

We collect US data from three sources: accounting numbers from COMPUSTAT; stock price, analysts’ earnings forecasts, and industry identification codes from I/B/E/S; and stock returns from CRSP. We select firm-years that satisfy the following criteria as of April of each year: (1) financial statement data, such as book value of equity, are available from COMPUSTAT; (2) stock price, analysts’ earnings forecasts, industry identification codes, and number of shares are available from I/B/E/S; (3) stock return data for the calculation of market beta are available from CRSP; (4) fiscal year-end is December; (5) stock price is greater than or equal to $2; (6) analysts’ earnings forecasts are non-negative; (7) each industry-year combination has at least

\(^{12}\) Our main results remain unchanged even when we evaluate the valuation accuracy using unadjusted equity value estimates.
five observations; (8) all value driver to price ratios are positive; (9) the industry is not classified as ‘others (SIC 9900).’ The fourth criterion is chosen so as to facilitate a more reasonable cross-sectional analysis. The fifth criterion mitigates the effects of outliers. The sixth criterion is necessary for the implementation of the two-period OJ and PEG model, as in Gode and Mohanram (2003). The seventh criterion ensures that the comparable group for the multiple valuation approach is not unreasonably small. The eighth criterion avoids negative equity value estimates. To mitigate the effects of outliers, all value drivers to stock price are winsorized at 1% and 99%. The resulting sample includes 24,886 observations of 4,292 US firms between 1984 and 2005.

4. RESULTS

(i) Descriptive Statistics

Panel A of Table 1 reports the pooled distributions of key variables. The mean of current earnings reported in I/B/E/S, scaled by stock price, is 0.056. The distribution of the ratio of analysts’ earnings forecasts to stock price is consistent with prior research (e.g., Liu et al., 2002), as follows: The mean of analysts’ one-year-ahead (two-year-ahead) earnings scaled by stock price is 0.069 (0.084). A similar increasing pattern of analysts’ earnings forecasts is found in each forecasted earnings thereafter. The mean of analysts’ five-year earnings-growth forecasts is 14.9%. On average, ten analysts follow each firm in our sample. The distribution of other variables, such as ROE and market beta, is also consistent with prior research.

Panel B of Table 1 describes the pooled distribution of the ratios of unadjusted equity value estimates to stock prices (hereafter, unadjusted V/P ratios). The mean unadjusted V/P ratios based on the OJ model are much higher than those based on the RIV model. In particular, the mean of unadjusted V/P ratios based on the two-period OJ model is 1.994, which means on average 99% overvaluation of equity values. However, it is noteworthy that the overall bias of the unadjusted equity value estimates may be due to their high sensitivity to the assumptions of the models, which are applied uniformly to all firms. As discussed in Section 3, we reduce such an average bias by applying the multiple valuation approach rather than by changing the assumptions in our implementation. As will be shown in Section 4(ii), the mean of V/P ratios is closer to unity (i.e., the mean of pricing errors is closer to zero) when we apply the multiple valuation approach.

(ii) Analysis of Valuation Accuracy

Table 2 presents the distribution of pricing errors of the adjusted equity value estimates. Under the assumption of market efficiency, our metric of valuation accuracy is the pricing errors, defined as the equity value estimates less stock prices deflated by stock prices. Following Liu et al. (2002), we examine several measures that describe the distribution of pricing errors. Specifically, we consider following three statistics: (1) The mean of absolute pricing errors (hereafter, MAPE); (2) the percentage of sample whose absolute percentage pricing error exceeds 15% (hereafter, 15%APE);
### Table 1

#### Descriptive Statistics

**Panel A: Distributions of Main Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
<th>5%</th>
<th>10%</th>
<th>25%</th>
<th>75%</th>
<th>90%</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/B/E/S earnings/Price</td>
<td>0.056</td>
<td>0.056</td>
<td>0.042</td>
<td>−0.005</td>
<td>0.015</td>
<td>0.036</td>
<td>0.077</td>
<td>0.101</td>
<td>0.118</td>
</tr>
<tr>
<td>EPS1/Price</td>
<td>0.069</td>
<td>0.066</td>
<td>0.032</td>
<td>0.021</td>
<td>0.031</td>
<td>0.048</td>
<td>0.087</td>
<td>0.110</td>
<td>0.127</td>
</tr>
<tr>
<td>EPS2/Price</td>
<td>0.084</td>
<td>0.079</td>
<td>0.035</td>
<td>0.035</td>
<td>0.044</td>
<td>0.061</td>
<td>0.101</td>
<td>0.129</td>
<td>0.149</td>
</tr>
<tr>
<td>EPS3/Price</td>
<td>0.096</td>
<td>0.090</td>
<td>0.040</td>
<td>0.043</td>
<td>0.053</td>
<td>0.070</td>
<td>0.115</td>
<td>0.148</td>
<td>0.172</td>
</tr>
<tr>
<td>EPS4/Price</td>
<td>0.110</td>
<td>0.101</td>
<td>0.047</td>
<td>0.050</td>
<td>0.061</td>
<td>0.080</td>
<td>0.131</td>
<td>0.169</td>
<td>0.200</td>
</tr>
<tr>
<td>EPS5/Price</td>
<td>0.126</td>
<td>0.115</td>
<td>0.056</td>
<td>0.059</td>
<td>0.071</td>
<td>0.090</td>
<td>0.149</td>
<td>0.195</td>
<td>0.233</td>
</tr>
<tr>
<td>5-year earnings growth forecasts</td>
<td>0.149</td>
<td>0.130</td>
<td>0.087</td>
<td>0.048</td>
<td>0.070</td>
<td>0.100</td>
<td>0.180</td>
<td>0.250</td>
<td>0.300</td>
</tr>
</tbody>
</table>

**Panel A** presents the distributions of the main variables. EPST is \( T \)-year-ahead analysts' earnings forecast. We calculate three-year-ahead earnings forecasts, if these forecasts are not available, as two-year-ahead earnings forecasts multiplied by one plus five-year earnings growth forecasts. We compute four- and five-year-ahead earnings forecasts in a similar manner. ROE is the return on equity.

