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Effect of Analysts' Optimism on Estimates of the Expected Rate of Return Implied by Earnings Forecasts

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ABSTRACT

Recent literature has used analysts' earnings forecasts, which are known to be optimistic, to estimate implied expected rates of return, yielding upwardly biased estimates. We estimate that the bias, computed as the difference between the estimates of the implied expected rate of return based on analysts' earnings forecasts and estimates based on current earnings realizations, is 2.84%. The importance of this bias is illustrated by the fact that several extant studies estimate an equity premium in the vicinity of 3%, which would be eliminated by the removal of the bias. We illustrate the point that cross-sample

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differences in the bias may lead to the erroneous conclusion that cost of capital differs across these samples by showing that analysts' optimism, and hence, bias in the implied estimates of the expected rate of return, differs with firm size and with analysts' recommendation. As an important aside, we show that the bias in a value-weighted estimate of the implied equity premium is 1.60% and that the unbiased value-weighted estimate of this premium is 4.43%.

1. Introduction

A large and expanding body of literature uses analysts' forecasts of earnings to determine the expected rate of return implied by these forecasts, current book values, and current prices.[1] These implied expected rates of return are often used as estimates of the market's expected rate of return and/or as estimates of the cost of capital.[2] Yet the earnings forecasts are optimistic, particularly as they are usually measured a year in advance of the earnings announcement.[3] Since these earnings forecasts are optimistically biased, the expected rates of return implied by these forecasts will be upward biased. We show that this bias is statistically and economically significant.[4]

The extant literature on analysts' optimism/pessimism generally compares forecasts of earnings with realizations of the earnings that are forecasted. This provides an ex post measure of optimism. Our primary analysis is a comparison of the expected rate of return implied by current market prices and analysts' earnings forecasts of next period's earnings with

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[1] Literature that reverse-engineers valuation models to obtain estimates of the implied expected rate of return on equity investment is very new. These models include the dividend capitalization model in Botosan [1997]; the residual income valuation model in O'Hanlon and Steele [2000], Gebhardt, Lee, and Swaminathan [2001], Claus and Thomas [2001], Easton et al. [2002], and Baginski and Wahlen [2003]; and the abnormal growth in earnings model in Gode and Mohanram [2003] and Easton [2004]. Literature using these estimates to test hypotheses regarding factors that may affect the expected rate of return developed almost simultaneously; for example, see Daske [2006], Dhaliwal et al. [2005], Francis, Khurana, and Periera [2005], Francis et al. [2004], Hail and Leuz [2006], Hribar and Jenkins [2004], and Lee, Myers, and Swaminathan [1999]. This development took place despite the fact that (1) some of these methods were not designed to provide firm-specific estimates; see, in particular, Claus and Thomas [2001], Easton et al. [2002], and Easton [2004]; and (2) there is very little evidence regarding the empirical validity of these methods.

[2] Although the term cost of capital is commonly used to describe these implied expected rates of return, they are not the cost of capital unless the market prices are efficient and the earnings forecasts are the market's earnings expectations. A more precise term would be "the internal rate of return implied by market prices, accounting book values and analysts' forecasts of earnings."

[3] These forecasts tend to be much more optimistic than those made closer to the earnings announcement; see Richardson, Teoh, and Wysocki [2004].

[4] Claus and Thomas [2001] observe that the optimistic bias in analysts' forecasts will bias their estimate of the equity premium upward. Williams [2004] also makes this point in his discussion of Botosan, Plumlee, and Xie [2004]. This effect of analysts' optimism is exacerbated by the fact that all studies using analysts' forecasts to calculate an implied expected rate of return are based on forecasts made well in advance (usually at least a year ahead) of the earnings announcement.

the expected rate of return implied by these prices and current earnings. Since this comparison is done at the time the forecast is made, rather than after the realization, it provides an ex ante measure of the affect of optimism/pessimism. We are primarily interested in this ex ante comparison for two reasons. First, our goal is to determine the bias in estimates of expected rates of return implied by analysts' forecasts at the time that these forecasts are made. Second, this measure of optimism/pessimism is not affected by events that occur between the forecast date and the time of the earnings realization.[5]

The method we use for estimating the expected rate of return that is implied by prices, current book values, and forecasts of earnings is the method that Easton et al. [2002] use to estimate the equity premium in the United States. The method we use for estimating the expected rate of return that is implied by prices and current accounting data is an adaptation of the method that O'Hanlon and Steele [2000] use to estimate the equity premium for the United Kingdom. Both of these methods simultaneously estimate the implied expected rate of return and the expected growth rate for portfolios/groups of stocks. The estimate of the expected growth rate is not important in and of itself in our study; but estimating it simultaneously with the estimation of the implied expected rate of return is critical because it avoids the introduction of error which will almost inevitably arise when the expected growth rate is assumed.[6]

The conclusion from the very recent studies that examine the validity of *firm-specific* estimates of the implied expected rate of return derived from reverse-engineering earnings-based valuation models (see, Botosan and Plumlee [2005], Easton and Monahan [2005], Guay, Kothari, and Shu [2005]) is that these estimates are poor, indeed. None of these studies address bias, that is, the *average* difference between the market expectation of the rate of return, which these studies purport to measure, and rates implied by analysts' forecasts. Yet it is possible that the bias in analysts' forecasts, and hence the likely bias in estimates of expected rates of return, may be affected by the factor that researchers are investigating. For example, it is possible that analysts' forecasts for firms under one accounting regime (say, accounting based on international accounting standards) may be more optimistic than analysts' forecasts for firms under a different accounting regime (say, accounting based on domestic standards). These optimistic forecasts may

[5] An obvious recent example of such an event is the tragedy of the terrorist attack of September 11, 2001. This event, which was not foreseen by analysts, would almost certainly have made their forecasts overly optimistic with the benefit of hindsight. We return to this example.

[6] Any assumed growth rate will almost invariably differ from the growth rate implied by the data. See Easton [2006] for a detailed discussion of this source of error. If the same (assumed) growth rate is applied to both the earnings forecast and actual earnings data, differences in optimism will mechanically produce differences in estimates of the implied expected rate of return. With simultaneous estimation of growth, the relation between optimism in analysts' forecasts and optimistic bias in estimates of the expected rate of return is not mechanical since the optimism may be mitigated or exaggerated by differing growth estimates.

bias the estimate of the expected rate of return upward, potentially leading to the (possibly erroneous) conclusion that the cost of capital is higher for these firms. We illustrate this point by showing that analysts' optimism (and hence the bias in implied expected rates of return) varies with firm size and with analysts' recommendations.

All of our analyses are based on I/B/E/S forecasts of earnings and recommendations for the years 1993–2004 and actual prices and accounting data for 1992–2004.[7] Consistent with the extant literature, we show that the forecasts tend to be optimistic leading to an implied expected rate of return which is, on average, biased upward by 2.84%. Comparing this bias with the estimates of the expected equity premium based on these data (3% or less in Claus and Thomas [2001], between 2% and 3% in Gebhardt, Lee, and Swaminathan [2001], and 4.8% in Easton et al. [2002]) suggests that there may be no premium at all! It is important to note, however, that each of these papers attributes equal weight to all stocks that are used in the calculation of the mean or median estimate of the market expected rate of return in Claus and Thomas [2001] and Gebhardt, Lee, and Swaminathan [2001], and in the regression in Easton et al. [2002].