**Panel B: Ratios of Unadjusted Equity Value Estimates to Stock Prices**

<table>
<thead>
<tr>
<th>Model</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
<th>5%</th>
<th>10%</th>
<th>25%</th>
<th>75%</th>
<th>90%</th>
<th>95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>OJ2</td>
<td>1.994</td>
<td>1.316</td>
<td>1.979</td>
<td>0.447</td>
<td>0.575</td>
<td>0.844</td>
<td>2.340</td>
<td>4.154</td>
<td>5.872</td>
</tr>
<tr>
<td>OJ5</td>
<td>1.749</td>
<td>1.152</td>
<td>1.743</td>
<td>0.383</td>
<td>0.514</td>
<td>0.765</td>
<td>2.017</td>
<td>3.639</td>
<td>5.203</td>
</tr>
<tr>
<td>PEG2</td>
<td>1.407</td>
<td>0.929</td>
<td>1.425</td>
<td>0.270</td>
<td>0.365</td>
<td>0.557</td>
<td>1.692</td>
<td>2.993</td>
<td>4.175</td>
</tr>
<tr>
<td>PEG5</td>
<td>1.298</td>
<td>0.867</td>
<td>1.258</td>
<td>0.340</td>
<td>0.428</td>
<td>0.594</td>
<td>1.476</td>
<td>2.640</td>
<td>3.783</td>
</tr>
<tr>
<td>RIV2</td>
<td>1.111</td>
<td>0.848</td>
<td>0.902</td>
<td>0.245</td>
<td>0.343</td>
<td>0.543</td>
<td>1.354</td>
<td>2.189</td>
<td>2.919</td>
</tr>
<tr>
<td>RIV5</td>
<td>1.113</td>
<td>0.866</td>
<td>0.845</td>
<td>0.285</td>
<td>0.383</td>
<td>0.571</td>
<td>1.351</td>
<td>2.179</td>
<td>2.831</td>
</tr>
<tr>
<td>RIVC2</td>
<td>0.829</td>
<td>0.747</td>
<td>0.435</td>
<td>0.288</td>
<td>0.370</td>
<td>0.527</td>
<td>1.026</td>
<td>1.384</td>
<td>1.656</td>
</tr>
<tr>
<td>RIVC5</td>
<td>0.937</td>
<td>0.818</td>
<td>0.515</td>
<td>0.333</td>
<td>0.422</td>
<td>0.590</td>
<td>1.142</td>
<td>1.602</td>
<td>1.959</td>
</tr>
<tr>
<td>RIVG2</td>
<td>0.952</td>
<td>0.835</td>
<td>0.536</td>
<td>0.307</td>
<td>0.400</td>
<td>0.581</td>
<td>1.188</td>
<td>1.653</td>
<td>2.015</td>
</tr>
<tr>
<td>RIVG5</td>
<td>1.081</td>
<td>0.910</td>
<td>0.658</td>
<td>0.352</td>
<td>0.450</td>
<td>0.642</td>
<td>1.327</td>
<td>1.942</td>
<td>2.411</td>
</tr>
</tbody>
</table>

**Notes:**

Panel A presents the distributions of the main variables. EPST is \( T \)-year-ahead analysts' earnings forecast. We calculate three-year-ahead earnings forecasts, if these forecasts are not available, as two-year-ahead earnings forecasts multiplied by one plus five-year earnings growth forecasts. We compute four- and five-year-ahead earnings forecasts in a similar manner. ROE is the return on equity.

Panel B presents the distributions of the ratios of unadjusted equity value estimates to stock prices (V/P) for each implementation of valuation models. The valuation models are the two-period OJ model (OJ2), the five-period OJ model (OJ5), the two-period PEG model (PEG2), the five-period PEG model (PEG5), the two-period RIVI model (RIV2), the five-period RIVI model (RIV5), the two-period RIVC model (RIVC2), the five-period RIVC model (RIVC5), the two-period RIVG model (RIVG2), and the five-period RIVG model (RIVG5). Sections 2(i) and 3(i) provide a detailed discussion of these models.
Table 2
Distribution of Valuation Accuracy Measures

<table>
<thead>
<tr>
<th>Model</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
<th>MAPE</th>
<th>15%APE</th>
<th>IQRPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OJ2</td>
<td>0.035</td>
<td>−0.226</td>
<td>0.919</td>
<td>0.577</td>
<td>0.870</td>
<td>0.684</td>
</tr>
<tr>
<td>OJ5</td>
<td>0.022</td>
<td>−0.176</td>
<td>0.806</td>
<td>0.515</td>
<td>0.827</td>
<td>0.640</td>
</tr>
<tr>
<td>PEG2</td>
<td>0.033</td>
<td>−0.217</td>
<td>0.886</td>
<td>0.573</td>
<td>0.872</td>
<td>0.710</td>
</tr>
<tr>
<td>PEG5</td>
<td>0.018</td>
<td>−0.152</td>
<td>0.731</td>
<td>0.470</td>
<td>0.796</td>
<td>0.577</td>
</tr>
<tr>
<td>RIVI2</td>
<td>0.012</td>
<td>−0.102</td>
<td>0.589</td>
<td>0.404</td>
<td>0.766</td>
<td>0.548</td>
</tr>
<tr>
<td>RIVI5</td>
<td>0.012</td>
<td>−0.095</td>
<td>0.556</td>
<td>0.385</td>
<td>0.753</td>
<td>0.531</td>
</tr>
<tr>
<td>RIVC2</td>
<td>0.007</td>
<td>−0.058</td>
<td>0.429</td>
<td>0.308</td>
<td>0.681</td>
<td>0.440</td>
</tr>
<tr>
<td>RIVC5</td>
<td>0.007</td>
<td>−0.068</td>
<td>0.445</td>
<td>0.317</td>
<td>0.694</td>
<td>0.449</td>
</tr>
<tr>
<td>RIVG2</td>
<td>0.008</td>
<td>−0.076</td>
<td>0.470</td>
<td>0.338</td>
<td>0.720</td>
<td>0.481</td>
</tr>
<tr>
<td>RIVG5</td>
<td>0.009</td>
<td>−0.092</td>
<td>0.508</td>
<td>0.358</td>
<td>0.739</td>
<td>0.499</td>
</tr>
</tbody>
</table>

Notes:
This table presents the distribution of the pricing errors of the adjusted equity value estimates for each implementation of valuation models. The pricing errors are defined as the equity value estimates less stock prices, deflated by stock prices. MAPE is the mean of absolute pricing errors. 15%APE is the percentage of sample whose absolute pricing errors is over 15%. IQRPE is the inter-quartile range of pricing errors. See Table 1 for the definition of valuation models.