This equal-weighting has two potential effects. First, we show that analysts' optimism decreases as firm size increases so that small stocks unduly bias the estimate of an equally weighted estimate of the implied expected rate of return. Second, stocks with low or negative earnings, which are somewhat meaningless as summary valuation metrics, potentially have an influence that is similar to the influence of large stable firms where earnings are a much more meaningful valuation metric. In order to avoid these undue influences, we repeat all of the analyses weighting each of the observations by market capitalization.

Our estimate of the implied expected rate of return on the market from the value-weighted regression, after removing the effect of bias in analysts' forecasts, is 9.67% with an implied equity risk premium of 4.43%. Of course, this estimate of the equity risk premium is more reasonable than that obtained when all observations have equal weight.[8]

Studies such as Michaely and Womack [1999], Boni and Womack [2002], Eames, Glover, and Kennedy [2002], and Bradshaw [2004] show that analysts generally make "strong buy" and "buy" recommendations. They sometimes recommend "hold," and rarely recommend "sell." If strong buy or

[7] Our analyses of bias have direct implications for all of the papers that are based on these I/B/E/S forecasts of earnings and are likely to also apply to other papers based on buy-side analysts' earnings forecasts. We are silent on the effects of bias in studies based on the dividend capitalization model (such as Botosan [1997] and Brav, Lehavy, and Michaely [2005]) because the implied expected rates of return in these studies are based on forecasts of dividends and prices rather than on earnings forecasts.

[8] Since the extent of analysts' optimism decreases as firm size increases, the bias in the expected rate of return on the market estimated via the value-weighted regression is lower than the estimate from the equally weighted regression; 1.60% compared with 2.84%.

buy recommendations are associated with analysts' expectations of positive abnormal returns, the pervasiveness of these recommendations could be the reason for finding upwardly biased estimates of expected rates of return implied by analysts' earnings forecasts. To examine this issue further, we repeat the analyses for subsamples formed on the basis of percentage of analysts comprising the consensus who recommend strong buy or buy.

We show that the consensus analyst forecast is optimistic even when less than 30% of analysts comprising the consensus recommended strong buy or buy.[9] It follows that estimates of the implied expected rate of return are biased upward even for these subsamples. Interestingly, we show that the implied expected rate of return declines monotonically as the percentage of analysts recommending strong buy or buy declines. In other words, analysts' recommendations appear to be based on expected raw rates of return rather than the difference between the analysts' expectations and the market expectation (i.e., abnormal returns). This evidence is consistent with the observation in Groysberg et al. [2007] that analysts' salary increases and bonuses are based on stock returns subsequent to their recommendations adjusted for the return on the Standard and Poor's (S&P) 500 index.

The remainder of the paper proceeds as follows. In section 2, we outline the methods used in estimating the expected rate of return implied by market prices, current book value of equity, and current and forecasted accounting earnings. Section 3 describes the data used in our analyses. In section 4, we document the ex post and the ex ante bias in consensus analysts' forecasts and discuss the implications for cost of capital estimates in extant accounting research, which are generally based on equal weighting of observations from the entire sample of firms followed by analysts. In section 5, we repeat the analyses using value-weighting of firms to show that the estimate of the bias is lower and the estimate of the expected equity risk premium is more reasonable than that obtained in extant studies. Subsamples based on percentage of analysts recommending buy are analyzed in section 6. Section 7 concludes with a summary of implications for future research.

2. *Methods of Estimating the Implied Expected Rate of Return*

We develop three methods for estimating the implied expected rate of return. These estimates are based on (1) analysts' earnings forecasts of next year's earnings, (2) realized earnings for the current year, and (3) perfect foresight forecasts of next year's earnings. Comparing the estimates based on forecasts to the estimates based on actual earnings leads to two determinations of the bias when estimates of the market expected rate of return are based on analysts' forecasts of earnings. In each case, bias is the difference

[9] While it is reasonable to expect that the level of the analyst's recommendation should be associated with *expected* abnormal returns, it should be noted that Bradshaw [2004] finds analysts' recommendations are uncorrelated with future *realized* abnormal returns.

between estimates based on forecasts of earnings and estimates based on earnings realizations.

Our primary measure compares the estimates of the implied expected rate of return based on analysts' forecasts with estimates based on current earnings realizations. We refer to this measure as the *ex ante* measure of bias because it relies on information available at the time of the earnings forecast. The second measure compares estimates formed using analysts' forecasts with estimates based on perfect foresight of next-period earnings realizations. We refer to this as the *ex post* measure.[10]

2.1 EX ANTE DETERMINATION OF THE EFFECT OF BIAS

Each of the three methods for estimating the implied expected rate of return is derived from the residual income valuation model, which may be written as follows:

$$v_{jt} \equiv bps_{jt} + \sum_{\tau=1}^{\infty} \frac{eps_{jt+\tau} - r_j \times bps_{jt+\tau-1}}{(1+r_j)^{\tau}} \tag{1}$$

where v_{jt} is the intrinsic value per share of firm j at time t, bps_{jt} is the book value per share of common equity of firm j at time t, eps_{jt} is the earnings per share of firm j at time t, and r_j is the cost of capital for firm j.[11] Easton et al. [2002] rely on the following finite horizon version of this model:

$$p_{jt} \equiv bps_{jt} + \frac{eps^{IBES}_{jt+1} - r_j \times bps_{jt}}{(r_j - g_j)} \tag{2}$$

where p_{jt} is price per share for firm j at time t, eps^{IBES}_{jt+1} is an I/B/E/S forecast of earnings for period t+1, and g_j is the expected rate of growth in residual income beyond period t+1 required to equate (p_{jt} – bps_{jt}) and the present value of an infinite residual income stream.[12, 13]

Easton et al. [2002], like many other studies, implicitly use analysts' forecasts of earnings as a proxy for market expectations of next period earnings. Optimistic bias in analysts' forecasts may imply a bias in this proxy. In this

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[10] There may be factors other than analysts' optimism affecting each of these measures of bias; but, since other factors affecting the ex ante measure would not affect the ex post measure (and vice versa), obtaining similar results based on both measures suggests that the effect of other factors is minimal. We elaborate on this point in section 2.3.

[11] Derivation of this model requires the no arbitrage assumption, which is necessary to derive the dividend capitalization formula, and that earnings are comprehensive—in other words, the articulation of earnings and book value is clean surplus.

[12] Price in this relation replaces intrinsic value. This form of the residual income model does not rely on the no-arbitrage assumption—rather it is simply based on the definition of the expected rate of return (the difference between current price and expected cum-dividend end-of-year price divided by current price).

[13] In Easton et al. [2002] the period t to t+1 is 4 years so that eps_{jt+1} is aggregate expected cum-dividend earnings for the four years after date t. We use a one-year forecast horizon instead of four years in order to facilitate more effective use of the data. Easton et al. [2002] note that estimates of the expected rate of return based on just one year of forecasts are very similar to those based on four years of forecasts.

paper we use a modification of the method in O'Hanlon and Steele [2000] to determine, ex ante, an estimate of the expected rate of return that is not affected by this forecast error. This method provides an estimate of the expected rate of return implied by current realized accounting earnings; we compare this with the estimate implied by analysts' earnings forecasts from Easton et al. [2002] to measure bias ex ante.

The method adapted from O'Hanlon and Steele [2000] is based on the following form of the residual income valuation model:

$$p_{jt} \equiv bps_{jt} + \frac{(eps_{jt} - r_j \times bps_{jt-1})(1 + g'_j)}{(r_j - g'_j)} \tag{3}$$

The difference between this form of the model and the form used by Easton et al. [2002] is that g'_j is the perpetual growth rate starting from *current residual income* (i.e., residual income for time period $t{-}1$ to t) that implies a residual income stream such that the present value of this stream is equal to the difference between price and book value; in Easton et al. [2002], g_j is the perpetual growth rate starting from *next-period residual income* (i.e., expected residual income for time period t to $t{+}1$).

Since eps_{jt} (i.e., realized earnings) is the only payoff used in estimating the implied expected rate of return based on equation (3), this estimate is not affected by analysts' optimism unless that optimism is shared by the market and captured in p_{jt}. It follows that the difference between the estimate of the expected rate of return based on analysts' forecasts in equation (2) and the estimate based on current earnings in equation (3) is an ex ante estimate of bias introduced by using analysts' forecasts to estimate the markets' expected rate of return.

2.2 EX POST DETERMINATION OF THE EFFECT OF BIAS

Optimistic bias in analysts' earnings forecasts is well established in the literature; see, for example, O'Brien [1988], Mendenhall [1991], Brown [1993], Dugar and Nathan [1995], and Das, Levine, and Sivaramakrishnan [1998]. Each of these studies estimates the ex post bias by comparing earnings forecasts with realizations of these forecasted earnings. We obtain an ex post measure of the bias in the estimate of the expected rate of return by comparing the estimate of the expected rate of return based on I/B/E/S analysts' forecasts in equation (2) with the expected rate of return based on (perfect foresight forecasts of) earnings realizations; that is, we replace eps^{IBES}_{jt+1} in equation (2) with earnings realizations for period $t{+}1$, denoted eps^{PF}_{jt+1}. Of course, this ex post comparison, like prior studies of bias in analysts' forecasts, is affected by events having an effect on earnings that happen between the time of the forecast and the date of the earnings announcement.

2.3 EX ANTE AND EX POST COMPARISONS

In the ex post comparison of expected rates of return, unforeseen events are *omitted* from the market price but included in eps^{PF}_{jt+1}. On the other hand, in the ex ante comparison, expectations of future events are not included in

eps_{jt} but are implicitly *included* in the market price. Since there is no obvious reason to expect a correlation between the information omitted from price in the analyses based on equation (2) and the information included in price but excluded from earnings in the analyses based on equation (3), we use the results from both methods to gain alternative, independent estimates of the bias. Our results are similar using either method.

Our maintained hypothesis in the ex ante comparison of implied expected rates of return is that the market at time t sees through (undoes) the optimistic bias in the analysts' forecasts. The empirical evidence that the implied expected rates of return based on current earnings and on realized future earnings are the same suggests that this maintained hypothesis is reasonable.

2.4 ESTIMATION BASED ON PRICES, BOOK VALUE, AND EARNINGS FORECASTS

Easton et al. [2002] transform equation (2) to form the following regression relation:

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p_{jt}}{bps_{jt}} + \mu_{jt} \tag{4}$$

where $\gamma_0 = g$ and $\gamma_1 = r - g$.[14] This regression may be estimated for any group/portfolio of stocks to obtain an estimate of the implied expected rate of return, r, and the implied expected growth rate in residual earnings, g, for the portfolio. Easton et al. [2002] run this regression for a sample of U.S. stocks to obtain an estimate of the expected rate of return on the U.S. equity market and hence an estimate of the equity premium for that market. In the empirical implementation of this model, eps_{jt+1} is the I/B/E/S forecast of earnings measured just after the announcement of eps_{jt}. Since this is the only payoff that is used in the estimation of the implied expected rate of

[14] At the firm-specific level, the following relation between the regression variables, $\frac{eps_{jt+1}}{bps_{jt}} = \gamma_{0j} + \gamma_{1j}\frac{p_{jt}}{bps_{jt}}$, is readily obtained by rearranging the identity shown in equation (2). In the re-expression of this relation for a group of observations (as in equation (4)) as a regression relation, the coefficients γ_0 and γ_1 represent an average of the firm-specific γ_{0j} and γ_{1j} coefficients and the cross-sectional variation in these coefficients creates the regression residual. Easton et al. [2002] describe this regression in more detail pointing out that it involves the implicit assumption that it has the properties of a random coefficient regression. It is, of course, possible that the γ_{0j} and γ_{1j} are correlated in cross-section with either (or both) the dependent or (and) the independent variable and this correlation may introduce bias into the estimates of the regression coefficients (and, hence, into the estimates of the implied expected rates of return). It seems reasonable to assume, however, that this bias is very similar for the regressions based on analysts' earnings forecasts (eps^{IBES}_{jt+1}) and for those based on perfect foresight forecast of earnings (eps^{PF}_{jt+1}). Also, we can think of no reason why the effect of the bias in the analyses based on regression (4) is the same as the effect for the analyses based on current accounting earnings (regression (5)). In other words, similar results from the analysis based on perfect foresight forecasts and from the analyses based on current accounting data support the conclusion that this bias does not unduly affect our estimates.

return, any bias in the estimate of the implied expected rate of return would result from bias in the forecast.

2.5 ESTIMATION BASED ON CURRENT ACCOUNTING DATA

The analyses in O'Hanlon and Steele [2000] are based on realized earnings rather than earnings forecasts. Following the essence of the idea in O'Hanlon and Steele [2000], which is summarized in equation (3), we transform this equation to form the following regression relation:[15]

$$\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p_{jt} - bps_{jt}}{bps_{jt-1}} + \zeta_{jt} \tag{5}$$

where $\delta_0 = r$, $\delta_1 = (r - g')/(1 + g')$. This regression may be estimated for any group/portfolio of stocks to obtain an estimate of the expected rate of return, r, and the expected growth rate, g', for the portfolio. O'Hanlon and Steele [2000] run a regression similar to regression (5) for a sample of U.K. stocks to obtain an estimate of the expected rate of return on the U.K. equity market; and, hence, an estimate of the equity premium for that market. In the empirical implementation of regression (5), eps_{jt} is realized earnings. Since this is the only payoff used in estimating the implied expected rate of return, this estimate is not affected by analysts' optimism unless that optimism is shared by the market and captured in p_{jt}. It follows that the difference between the estimate of the expected rate of return obtained via regression (4) and the estimate based on regression (5) is an ex ante estimate of the bias when analysts' forecasts are used to estimate expected rates of return.

2.6 THE RELATIONS BETWEEN PRICES AND ACTUAL EARNINGS AND BETWEEN PRICES AND FORECASTS OF EARNINGS

In order to ensure that we obtain an estimate of the expected rate of return implied by analysts' forecasts we must use prices in regression (4) that reflect analysts' forecasts. Similarly, in regression (5) we must use prices that reflect earnings realizations to obtain an estimate of the markets' expected rate of return. The alignment of price dates, earnings announcement dates, and analysts' forecast dates is described in this subsection and summarized in figure 1.

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[15] We attribute this model to O'Hanlon and Steele [2000] because they capture its essential elements. The similarity to their model may not, however, be immediately apparent. Since the derivation in O'Hanlon and Steele [2000] is based on Ohlson [1989], the observation that the regression intercept is an estimate of the implied expected rate of return is not evident and O'Hanlon and Steele [2000] do not use it in this way. Rather, they estimate the implied expected rate of return at the firm-specific level by applying their model to time-series data and then measuring the risk premium as the slope of the securities market line estimated from a regression of these firm-specific rates of return on corresponding beta estimates. Notice that, in addition to requiring earnings to be clean surplus in all future periods, this form of the residual income model also requires that the relation between earnings for period t and book value for periods t and $t-1$ follows the clean surplus relation.