For MAPE, we test the significance of differences of valuation accuracy across valuation models by using $t$-statistics obtained from pair wise comparisons. For 15%APE and IQRPE, as in Liu et al. (2002), we conduct a bootstrap-type analysis to test the significance of such differences.

Our primary results are those reported in Table 2. Examination of the MAPE, 15%APE, and IQRPE in Table 2 suggests that all four variations of the OJ estimates exhibit higher pricing errors than any variation of the RIV estimates in terms of each valuation accuracy measure. Further, untabulated results confirm that these differences in valuation accuracy are statistically significant. Increasing the forecast horizon for the OJ model significantly improves the valuation accuracy of the OJ estimates. For example, the MAPE of the five-period OJ (PEG) estimates is 0.515 (0.470), which is smaller than that of the two-period OJ (PEG) estimates, 0.577 (0.573). Interestingly, the five-period PEG estimates perform the best among the four variations of the OJ estimates. Nevertheless, the five-period PEG estimates still exhibit higher

13 MAPE is used by Beatty et al. (1999), 15%APE is used by Kim and Ritter (1999), and IQRPE is used by Liu et al. (2002). Since each measure has its own shortcomings when the pricing error distribution has extreme values or serious skewedness, we consider all three measures simultaneously to address the potential limitation of each valuation accuracy measure.

14 Unlike comparing $R^2$ values from cross-sectional valuation regressions, examining the dispersion of valuation errors to measure the valuation accuracy allows more meaningful and representative cross-sample comparisons (Liu et al., 2005). However, our sensitivity analyses, comparing $R^2$ of the regressions of stock prices on the unadjusted equity value estimates with an intercept, suggest that our main results do not change.

15 Conceptually, a combination of OJ and RIV estimates may maximize valuation accuracy unless valuation errors are perfectly correlated. To explore this possibility, we run a cross-sectional regression of stock prices on OJ and RIV estimates using the previous year data and create a weighted average of OJ and RIV estimates in the current year based on the slope coefficients. Untabulated results indicate that such combination of OJ and RIV estimates does not consistently perform better than an RIVC estimate. This is primarily because RIV estimates are generally assigned with weights close to one, leaving OJ estimates with almost zero weights. Thus, our attempt to find a combination of OJ and RIV estimates that works the best just confirms our primary finding that RIV estimates outperform OJ estimates in terms of valuation accuracy.
pricing errors than any of the RIV estimates. For example, the IQRPE of the five-period PEG estimates is 0.577, which is greater than the highest IQRPE value of the RIV estimates (RIVI2: 0.548).\footnote{Untabulated results also suggest that the lower valuation accuracy of the OJ estimates relative to the RIV estimates is consistently found across different sectors and industries. Different characteristics (e.g., growth) across industries, therefore, do not seem to affect our main result.}

Among the RIV estimates, the RIVI estimates exhibit the lowest valuation accuracy. Hence, although one could argue that the RIVI estimates have an unfair advantage over other RIV estimates from incorporating industry specific information, our result does not support this. In addition, increasing the forecast horizon for the RIV estimates does not always improve valuation accuracy. Increasing the horizon for the RIVC and RIVG estimates rather increases pricing errors.\footnote{This apparently contradictory finding may be explained by the higher noise in analysts’ longer-term earnings forecasts (such as $\text{eps}_3$, $\text{eps}_4$ and $\text{eps}_5$). Increasing the forecast horizon gives more weight to the noise contained in analysts’ longer-term earnings forecasts than to the noise in short-term earnings forecasts. Increasing the horizon improves the valuation accuracy of the OJ estimates since the noise in short-term earnings growth may dominate the noise in longer-term earnings forecasts. For the RIVC and RIVG estimates, however, increasing the horizon may induce only more noise contained in longer-term earnings forecasts, which leads to higher pricing errors. In contrast, this reasoning may not be applied to the RIVI estimates because ROE converging to the industry median may reduce the effect of the higher noise in longer-term earnings forecasts.}

For example, the MAPE of the two-period RIVC (RIVG) estimates is 0.308 (0.338) while that of the five-period RIVC (RIVG) estimates is 0.317 (0.358). This inconsistency between the OJ and RIV estimates suggests that the improvement in the valuation accuracy observed for the five-period OJ (PEG) estimates relative to the two-period OJ (PEG) estimates cannot be explained by the alternative hypothesis that analysts forecast their five-year earnings growth on the basis of current stock prices and thus result in a higher association between stock prices and equity value estimates reflecting analysts’ five-year earnings growth forecasts.

While our results were expressed above in terms of average performance, our findings can also be summarized as follows: Conditional on a two-year horizon, the RIV estimates exhibit the best performance on average, while valuing more accurately 72% of the time. For the remaining 28% of the sample firm years, the OJ estimates are more accurate.\footnote{For fair comparison, the RIVI estimates are not included in this analysis, because we do not implement an OJ version of the RIVI model for the reason discussed in Section 3.} Similarly, for a five-year horizon, the RIV estimates also show the best performance on average, while valuing more accurately 68% of the sample firm years; that is, the OJ estimates are more accurate for the remaining 32%. Further, the OJ5 (PEG5) estimates are more accurate than OJ2 56% (PEG2 60%) of the time. In contrast, RIVC5 (RIVG5) is more accurate than RIVC2 48% (RIVG2 45%) of the time.