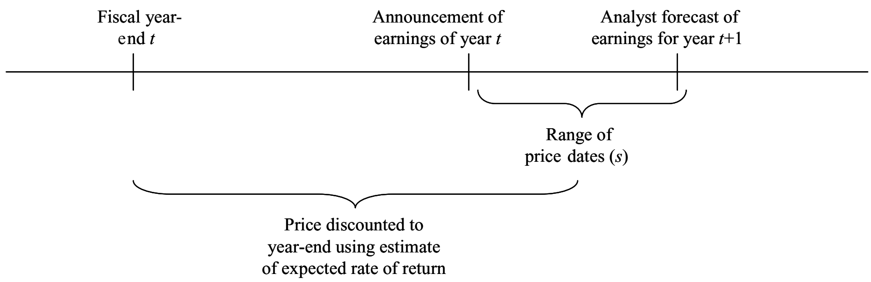

FIG. 1.—Alignment of price dates, earnings announcement dates, and analysts' forecast dates.

We choose the first consensus forecast announced at least 14 days after the date of the earnings announcement.[16] In the analyses based on these forecasts, we use the price at the close of trade one day after the earnings announcement. Consistent with numerous studies of the information content of earnings, it seems reasonable to assume that this price incorporates the information in realized earnings. Further, we implicitly assume that this price is known to analysts at the time they form their earnings forecasts. In view of the fact that the forecasts comprising the consensus are formed at various points in time, this assumption may be invalid; some of the forecasts comprising the consensus may precede the earnings announcement date or they may have been issued a considerable time after this date. We examine the sensitivity of the results to this assumption by varying the price date from the day after the earnings announcement to one day after the consensus forecast is measured. This latter measurement date for price allows for the incorporation of the information in the analysts' forecasts in price. The results are not sensitive to this choice.

The residual income valuation model underlying regression (4) and regression (5) describes the value of a stock at the fiscal period end-date. Our analyses are based on prices after this date. To accommodate this difference, we replace price (p_{jt}) in equation (4) and equation (5) with price at the dates described above discounted by the expected rate of return ($\hat{r}$) back to the fiscal year-end; that is, $p_{jt+\tau}/(1+\hat{r})^{\tau/365}$, where τ is the number of days between the fiscal year-end and the price date. Since the discounting of price requires the expected rate of return we are attempting to estimate in equation (4) and equation (5), we use an iterative method as used in Easton et al. [2002]. We begin these iterations by assuming a discount rate for prices of 12%. We run each regression and obtain estimates of the expected rate of return which we then use as the new rate for discounting prices. We then rerun the regressions to re-estimate equation (4) and/or equation (5) and provide another estimate of expected return. This procedure is repeated

[16] Use of the first forecast made after the earnings announcement from the I/B/E/S Detail History database does not alter any results.

until the estimate of the expected return and the rate used in discounting price converge.[17]

3. *Description of the Data*

All earnings forecast and recommendation data are obtained from the I/B/E/S unadjusted research databases. We use the first median consensus forecast of earnings for year t+1 released 14 days or more after the announcement of earnings for year t.[18] This forecast is released on the third Thursday of each month. These data are obtained from the I/B/E/S Summary database. “Actual” earnings are also obtained from this database. The first year of our analyses uses forecasts and recommendations for 1993 in order to ensure the dates of the individual analysts’ forecasts are reliable.[19] Book value of common equity and common shares outstanding are obtained from the Center for Research in Security Prices (CRSP)/Compustat annual merged database.[20] Prices are obtained from the CRSP daily price file.

We delete firms with non-December fiscal year-end so that the market-implied discount rate and growth rate are estimated at the same point in time for each firm-year observation. For each set of tests, firms with any of the dependent or independent variables for that year in the top or bottom 2% of observations are removed to reduce the effects of outliers. Dropping between 1% and 5% of observations does not affect the conclusions of our study. For December 1999, in particular, removal of only 1% of the observations has a large effect on that year’s estimates in the value-weighted analyses; this is due to the extremely high price-to-book ratios of some internet firms prior to the market crash in 2000.

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[17] This iterative process is repeated until none of the annual estimates changes by more than 0.00001%. In our samples, the annual estimates usually converged in five to six iterations. This iterative procedure is not sensitive to choices of beginning discount rates ranging from 5% to 20%.

[18] Results from repeating all analyses using individual analyst, rather than consensus, forecasts are qualitatively and quantitatively very similar.

[19] Zitzewitz [2002] describes the importance of not relying on forecast dates in the I/B/E/S database prior to 1993 due to potential errors in forecast dates. Since that time, forecasts are entered directly by analysts in real-time generally within 24 hours of making them available to clients.

[20] In order to ensure that the clean-surplus assumption required for the derivation of the residual income valuation model holds in the data for fiscal year t, contemporaneous book value in regression (5)—that is, b_{jt}—is calculated as Compustat book value of common equity minus Compustat net income plus I/B/E/S actual income. That is, we use the book value number that would have been reported if the (corresponding) income statement had been based on I/B/E/S actual earnings. We also remove year t dirty surplus items from Compustat book value. These adjustments are unnecessary for the book value variable in regression (4) because the clean-surplus assumption only refers to future income statements and balance sheets.

4. *Ex Post and Ex Ante Bias in Analysts' Consensus Forecasts*

We begin by documenting the accuracy (i.e., the mean/median *absolute* earnings forecast error) and the ex post bias (i.e., the mean/median earnings forecast error) in the analysts' earnings forecasts for the entire sample of stocks. We then compare the estimate of the expected rate of return implied by prices, book values, and analysts' forecasts of earnings with the estimate obtained from prices, book values, and actual current earnings. This is an estimate of ex ante bias in the estimates of the expected rate of return reported in the extant literature.

4.1 ACCURACY AND BIAS IN THE ANALYSTS' FORECASTS OF EARNINGS

Panel A of table 1 summarizes the accuracy and the ex post bias in the I/B/E/S consensus forecast of earnings at the end of each of the years 1992–2003. We use the mean and the median absolute forecast error as the measure of accuracy presenting the mean and the median absolute forecast error deflated by end-of-year price in order to give an indication of the scale of these errors. The mean absolute price-deflated forecast error ranges from 0.019 in 2003 to 0.052 in 2000; the median absolute price-deflated forecast error ranges from 0.008 in 2003 to 0.018 in 2000. We use the mean (median) forecast error as the measure of the ex post bias in the analysts' forecasts. The mean price-deflated forecast error ranges from −0.041 in 2000 to −0.003 in 2003. The median price-deflated forecast error ranges from −0.012 in 2000 to 0.000 in 2003.

These predominantly negative forecast errors are consistent with the prior literature, which concludes that analysts' forecasts, particularly long-run forecasts, tend to be optimistic; see, for example, O'Brien [1993], Lin [1994], and Richardson, Teoh, and Wysocki [2004]. As noted earlier, these forecast errors compare forecasts with ex post realizations.

4.2 DESCRIPTION OF REGRESSION VARIABLES

The number of observations we use to estimate the annual regressions ranges from 1,418 at December 1992 to 2,137 at December 1997. As shown in panel B of table 1, the mean price-to-book ratio, which is the independent variable in regression (4), ranges from 1.945 at December 2002 to 3.398 at December 1999; the median price-to-book ratio ranges from 1.625 at December 2002 to 2.409 at December 1997. Regression (4) is run with the forecasted return-on-equity based on the I/B/E/S consensus forecast as the dependent variable. The mean forecasted return-on-equity ranges from 0.079 at December 2001 to 0.146 at December 1994; the median forecasted return-on-equity ranges from 0.111 at December 2001 to 0.145 at December 1994.

The annual mean and median current return-on-equity, which is the dependent variable in regression (5), is generally a little less than the corresponding mean and median forecasted return-on-equity. The mean current return-on-equity ranges from 0.077 at December 2001 to 0.122 at December

TABLE 1

Descriptive Statistics

Panel A: Forecast errors for the consensus sample

		Accuracy $\|FE_{jt+1}\|/p_{jt}$			Bias FE_{jt+1}/p_{jt}		
t	N	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
12/92	1,418	0.030	0.014	0.054	−0.017	−0.007	0.060
12/93	1,544	0.028	0.009	0.143	−0.019	−0.003	0.144
12/94	1,781	0.030	0.012	0.061	−0.019	−0.004	0.066
12/95	1,939	0.028	0.011	0.062	−0.019	−0.004	0.065
12/96	2,006	0.027	0.010	0.067	−0.018	−0.005	0.070
12/97	2,137	0.031	0.013	0.059	−0.024	−0.009	0.062
12/98	2,044	0.040	0.012	0.094	−0.025	−0.004	0.099
12/99	1,854	0.046	0.012	0.177	−0.028	−0.004	0.180
12/00	1,729	0.052	0.018	0.134	−0.041	−0.012	0.138
12/01	1,809	0.033	0.011	0.204	−0.018	−0.003	0.206
12/02	1,825	0.031	0.011	0.065	−0.012	−0.002	0.071
12/03	2,000	0.019	0.008	0.037	−0.003	0.000	0.042
Mean across years	1,841	0.033	0.012	0.096	−0.020	−0.005	0.100

(*Continued*)

TABLE 1 — *Continued*

Panel B: Regression variables

Regressions:

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p_{jt}}{bps_{jt}} + \mu_{jt} \quad (4)$$

$$\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p_{jt} - bps_{jt}}{bps_{jt-1}} + \zeta_{jt} \quad (5)$$

		$\frac{eps^{Cons}_{jt+1}}{bps_{jt}}$			$\frac{eps_{jt}}{bps_{jt-1}}$			$\frac{p'_{jt}}{bps_{jt}}$			$\frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}}$		
t	N	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
12/92	1,418	0.138	0.132	0.076	0.104	0.110	0.097	2.193	1.792	1.254	1.265	0.854	1.357
12/93	1,544	0.138	0.138	0.095	0.113	0.122	0.111	2.374	1.929	1.364	1.505	0.994	1.481
12/94	1,781	0.146	0.145	0.105	0.121	0.126	0.118	2.114	1.706	1.241	1.334	0.834	1.491
12/95	1,939	0.145	0.142	0.107	0.122	0.132	0.136	2.454	1.906	1.695	1.679	1.060	1.943
12/96	2,006	0.135	0.139	0.120	0.108	0.126	0.146	2.654	2.114	1.768	1.851	1.228	1.973
12/97	2,137	0.125	0.140	0.145	0.102	0.125	0.153	2.998	2.409	1.963	2.132	1.491	2.156
12/98	2,044	0.118	0.134	0.160	0.093	0.116	0.155	2.728	1.974	2.302	1.810	0.959	2.499
12/99	1,854	0.126	0.141	0.140	0.094	0.124	0.167	3.398	1.883	4.247	2.699	0.996	4.878
12/00	1,729	0.116	0.136	0.152	0.100	0.130	0.181	2.749	1.964	2.420	2.022	1.109	2.748
12/01	1,809	0.079	0.111	0.155	0.068	0.100	0.156	2.457	1.928	1.668	1.548	0.989	1.896
12/02	1,825	0.093	0.117	0.150	0.077	0.102	0.146	1.945	1.625	1.248	1.007	0.662	1.427
12/03	2,000	0.106	0.121	0.142	0.090	0.111	0.167	2.883	2.314	1.801	2.198	1.450	2.393
Mean across years	1,841	0.122	0.133	0.129	0.099	0.119	0.144	2.579	1.962	1.914	1.754	1.052	2.187

t is the reference date around which all variables are identified. All estimates are based on calendar year-end; for example 12/92 indicates December 31, 1992. Prices are closing prices for the calendar year, book values are reported as at fiscal year end, which for our samples of firms is 12/31/1992, and earnings are for the period ending 12/31/1992. N is the number of observations. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is price per share as of the end of fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time $t+\tau$ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

1995; the median current return-on-equity ranges from 0.010 at December 2001 to 0.132 at December 1995. The mean of the independent variable in this regression, the difference between price and current book value deflated by lagged book value, ranges from 1.007 at December 2002 to 2.699 at December 1999; the median ranges from 0.662 at December 2002 to 1.491 at December 1997.

4.3 COMPARISON OF IMPLIED EXPECTED RATES OF RETURN BASED ON I/B/E/S FORECASTS OF EARNINGS WITH IMPLIED EXPECTED RATE OF RETURN BASED ON EARNINGS REALIZATIONS

In this section, we compare the estimates of the implied expected rates of return based on the method in Easton et al. [2002], which uses one-year-ahead I/B/E/S consensus forecasts of earnings in regression (4), with the estimates obtained from the method adapted from O'Hanlon and Steele [2000], which uses current earnings and current and lagged book value in regression (5). We also compare the estimates based on analysts' forecasts to those implied by future earnings realizations; that is, by perfect foresight forecasts.

4.3.1. The Expected Rate of Return Implied by Analysts' Earnings Forecasts. The summary statistics from regression (4), where the dependent variable is I/B/E/S forecasted return-on-equity, are included in panel A of table 2. We provide year-by-year estimates of the regression coefficients and *t*-statistics for tests of their difference from zero. These *t*-statistics may be overstated due to the possibility of correlated residuals; so we present the mean coefficient estimates and the related Fama and MacBeth [1973] *t*-statistics. The regression adjusted R^2 ranges from 0.73% at December 1999 to 36.60% at December 1992.[21] The mean estimate of the intercept coefficient γ_0, an estimate of the implied growth in residual income beyond the one-year forecast horizon, is 0.074 with a *t*-statistic of 8.50. The mean estimate of the slope coefficient γ_1, an estimate of the difference between the implied expected rate of return and the implied growth in residual income beyond the one-year forecast horizon, is 0.020 with a *t*-statistic of 5.86.

The estimates of the implied expected rate of return obtained from the estimates of the regression (4) coefficients, where the dependent variable is analysts' forecasts of return-on-equity, are in panel A of table 2. These

[21] We note the very low R^2 in some of these regressions. As a result we perform several analyses of the effects of outliers including more severe outlier removal—for example, removing up to the top and bottom 20% of observations or by eliminating all observations with an *R*-student statistic greater than 2; the regression R^2 increases but none of our inferences based on the resulting estimates of the implied expected rate of return change. We also perform all analyses on the subset of observations for which analysts forecast positive earnings. Again we obtain much higher R^2 values but inferences remain unchanged. These further analyses of outliers are also performed on all subsequent regressions and, in all cases, our inferences are unchanged.