(iii) Analysis of Implied Expected Future ROE

In this section, we investigate the reason for the lower valuation accuracy of the OJ estimates by analyzing the evolution over time of expected future ROE implied by each implementation of valuation models. Taking realized future earnings as an unbiased estimate for market expectations of future earnings, we evaluate the trend of expected future ROE implied by each implementation of valuation models in terms of the fit with the trend of realized future ROE.\footnote{A potential survivorship bias arises because we use the realized future ROE, because our analysis requires the availability of realized future ROE for at least ten years. However, we can think of no ex-ante reason why}

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Table 3
Mean Absolute Errors of Expected Future ROE

<table>
<thead>
<tr>
<th>Model</th>
<th>t+1</th>
<th>t+2</th>
<th>t+3</th>
<th>t+4</th>
<th>t+5</th>
<th>t+6</th>
<th>t+7</th>
<th>t+8</th>
<th>t+9</th>
<th>t+10</th>
</tr>
</thead>
<tbody>
<tr>
<td>OJ2</td>
<td>0.037</td>
<td>0.054</td>
<td>0.062</td>
<td>0.066</td>
<td>0.068</td>
<td>0.070</td>
<td>0.071</td>
<td>0.071</td>
<td>0.071</td>
<td>0.073</td>
</tr>
<tr>
<td>OJ5</td>
<td>0.037</td>
<td>0.054</td>
<td>0.061</td>
<td>0.066</td>
<td>0.067</td>
<td>0.068</td>
<td>0.069</td>
<td>0.070</td>
<td>0.069</td>
<td>0.071</td>
</tr>
<tr>
<td>PEG2</td>
<td>0.037</td>
<td>0.054</td>
<td>0.063</td>
<td>0.068</td>
<td>0.070</td>
<td>0.071</td>
<td>0.072</td>
<td>0.072</td>
<td>0.072</td>
<td>0.073</td>
</tr>
<tr>
<td>PEG5</td>
<td>0.037</td>
<td>0.054</td>
<td>0.062</td>
<td>0.067</td>
<td>0.069</td>
<td>0.070</td>
<td>0.071</td>
<td>0.071</td>
<td>0.071</td>
<td>0.072</td>
</tr>
<tr>
<td>RIV2</td>
<td>0.037</td>
<td>0.054</td>
<td>0.060</td>
<td>0.063</td>
<td>0.064</td>
<td>0.065</td>
<td>0.066</td>
<td>0.066</td>
<td>0.067</td>
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</tr>
<tr>
<td>RIV5</td>
<td>0.037</td>
<td>0.054</td>
<td>0.061</td>
<td>0.066</td>
<td>0.067</td>
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<td>0.067</td>
<td>0.067</td>
<td>0.067</td>
<td>0.068</td>
</tr>
<tr>
<td>RIVC2</td>
<td>0.037</td>
<td>0.054</td>
<td>0.061</td>
<td>0.064</td>
<td>0.064</td>
<td>0.066</td>
<td>0.066</td>
<td>0.067</td>
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</tr>
<tr>
<td>RIVC5</td>
<td>0.037</td>
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<td>0.061</td>
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<td>0.067</td>
<td>0.067</td>
<td>0.067</td>
<td>0.069</td>
</tr>
<tr>
<td>RIVG2</td>
<td>0.037</td>
<td>0.054</td>
<td>0.060</td>
<td>0.063</td>
<td>0.064</td>
<td>0.066</td>
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<tr>
<td>RIVG5</td>
<td>0.037</td>
<td>0.054</td>
<td>0.061</td>
<td>0.066</td>
<td>0.067</td>
<td>0.067</td>
<td>0.068</td>
<td>0.068</td>
<td>0.068</td>
<td>0.069</td>
</tr>
</tbody>
</table>

Notes:
This table presents the mean of absolute errors of expected future ROE (MAE_ROE) assumed by each implementation of valuation models in each of future years. MAE_ROE are calculated as the absolute value of expected future ROE implied by each implementation of valuation models less realized future ROE. See Section 4(iii) for the calculation of expected future ROE for each implementation of valuation models. See Table 1 for the definition of valuation models.

For all implementations of valuation models, we use the same analysts’ earnings forecasts to proxy for market expectations of future earnings until the forecast horizons, and assume the same cost of equity capital and the same future dividend payout ratio. Thus, we can focus only on the different assumptions across the implementations of valuation models on the forecast horizon and future earnings growth beyond the forecast horizon as the main driver of differences in valuation accuracy of their equity value estimates.

We obtain future earnings per share within the forecast horizon from analysts’ earnings forecasts, as discussed in Section 3(i). For the period between next year of the forecast horizon and the 10th year, we calculate expected future ROE by obtaining the expected earnings per share backward from the future abnormal earnings growth (residual incomes) assumed by each of the OJ (RIV) estimates as well as future book value of equity derived from the clean surplus relation.

To evaluate and contrast the ROE trends, we examine the absolute errors of expected future ROE implied by each implementation of valuation models. The absolute errors of ROE are calculated as the absolute value of expected future ROE less realized future ROE. The mean of absolute errors of ROE (hereafter, MAE_ROE) is presented in Table 3.

As shown in Table 3, the MAE_ROEs for the OJ estimates are generally greater than those for the RIV estimates after year \( t + 5 \). Increasing the forecast horizon for the OJ estimates from two to five years, however, significantly lowers MAE_ROE. For example, the difference in MAE_ROE for year \( t + 10 \) between the two-period and five-period OJ estimates is 0.2 (0.1) percentage point, and untabulated \( t \)-tests indicate that these differences are all significant at 1%. Nevertheless, the MAE_ROE of the survivorship bias would distort our main conclusion. In addition, we compute realized future ROE using the actual earnings per share reported in I/B/E/S, which are considered the earnings that analysts actually forecast.

To maintain consistency with the multiple valuation approach to calculate the adjusted equity value estimates, which are used for the comparison of the valuation accuracy, we make a similar adjustment to the ROE errors by subtracting the industry mean of expected (realized) future ROE from the raw expected (realized) future ROE.

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five-period OJ estimates is still consistently higher than that of the RIV estimates after year \( t + 5 \). These results suggest that the assumptions of the OJ estimates on future earnings growth beyond the forecast horizon might not be descriptively valid for predicting future ROE and thus could result in the low valuation accuracy of the OJ estimates.\(^{21}\)

(iv) Analysis of Valuation Accuracy and Implied Expected Future ROE for the Sample Partitioned on the Current ROE

To further explore the reason for the low performance of the OJ estimates (especially, the two-period OJ and PEG estimates) in terms of valuation accuracy (Section 4(ii)) and implied expected future ROE trends (Section 4(iii)), we continue our analysis for the sample partitioned into five quintiles based on the current ROE level. Our ex-ante conjecture is that the lower valuation accuracy of the two-period OJ and PEG estimates may be due to the noise in short-term earnings growth, which has a critical impact on the equity value estimates based on the two-period OJ and PEG models.\(^{22}\) Short-term earnings growth is noisy in terms of predicting longer-term earnings growth because one-year-ahead earnings forecasts are likely to include more transitory earnings items than longer-term earnings forecasts. If this is the case, we can expect the valuation accuracy of the two-period OJ and PEG estimates to be the worst for the firms in the extreme current ROE quintiles.

Panel A of Table 4 presents the results of valuation accuracy analyses for the sample partitioned based on current ROE. Overall, the firms in the medium current ROE quintile (quintile 3) exhibit the lowest pricing errors (highest valuation accuracy) for most of equity value estimates.\(^{23}\) Provided that current earnings of the firms in quintile 3 are expected to be persistent in the future and persistent earnings generally lead to more accurate equity value estimates, this result is straightforward. For each current ROE quintile, the OJ estimates exhibit higher pricing errors than the RIV estimates, a result confirming our earlier finding in Table 2.

The most important result is that the low valuation accuracy of the two-period OJ and PEG estimates is most distinct for the firms in the lowest current ROE quintile (quintile 1). Furthermore, increasing the forecast horizon for the OJ and PEG estimates results in significant improvements in valuation accuracy for the firms in quintile 1. The valuation accuracy of the RIV estimates is also the lowest for the firms in quintile 1, but we do not observe a comparable improvement in valuation accuracy for the RIV estimates when increasing the forecast horizon for the firms in quintile 1.

On the other hand, since the OJ model uses capitalized one-year-ahead earnings as the valuation anchor, for firms with lower current earnings, a larger portion of equity value will be represented by the terminal value, which is more vulnerable to the

\(^{21}\) However, the MAE\(_{\text{ROE}}\) of the five-period PEG estimates is not consistently lower than that of the two-period OJ estimates. In addition, for the RIV estimates, the ranking of MAE\(_{\text{ROE}}\) is not always consistent with that of valuation accuracy measures (e.g., MAPE). This result, however, does not affect our main conclusion that the OJ estimates show lower valuation accuracy than the RIV estimates primarily because the OJ estimates’ assumptions might be less valid for predicting future earnings than the RIV estimates’.

\(^{22}\) Untabulated results indicate that the terminal value of the two-period OJ estimates represents 53.2% (median) of equity value while that of the five-period OJ estimates represents 38.3% of equity value. On the other hand, such portion for the RIV estimates is on average only 26.5%. This is because the RIV model anchors on current book value of equity. This result implies that the two-period OJ estimates are more sensitive to the terminal values, which are largely determined by short-term earnings growth.

\(^{23}\) Untabulated \(t\)-tests indicate that the differences of MAPE across equity value estimates and firm quintiles are significant at 1% for most cases.
### Table 4
Mean Absolute Pricing Errors for the Sample Partitioned on Current ROE and B/M

#### Panel A: MAPE for the Sample Partitioned on Current ROE

<table>
<thead>
<tr>
<th>Rank of Current ROE</th>
<th>OJ2</th>
<th>OJ5</th>
<th>PEG2</th>
<th>PEG5</th>
<th>RIVI2</th>
<th>RIVI5</th>
<th>RIVC2</th>
<th>RIVC5</th>
<th>RIVG2</th>
<th>RIVG5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 (lowest)</td>
<td>0.857</td>
<td>0.615</td>
<td>0.842</td>
<td>0.565</td>
<td>0.517</td>
<td>0.488</td>
<td>0.408</td>
<td>0.396</td>
<td>0.404</td>
<td>0.417</td>
</tr>
<tr>
<td>Q2</td>
<td>0.560</td>
<td>0.504</td>
<td>0.565</td>
<td>0.458</td>
<td>0.393</td>
<td>0.384</td>
<td>0.286</td>
<td>0.302</td>
<td>0.311</td>
<td>0.341</td>
</tr>
<tr>
<td>Q3</td>
<td>0.470</td>
<td>0.461</td>
<td>0.476</td>
<td>0.410</td>
<td>0.325</td>
<td>0.320</td>
<td>0.247</td>
<td>0.267</td>
<td>0.289</td>
<td>0.316</td>
</tr>
<tr>
<td>Q4</td>
<td>0.474</td>
<td>0.464</td>
<td>0.470</td>
<td>0.425</td>
<td>0.356</td>
<td>0.341</td>
<td>0.275</td>
<td>0.286</td>
<td>0.317</td>
<td>0.334</td>
</tr>
<tr>
<td>Q5 (highest)</td>
<td>0.523</td>
<td>0.533</td>
<td>0.515</td>
<td>0.491</td>
<td>0.426</td>
<td>0.393</td>
<td>0.325</td>
<td>0.334</td>
<td>0.367</td>
<td>0.383</td>
</tr>
</tbody>
</table>