TABLE 2

Comparison of Implied Expected Rates of Return Based on I/B/E/S Forecasts of Earnings with Implied Expected Rate of Return Based on Current Accounting Data

Panel A: Estimates of expected rate of return based on analysts' forecasts and current accounting data

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression: $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data				
t	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (A)	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$ (B)	Difference between estimates (A − B)
12/92	1,418	0.057	0.037	36.60%	9.39%	0.057	0.037	27.09%	5.67%	3.72%
		(17.71)	(28.62)			(18.96)	(22.97)			
12/93	1,544	0.073	0.027	15.59%	10.08%	0.068	0.030	15.32%	6.83%	3.25%
		(16.53)	(16.91)			(18.37)	(16.74)			
12/94	1,781	0.073	0.035	16.81%	10.73%	0.069	0.039	24.00%	6.90%	3.83%
		(16.25)	(18.99)			(21.01)	(23.73)			
12/95	1,939	0.095	0.021	10.83%	11.53%	0.092	0.018	6.55%	9.22%	2.31%
		(23.47)	(15.38)			(23.40)	(11.70)			
12/96	2,006	0.089	0.018	6.66%	10.61%	0.073	0.019	6.77%	7.26%	3.35%
		(18.91)	(12.00)			(16.79)	(12.11)			
12/97	2,137	0.082	0.014	3.71%	9.64%	0.066	0.017	5.60%	6.62%	3.02%
		(14.64)	(9.13)			(14.61)	(11.30)			
12/98	2,044	0.082	0.013	3.50%	9.50%	0.065	0.016	6.43%	6.49%	3.01%
		(15.23)	(8.67)			(15.86)	(11.89)			
12/99	1,854	0.136	−0.003	0.73%	13.29%	0.100	−0.002	0.34%	9.97%	3.32%
		(32.67)	(−3.83)			(22.54)	(−2.71)			
12/00	1,729	0.084	0.012	3.38%	9.57%	0.086	0.007	1.00%	8.61%	0.96%
		(15.42)	(7.84)			(16.02)	(4.30)			

12/01	1,809	0.029	0.020	4.63%	4.93%	0.028	0.026	9.99%	2.82%	2.11%
		(4.64)	(9.42)			(6.30)	(14.20)			
12/02	1,825	0.019	0.038	9.83%	5.70%	0.030	0.047	21.13%	2.96%	2.74%
		(3.12)	(14.14)			(7.98)	(22.13)			
12/03	2,000	0.069	0.013	2.72%	8.18%	0.057	0.015	4.35%	5.74%	2.44%
		(11.65)	(7.55)			(11.55)	(9.59)			
Mean across years	1,841	0.074	0.020	9.58%	9.43%	0.066	0.022	10.71%	6.59%	2.84%
t-stat.		(8.50)	(5.86)		(14.16)	(10.50)	(5.51)		(10.50)	(12.33)

Panel B: Estimates of expected rate of return based on future realized earnings

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt} \quad (4)$$

	Estimates based on perfect foresight earnings forecasts				Difference between estimates	
t	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (C)	(A − C)	(B − C)
12/92	0.037	0.031	14.10%	6.77%	2.62%	−1.10%
	(7.09)	(15.31)				
12/93	0.049	0.026	7.97%	7.45%	2.63%	−0.62%
	(8.10)	(11.61)				
12/94	0.046	0.031	8.33%	7.71%	3.02%	−0.81%
	(7.56)	(12.77)				
12/95	0.076	0.013	2.22%	8.87%	2.66%	0.35%
	(13.29)	(6.69)				
12/96	0.082	0.004	0.12%	8.56%	2.05%	−1.30%
	(12.01)	(1.83)				
12/97	0.040	0.009	0.77%	4.89%	4.75%	1.73%
	(5.14)	(4.18)				
12/98	0.057	0.006	0.44%	6.27%	3.23%	0.22%
	(8.28)	(3.15)				

(*Continued*)

TABLE 2 — *Continued*

Panel B: Estimates of expected rate of return based on future realized earnings

$$\frac{eps_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt} \quad (4)$$

	Estimates based on perfect foresight earnings forecasts				Difference between estimates	
t	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (C)	(A − C)	(B − C)
12/99	0.105	−0.007	1.87%	9.79%	3.50%	0.18%
	(17.73)	(−6.01)				
12/00	0.043	0.004	0.18%	4.70%	4.87%	3.91%
	(6.16)	(2.05)				
12/01	0.018	0.013	1.40%	3.13%	1.80%	−0.31%
	(2.47)	(5.16)				
12/02	−0.003	0.041	9.16%	3.77%	1.93%	−0.81%
	(−0.48)	(13.60)				
12/03	0.075	0.007	0.64%	8.28%	−0.10%	−2.54%
	(11.02)	(3.71)				
Mean across years	0.052	0.015	3.93%	6.68%	2.75%	−0.09%
t-stat.	(6.12)	(3.63)		(10.79)	(7.13)	(−0.19)

Panel A of the table reports the results of estimating annual cross-sectional regressions; regression (4) is based on I/B/E/S consensus forecasts and regression (5) is based on current accounting data. Panel B reports the results of estimating regression (4) based on subsequent earnings realizations, which are used as perfect foresight forecasts. Observations with any of the dependent or independent variables in the top and bottom 2% of observations are removed to reduce the effects of outliers. Summary means across the annual regressions and the related Fama and MacBeth [1973] t-statistics are provided. The last column of panel A contains the difference between estimates of expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. The last two columns of panel B contain the differences between perfect foresight estimates and the estimates of the expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. t is the reference date around which all variables are identified. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is price per share as of the end of the fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time $t+\tau$ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

estimates range from 4.93% at December 2001 to 13.29% at December 1999, with a mean (t-statistic) of 9.43% (14.16).

4.3.2. The Expected Rate of Return Implied by Current Accounting Data. The summary statistics from regression (5) are included in panel A of table 2. The regression adjusted R^2 ranges from 0.34% at December 1999 to 27.09% at December 1992. The mean estimate of the intercept coefficient $\delta_{0,}$ which is an estimate of the implied expected rate of return, is 0.066 (t-statistic of 10.50), and the mean estimate of the slope coefficient $\delta_{1,}$ which is a function of the expected rate of return and the expected growth in residual income, is 0.022 (t-statistic of 5.51). The estimates of the implied expected rate of return are also included in panel A of table 3. These estimates range from 2.82% at December 2001 to 9.97% at December 1999, with a mean (t-statistic) of 6.59% (10.50).

The estimates of the implied expected rate of return are very low: They imply an average equity premium of 1.35%. We show, in section 5, that this is due to two related factors. First, since the variables in regression (5) are ratios, the size of the firms in the regression has no direct effect on the estimate of the equity premium. In other words, as in all extant studies that estimate an equity premium based on accounting earnings, all observations are essentially assigned equal (rather than value-based) weights so that small stocks have an undue effect on the estimate of the market return. Second, stocks with low or negative earnings, which are somewhat meaningless as summary valuation metrics, potentially have an influence that is similar to the influence of large stable firms where earnings are a much more meaningful valuation metric.