#### Panel B: MAPE for the Sample Partitioned on Current B/M

<table>
<thead>
<tr>
<th>Rank of Current B/M</th>
<th>OJ2</th>
<th>OJ5</th>
<th>PEG2</th>
<th>PEG5</th>
<th>RIVI2</th>
<th>RIVI5</th>
<th>RIVC2</th>
<th>RIVC5</th>
<th>RIVG2</th>
<th>RIVG5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 (lowest)</td>
<td>0.542</td>
<td>0.522</td>
<td>0.520</td>
<td>0.481</td>
<td>0.468</td>
<td>0.416</td>
<td>0.362</td>
<td>0.352</td>
<td>0.388</td>
<td>0.389</td>
</tr>
<tr>
<td>Q2</td>
<td>0.510</td>
<td>0.508</td>
<td>0.491</td>
<td>0.468</td>
<td>0.363</td>
<td>0.349</td>
<td>0.282</td>
<td>0.306</td>
<td>0.330</td>
<td>0.357</td>
</tr>
<tr>
<td>Q3</td>
<td>0.493</td>
<td>0.479</td>
<td>0.484</td>
<td>0.433</td>
<td>0.313</td>
<td>0.308</td>
<td>0.236</td>
<td>0.271</td>
<td>0.290</td>
<td>0.327</td>
</tr>
<tr>
<td>Q4</td>
<td>0.537</td>
<td>0.484</td>
<td>0.550</td>
<td>0.432</td>
<td>0.319</td>
<td>0.320</td>
<td>0.228</td>
<td>0.267</td>
<td>0.275</td>
<td>0.321</td>
</tr>
<tr>
<td>Q5 (highest)</td>
<td>0.803</td>
<td>0.584</td>
<td>0.821</td>
<td>0.534</td>
<td>0.556</td>
<td>0.533</td>
<td>0.432</td>
<td>0.390</td>
<td>0.407</td>
<td>0.397</td>
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</tbody>
</table>
Table 4 (Continued)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>INTERCEPT</th>
<th>ROE.Q1</th>
<th>ROE.Q5</th>
<th>B/M.Q1</th>
<th>B/M.Q5</th>
<th>SIZE</th>
<th>GROWTH</th>
<th>Adj. $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAPE.OJ2 – MAPE.OJ5</td>
<td>0.025</td>
<td>0.169</td>
<td>−0.021</td>
<td>0.007</td>
<td>0.126</td>
<td></td>
<td></td>
<td>0.031</td>
</tr>
<tr>
<td></td>
<td>(0.84)</td>
<td>(7.17)</td>
<td>(−1.82)</td>
<td>(0.43)</td>
<td>(6.21)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.399</td>
<td>0.199</td>
<td>−0.012</td>
<td>0.093</td>
<td>0.077</td>
<td>−0.029</td>
<td>−1.376</td>
<td>0.052</td>
</tr>
<tr>
<td></td>
<td>(4.31)</td>
<td>(11.56)</td>
<td>(−0.86)</td>
<td>(6.16)</td>
<td>(4.27)</td>
<td>(−4.46)</td>
<td>(−8.36)</td>
<td></td>
</tr>
<tr>
<td>MAPE.RIVG2 – MAPE.RIVG5</td>
<td>−0.030</td>
<td>0.001</td>
<td>−0.006</td>
<td>0.037</td>
<td>0.048</td>
<td></td>
<td></td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>(−10.51)</td>
<td>(0.22)</td>
<td>(−2.17)</td>
<td>(9.14)</td>
<td>(4.77)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.004</td>
<td>0.013</td>
<td>−0.006</td>
<td>0.053</td>
<td>0.040</td>
<td>0.001</td>
<td>−0.323</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>(0.27)</td>
<td>(2.44)</td>
<td>(−1.70)</td>
<td>(15.98)</td>
<td>(4.26)</td>
<td>(0.56)</td>
<td>(−10.19)</td>
<td></td>
</tr>
<tr>
<td>MAPE.OJ2 – MAPE.RIVG2</td>
<td>0.184</td>
<td>0.224</td>
<td>0.005</td>
<td>−0.059</td>
<td>0.104</td>
<td></td>
<td></td>
<td>0.042</td>
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<tr>
<td></td>
<td>(23.21)</td>
<td>(6.77)</td>
<td>(0.73)</td>
<td>(−4.96)</td>
<td>(5.08)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAPE.OJ5 – MAPE.RIVG5</td>
<td>0.046</td>
<td>0.193</td>
<td>0.016</td>
<td>−0.048</td>
<td>0.084</td>
<td>−0.044</td>
<td>0.161</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>(7.95)</td>
<td>(7.18)</td>
<td>(1.83)</td>
<td>(−3.13)</td>
<td>(5.04)</td>
<td>(−8.62)</td>
<td>(1.01)</td>
<td></td>
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<tr>
<td></td>
<td>0.129</td>
<td>0.047</td>
<td>0.021</td>
<td>−0.027</td>
<td>0.023</td>
<td></td>
<td></td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(3.89)</td>
<td>(3.38)</td>
<td>(1.53)</td>
<td>(−3.22)</td>
<td>(2.41)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>0.052</td>
<td>−0.004</td>
<td>0.023</td>
<td>−0.090</td>
<td>0.047</td>
<td>−0.012</td>
<td>1.261</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>(0.89)</td>
<td>(−0.25)</td>
<td>(1.24)</td>
<td>(−13.02)</td>
<td>(6.16)</td>
<td>(−2.67)</td>
<td>(11.33)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Panel A (Panel B) presents the distribution of the mean of absolute pricing errors (MAPE) of the adjusted equity value estimates from each implementation of valuation models for the sample partitioned into five quintiles based on current ROE (B/M). ROE is return on equity, and B/M is book-to-market ratio. The pricing errors are defined as the equity value estimates less stock prices, deflated by stock prices. In Panel A (Panel B), firms in quintile 1 (abbreviated as Q1) have the lowest current ROE (B/M) and firms in quintile 5 (abbreviated as Q5) have the highest current ROE (B/M). See Table 1 for the definition of valuation models. Panel C presents the results for the following year-by-year regression:

Dependent Variable = $\beta_0 + \beta_1 \text{ROE.Q1} + \beta_2 \text{ROE.Q5} + \beta_3 \text{B/M.Q1} + \beta_4 \text{B/M.Q5} + \beta_5 \text{SIZE} + \beta_6 \text{GROWTH} + \epsilon$.