4.3.3. The Ex Ante Difference between the Estimate of the Expected Rate of Return Based on Analysts' Earnings Forecasts and the Estimate of the Expected Rate of Return Based on Current Accounting Data. Differences between the estimates of expected rate of return based on regression (4) and regression (5) are included in the last column of panel A of table 2. On average, the difference between the estimate of the expected rate of return based on analysts' earnings forecasts and the estimate of the expected rate of return based on earnings realizations is 2.84% (t-statistic of 12.33). There are some years when the difference is quite large; for example, for the sample of stocks at December 1994, the difference is 3.83%. An implication of the observation that expected rates of return based on analysts' forecasts tend to be higher is that caution should be taken when interpreting the meaning of the rate of return that is implied by analysts' earnings forecasts; if, as is often the case in the extant literature, it is used as an estimate of the cost of capital, this estimate is likely upward biased.

4.3.4. Estimates of the Expected Rate of Return Based on Perfect Foresight Forecasts. The ex post forecast error documented in table 1 can be reparameterized as an error in the implied expected rate of return. This error may be estimated as the difference between the implied expected rate of return based on regression (4), where expected earnings are I/B/E/S forecasts (as in panel A of table 2), and the implied expected rate of return when these expected earnings are replaced in this regression by realized earnings for year $t+1$. The results of estimating the implied expected rate of return using realized earnings as "perfect foresight" forecasts are reported in panel B of table 2. Using perfect foresight earnings, the estimates of expected rate of return range from 3.13% at December 2001 to 9.79% at December 1999, with a mean (t-statistic) of 6.68% (10.79). Comparing perfect foresight to consensus forecasts, the mean bias is 2.75% (t-statistic of 7.13).[22]

4.3.5. Comparison of the Estimates of the Expected Rate of Return. The two estimates of expected rate of return that are not expected to contain bias, that is, those based on perfect foresight earnings and those based on current accounting data, are very similar. The difference of −0.09% between these estimates is not significantly different from zero with a t-statistic of −0.19. It follows that our estimates of the bias are similar using either method. That is, both methods yield alternative, independent estimates of the bias that do not differ significantly; this observation supports the maintained hypothesis that the market sees through the optimistic bias in the analysts' forecasts.

Further evidence consistent with the notion that the market sees through the optimistic bias is the fact that, consistent with Richardson, Teoh, and Wysocki [2004], the forecast error declines almost monotonically as the forecast horizon decreases from approximately 12 months (as in the analyses in panel B of table 2) to shortly before the earnings announcement date for year $t+1$. The untabulated associated implied expected rate of return based on earnings forecasts and prices also decreases almost monotonically to 6.47% for the consensus forecasts (of $t+1$ earnings) made in January of year $t+2$ (just before year $t+1$ earnings are announced). That is, the expected rate of return implied by analysts' forecasts declines to the ex ante estimate of the expected rate of return implied by accounting earnings at date t. Again these results suggest that the market at date t sees through the optimistic bias in the analysts' forecasts of earnings for period $t+1$.

Additional untabulated results show the primary result from panel A of table 2 of an average 2.84% difference between the analysts' and market's expected rate of return is virtually unchanged at 2.93, with a t-statistic of 14.69, when price is measured at the day after the consensus forecast is formed.[23] That is, changing the time period for discounting price back to

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[22] These results are consistent with the results in table 1. For example, we saw, in table 1, that the mean deflated forecast error is −0.020. A crude price earning (PE) valuation model, which relies on full payout and earnings following a random walk, suggests that the price-to-forward-earnings ratio is equal to the inverse of the expected rate of return. Thus a deflated forecast error of −0.020 implies an error in the expected rate of return of 2%.

[23] The results are virtually identical if we use prices taken from any date ranging from one day after the earnings announcement date to one day after the forecast announcement date (the set of s price dates shown in figure 1).

fiscal year-end has no statistically or economically significant effect on the results of our analyses.

4.3.6. Effects of Bias in Extant Research Contexts. In the preceding analyses, we calculated the average bias in the estimate of the expected rate of return. Since our estimates are for a cross section of U.S. stocks, this estimate represents the bias in estimates of the expected rate of return on the U.S. market and, in turn, a bias in the estimate of the expected equity risk premium in the U.S. market. This provides an indication of the effect of the bias in estimates of the equity risk premium in the extant literature, all of which are, essentially, equally weighted (rather than value-weighted). Arguably, the estimate of the equity risk premium should be based on a value-weighted estimate of the expected rate of return on the market.[24] We provide a method for estimating this rate of return in section 5. We show that the bias in this value-weighted estimate is less than the bias in the equally weighted estimate because the bias tends to be greater for small firms. The implication for extant research is that optimism does not affect all observations equally and hence spurious inferences may be drawn from cross-sectional comparison of implied expected rates of return that are potentially affected by the bias.

5. *Value-Weighted Estimates of the Implied Expected Rate of Return*

The analyses in section 4 examine the average effect of bias in analysts' forecasts of earnings on estimates of the implied expected rate of return. All observations are given equal weight in the analyses. Such weighting is appropriate in some studies. Easton, Sommers, and Zmijewski [2007], for example, compare the difference between the expected rate of return implied by analysts' forecasts and the expected rate of return implied by current earnings for firms subject to litigation under section 10b-5 for alleged misrepresentation. Since the focus of their study is on average differences, they give each observation equal weight; value-weighting would lead to results that were dominated by cases associated with WorldCom and Enron.

Value-weighting is more appropriate in many studies. Perhaps the best example is the estimation of the equity risk premium, which is a central part of three well-known studies based on analysts' earnings forecasts by Gebhardt, Lee, and Swaminathan [2001], Claus and Thomas [2001], and Easton et al. [2002]. These studies give equal weighting to all stocks. Yet, estimating the

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[24] The economic concept of an equity risk premium is based on a value-weighted market return. Bodie, Kane, and Marcus [2005, p. 283] describe the appropriate weighting of the market return as follows: "The proportion of each stock in the market portfolio equals the market value of the stock (price per share multiplied by the number of shares outstanding) divided by the total market value of all stocks."

TABLE 3

Value Weighting Observations, Results of Comparison of Implied Expected Rates of Return Based on I/B/E/S Forecasts of Earnings and Based on Current Accounting Data

Panel A: Descriptive statistics

	Decile of market capitalization at time t									
Mean of annual means	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Accuracy $\lvert FE_{jt+1}\rvert / p_{jt}$	0.102	0.053	0.040	0.034	0.026	0.023	0.018	0.017	0.015	0.012
Bias FE_{jt+1} / p_{jt}	−0.075	−0.033	−0.025	−0.021	−0.015	−0.013	−0.009	−0.009	−0.007	−0.005
$eps^{Cons}_{jt+1} / bps_{jt}$	0.065	0.081	0.093	0.095	0.113	0.128	0.140	0.149	0.160	0.186
eps_{jt} / bps_{jt-1}	0.002	0.050	0.066	0.075	0.095	0.113	0.126	0.134	0.145	0.168
p'_{jt} / bps_{jt}	1.707	1.954	2.188	2.362	2.482	2.676	2.794	2.895	2.941	3.593
$(p'_{jt} - bps^*_{jt}) / bps_{jt-1}$	0.641	1.000	1.275	1.533	1.752	1.958	2.083	2.142	2.146	2.732
	Decile of market capitalization at time t									
Mean of annual medians	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Accuracy $\lvert FE_{jt+1}\rvert / p_{jt}$	0.042	0.024	0.018	0.016	0.012	0.010	0.009	0.008	0.007	0.006
Bias FE_{jt+1} / p_{jt}	−0.023	−0.012	−0.009	−0.007	−0.005	−0.004	−0.004	−0.003	−0.002	−0.002
$eps^{Cons}_{jt+1} / bps_{jt}$	0.095	0.110	0.115	0.118	0.126	0.134	0.143	0.148	0.155	0.176
eps_{jt} / bps_{jt-1}	0.052	0.086	0.097	0.104	0.114	0.125	0.131	0.136	0.142	0.160
p'_{jt} / bps_{jt}	1.316	1.577	1.748	1.836	1.926	2.060	2.183	2.221	2.304	2.829
$(p'_{jt} - bps^*_{jt}) / bps_{jt-1}$	0.259	0.605	0.818	0.944	1.017	1.220	1.327	1.313	1.439	1.934