Dependent variables are the differences in MAPE between OJ2 and OJ5 (MAPE.OJ2 – MAPE.OJ5), between RIVG2 and RIVG5 (MAPE.RIVG2 – MAPE.RIVG5), between OJ2 and RIVG2 (MAPE.OJ2 – MAPE.RIVG2), and between OJ5 and RIVG5 (MAPE.OJ5 – MAPE.RIVG5). ROE.Q1 (ROE.Q5) equals one for the lowest (highest) quintile of current ROE and zero otherwise. B/M.Q1 (B/M.Q5) is one for the lowest (highest) quintile of B/M and zero otherwise. SIZE is the logarithm of market value of equity and GROWTH is analysts’ five-year earnings growth forecasts. The number of observations used in Panel C is reduced to 24,478 as a result of requiring non-missing variables. The coefficients presented are the means of the annual regressions. The numbers in parentheses are Fama and MacBeth’s (1973) $t$-statistics adjusted for autocorrelation in errors terms as in Kemsley and Nissim (2002). Adj. $R^2$ is the average adjusted $R^2$ of the annual regressions.

***, **, * denotes significance at < 0.01, < 0.05 and < 0.10 levels, respectively, for two-tailed tests.
noise in earnings growth forecasts. Thus, one could argue that it is not so surprising to observe a greater improvement of valuation accuracy of the OJ estimates for firms with lower ROE by increasing forecast horizons and so decreasing the portion of equity value represented by the terminal value. Furthermore, one could argue that a similar improvement of valuation accuracy of the RIV estimates for firms with lower book-to-market ratios would be observed, since the RIV model uses the book value of equity as the valuation anchor. Accordingly, we partition the sample based on the book-to-market ratios (B/M) and then examine whether we can further improve the valuation accuracy of the RIV estimates especially for firms with lower B/M.

Panel B of Table 4 provides the results of such analyses for the sample partitioned based on current B/M. The lower valuation accuracy of the two-period OJ and PEG estimates is most distinct for the firms in the highest B/M quintile (quintile 5). This result is straightforward, given the negative relation between B/M and current ROE (Penman, 2005). Consistent with Panel A, increasing the forecast horizon for the firms with the highest B/M leads to a remarkable improvement of valuation accuracy for the OJ and PEG estimates. However, increasing the forecast horizon for the firms with the lowest B/M (quintile 1) does not consistently result in a significant improvement in the valuation accuracy of the RIV estimates.

The univariate results above, however, do not control for the effects of other variables that potentially affect the differences of valuation accuracy across equity value estimates. To address this concern, we regress the differences of mean absolute pricing errors (MAPE) across equity value estimates on current ROE and B/M quintiles simultaneously as well as control variables, such as firm size (SIZE) and analysts’ earnings growth forecasts (GROWTH), which may differently affect future earnings growth beyond the forecast horizon across equity value estimates. Panel C of Table 4 presents the results for this regression.

Using the difference in MAPE between the two-period and five-period OJ estimates (MAPE_OJ2 – MAPE_OJ5) as the dependent variable, we find that the dummy for the lowest ROE quintile (ROE.Q1) and the dummy for the highest B/M quintile (B/M.Q5) are significantly positive, consistent with the results from Panels A and B of Table 4. When the dependent variable is the difference in MAPE between the two-period and five-period RIVG estimates (MAPE_RIVG2 – MAPE_RIVG5), we find that the dummy for the lowest B/M quintile is significantly positive. However, this coefficient (0.053) is smaller than the coefficient on ROE.Q1 for the OJ estimates (0.199). This result implies that a longer forecast horizon leads to a greater improvement in valuation accuracy for the OJ estimates than for the RIVG estimates, especially when the portion of equity value explained by the valuation anchor is very low.

Using the difference in MAPE between the two-period OJ and two-period RIVG estimates (MAPE_OJ2 – MAPE_RIVG2) as the dependent variable, we also find that ROE.Q1 and B/M.Q5 are both significantly positive, again consistent with the results from Panels A and B of Table 4. However, the dummy for the lowest B/M quintile (B/M.Q1) is negative in this specification. Moreover, a similar result is found when the five-period OJ and five-period RIVG estimates are compared. This finding suggests that the OJ estimates could outperform the RIV estimates in some cases when B/M is extremely low, while exhibiting a higher pricing error on average than does the RIV estimates as shown in Panel B.

24 In Panel C of Table 4, we compare OJ and RIVG estimates because these two models are similar in the sense that both estimates assume an increasing pattern of earnings beyond the forecast horizon. In untabulated results, we also compare PEG and RIVC estimates and obtain similar results.
Overall, our multivariate results from Panel C of Table 4 are largely consistent with the univariate results indicating that increasing the forecast horizon for the OJ estimates results in the greatest improvement in valuation accuracy for the lowest ROE and the highest B/M quintiles, but doing so for the RIV estimates does not necessarily lead to the greatest improvement in valuation accuracy for the lowest B/M quintile.

As an analysis of implied expected future ROE, Figure 1 visually presents the trend of expected future ROE implied by each implementation of valuation models for each current ROE quintile. Several observations are noteworthy.

First, Panel A of Figure 1 presents the trend of realized future ROE based on I/B/E/S earnings for each current ROE quintile. Consistent with Harris and Nissim (2004), we find that (1) ROE generally reverts to the mean, (2) the mean reversion is faster when ROE is further away from the mean, and (3) the ranking of ROE remains similar to that in the base year even around ten years later. These results are partially because firms with high (low) current ROE tend to have large positive (negative) transitory earnings items, and so their ROE reverts to the mean faster than ROE of firms with more normal levels of current profitability.

Second, Panel B presents the trend of expected future ROE implied by the two-period OJ (OJ2) estimates. Compared with realized future ROE, expected future ROE implied by the OJ2 (and PEG2) estimates is largely overestimated in each of future years, especially for the firms in the lowest current ROE quintile (quintile 1). In particular, for the OJ2 (and PEG2) estimates, the firms with the lowest current ROE are expected to show the second highest ROE for the years subsequent to year \( t + 5 \). However, Panel C demonstrates that increasing the forecast horizon up to five years mitigates this ROE overestimation problem for the firms in quintile 1.

Third, Panels D and E present the trends of expected future ROE implied by the RIVG estimates. Unlike the OJ2 (and PEG2) estimates, the RIVG (RIVI and RIVC) estimates do not cause a significant overestimation of future ROE for the firms in quintile 1.

Collectively, the patterns of the discrepancy between implied and realized future ROEs across current ROE quintiles are consistent with the patterns in the valuation accuracy across current ROE quintiles, as reported in Table 4.

We explain the results in Table 4 and Figure 1 as follows. When current ROE is extremely low due to large negative transitory items, one-year-ahead earnings expectations are lowered. If two-year-ahead earnings expectations revert to the normal level of earnings, short-term earnings growth expectations tend to be overestimated. The overestimated short-term earnings growth would also overestimate the long-term earnings growth beyond the forecast horizon according to the assumptions of the two-period OJ (and PEG) estimates, as shown in Panel B of Figure 1. However, for the five-period OJ (and PEG) estimates, long-term earnings expectations beyond the forecast horizon are shown.

25 Because the trend of expected future ROE implied by PEG2 (PEG5) estimates shows a similar pattern with that of OJ2 (OJ5) estimates, we present only the trend from OJ2 (OJ5) estimates. Similarly, we report only the trend from RIVG2 (RIVG5) estimates, which is comparable with OJ2 (OJ5) estimates.

26 We rerun the analysis of Table 3 for each current ROE quintile. Untabulated results are consistent with the patterns shown visually in Figure 1.

27 We rerun the analysis of Table 4, using the average ‘signed’ (as opposed to ‘absolute’) pricing errors. Untabulated results indicate that, for both the two-period OJ and PEG estimates, the mean values of signed pricing errors for the firms in the lowest current ROE quintile are significantly positive, whereas such values for the other equity value estimates are not. This finding is consistent with our prediction that the implementation of two-period OJ and PEG models could significantly overestimate long-term earnings growth, especially for the firms with the lowest current ROE, resulting in significantly positive pricing errors.
Figure 1
Trends of Future ROE for the Sample Partitioned on Current ROE

Panel A: Realized Future ROE based on I/B/E/S Actual Earnings

Panel B: Expected Future ROE Assumed by OJ2 Estimates
Panel C: Expected Future ROE Assumed by OJ5 Estimates

Panel D: Expected Future ROE Assumed by RIVG2 Estimates
Panel E: Expected Future ROE Assumed by RIVG5 Estimates

horizon are mainly affected by four- and five-year-ahead earnings expectations, rather than by one- and two-year-ahead earnings expectations. Since analysts’ four- and five-year-ahead earnings expectations are largely free from the current transitory items, the long-term earnings expectations of the five-period OJ (and PEG) estimates are not as much overestimated for the firms in quintile 1 as in the two-period OJ (and PEG) estimates, as shown in Panel C of Figure 1. However, for the RIV estimates, anchoring on current book value of equity may reduce the effect of noise contained in current earnings. Thus, increasing the forecast horizon for the RIV estimates may have a smaller effect on the long-term earnings expectations.

Collectively, the results in this Section 4(iv) support our conclusion in Section 4(iii) that the assumptions of the two-period OJ and PEG estimates on future earnings growth might not be valid for predicting future ROE and thus could result in a low valuation accuracy. Moreover, these results may help researchers and practitioners make more reasonable assumptions on future earnings growth beyond the forecast horizon when implementing equity valuation models for various purposes, such as inferring cost of equity capital.
5. CONCLUSION

This paper examines the relative valuation accuracy of OJ estimates and RIV estimates. We find that OJ estimates generally underperform RIV estimates in terms of valuation accuracy. Increasing the forecast horizon for OJ estimates from two to five years, however, significantly improves their valuation accuracy. Nevertheless, the valuation accuracy of OJ estimates remains lower than RIV estimates. Comparing predicted ROE to actual ROE suggests that the different assumptions across the OJ and RIV models about future earnings growth beyond the forecast horizon cause the differences in valuation accuracy. In particular, the noise contained in current earnings may affect short-term earnings growth expectations, distort long-term earnings expectations, and ultimately reduce the valuation accuracy of the two-period OJ estimates.

This paper contributes to accounting research by comparing the valuation accuracy of equity value estimates from empirical implements of the OJ and RIV models. Furthermore, our findings suggest that increasing the forecast horizon significantly improves the valuation accuracy of OJ estimates. Future research may investigate other aspects of the OJ model, such as the perpetuity growth rate, to further improve its valuation accuracy.

Our findings should be interpreted with caution since we only examine the valuation accuracy of representative empirical implementations of theoretical valuation models using a US sample. Thus, we do not claim that our results would generalize to alternative implementations or to other countries. For example, differences in accounting standards may lead investors to anticipate varying degrees of dirty surplus items and accounting conservatism which in turn may impact valuation accuracy and bias (see O’Hanlon and Pope, 1999; Cahan et al., 2000; Barniv and Myring, 2006; Choi et al., 2006; Daske, 2006; and Espinosa and Trombetta, 2007). Further, the performance numbers that investors focus on may vary across countries. In addition, although we investigate the cross-sectional variation of valuation accuracy based on current profitability, other unknown factors (such as risk) may also affect the cross-sectional variation (see Hughes et al., 2009). A theoretical approach might help more systematically identify conditions under which a specific implementation of a valuation model improves or deteriorates the valuation accuracy of resulting equity value estimates. This is beyond our research scope, however, and thus we leave it for future research. Nonetheless, our study provides new insights on the performance of competing implementations of accounting-based valuation models.

REFERENCES