(Continued)

TABLE 3—*Continued*

Panel B: Value-weighted estimates of expected rate of return based on analysts' forecasts and current accounting data

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data				
t	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (A)	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$ (B)	Difference in estimates of expected rate of return (A − B)
12/92	1,418	0.047	0.047	57.76%	9.35%	0.062	0.044	46.89%	6.22%	3.13%
		(14.73)	(44.03)			(23.49)	(35.38)			
12/93	1,544	0.052	0.047	51.76%	9.82%	0.079	0.042	46.23%	7.87%	1.95%
		(14.70)	(40.70)			(29.00)	(36.43)			
12/94	1,781	0.072	0.049	52.03%	12.15%	0.084	0.050	57.05%	8.39%	3.76%
		(22.46)	(43.95)			(34.82)	(48.64)			
12/95	1,938	0.092	0.036	46.89%	12.76%	0.127	0.028	32.37%	12.65%	0.11%
		(26.96)	(41.36)			(41.25)	(30.46)			
12/96	2,006	0.081	0.034	51.09%	11.53%	0.106	0.029	44.72%	10.64%	0.89%
		(25.50)	(45.77)			(38.36)	(40.29)			
12/97	2,137	0.094	0.026	44.60%	12.01%	0.106	0.023	39.89%	10.58%	1.43%
		(28.17)	(41.48)			(41.10)	(37.67)			
12/98	2,044	0.093	0.022	47.17%	11.49%	0.090	0.022	49.99%	8.97%	2.52%
		(28.30)	(42.72)			(33.70)	(45.20)			
12/99	1,855	0.147	0.010	23.55%	15.69%	0.147	0.004	4.00%	14.66%	1.03%
		(35.74)	(23.92)			(36.07)	(8.85)			
12/00	1,729	0.091	0.022	43.02%	11.26%	0.110	0.021	33.61%	11.04%	0.22%
		(22.09)	(36.13)			(28.77)	(29.60)			
12/01	1,808	0.059	0.031	44.84%	8.98%	0.070	0.030	47.31%	6.98%	2.00%
		(15.74)	(38.34)			(22.45)	(40.29)			

(*Continued*)

TABLE 3—*Continued*

Panel B: Value-weighted estimates of expected rate of return based on analysts' forecasts and current accounting data

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data				
t	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$ (A)	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$ (B)	Difference in estimates of expected rate of return (A − B)
12/02	1,825	0.055	0.043	59.95%	9.76%	0.083	0.041	61.56%	8.26%	1.50%
		(18.77)	(52.26)			(34.75)	(54.05)			
12/03	2,000	0.072	0.032	43.22%	10.41%	0.098	0.031	40.17%	9.76%	0.65%
		(21.58)	(39.02)			(27.36)	(36.65)			
Mean across years	1,841	0.079	0.033	47.16%	11.27%	0.097	0.030	41.98%	9.67%	1.60%
t-stat.		(10.09)	(9.62)		(21.20)	(13.90)	(8.38)		(13.90)	(4.91)

Panel A of the table reports the summary statistics from repeating the analysis performed in table 1 by annual decile of market capitalization at time t (decile 1 includes firms with the smallest market capitalization). Panel B repeats the analysis in table 2 using weighted least squares regression with regression weights equal to market capitalization at time t. The table reports the results of estimating annual cross-sectional regressions: regression (4) based on I/B/E/S consensus forecasts and regression (5) based on current accounting data. Observations with any of the dependent or independent variables in the top and bottom 2% of observations are removed to reduce the effects of outliers. Summary means across the annual regressions and the related Fama and MacBeth [1973] t-statistics are provided. The last column of panel A contains the difference between estimates of expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. The last two columns of panel B contain the differences between perfect foresight estimates and the estimates of expected return from the estimation of regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data. t is the reference date around which all variables are identified. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is the actual earnings per share for year t+1 as reported by I/B/E/S less the first median consensus forecast of earnings per share for year t+1 released at least 14 days after the announcement of year t earnings. p_{jt} is price per share as of the end of fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year t+1 released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time $t+\tau$ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

risk premium from investing in the equity market is more meaningful if stocks are weighted by their market capitalization. In the equally weighted analyses in the papers referred to above, small stocks have an undue effect on the estimate of the market return.[25] In order to avoid these undue influences, and to provide an estimate of the equity risk premium that is (1) not affected by analysts' optimism, and (2) more representative of the risk premium for the market portfolio, we repeat all of the analyses weighting each of the observations by market capitalization.[26]

In order to provide a sense of the likely effect of value-weighting, we begin by describing the way that analysts' accuracy and bias differs with firm size. We also document the relation between firm size and the variables used in regression (4) and regression (5). Central to our analyses is the observation, documented in panel A of table 3, that the mean scaled absolute forecast error, a measure of the accuracy of the forecasts, declines monotonically from 0.102 for the decile of smallest firms to 0.012 for the decile of largest firms. Similarly, the median absolute scaled forecast error declines monotonically from 0.042 to 0.006.

Analysts' optimism, measured as the mean (median) scaled forecast error, declines monotonically from −0.075 (−0.023) for the decile of smallest firms to −0.005 (−0.002) for the decile of largest firms. The differences in optimistic bias across these size deciles illustrate the point that differences in bias across samples of observations may explain a significant portion of the difference in the implied expected rates of return across these samples; in other words, differences in bias across samples may lead to spurious inferences. Thus, unless researchers use unbiased estimates of expected rate of return or they can show that samples/firms have earnings forecasts that are equally optimistic, observed differences in estimates of expected rate of return may result from a difference in the bias across samples/firms rather than differences in the cost of capital.

Consistent with prior literature, see, for example, Fama and French [1992], the price-to-book ratio increases with firm size from a mean of 1.707 for the decile of smallest firms to a mean of 3.593 for the decile of largest firms. The forecasted and the realized return-on-equity also increase with firm size, suggesting that the smaller firms tend to be firms with higher expected earnings growth.

The results from the estimation of value-weighted regression (4) and regression (5) are summarized in panel B of table 3. A notable difference between these value-weighted regression results and the results for equally weighted regressions (see panels A and B of table 2) is the higher adjusted R^2 for the value-weighted regressions. For example, the average adjusted R^2 for

[25] Smaller firms tend to have a much greater proportion of losses (the proportion of losses decreases monotonically from 17.64% for the decile of smallest firms in our sample to 1.65% for the decile of largest firms).

[26] Value-weighted analyses are performed using PROC REG in SAS with weight equal to market capitalization.

regression (4) based on analysts' consensus forecasts is 47.16% for the value-weighted regression, whereas it is 9.58% for the equally weighted regression. As expected, *t*-statistics on the coefficient estimates in these value-weighted regressions are also higher.

The mean estimate (*t*-statistic) of the expected rate of return, also reported in panel B of table 3, is 11.27% (21.20) using analysts' forecasts and 9.67% (13.90) using current accounting data.[27] The untabulated minimum expected rate of return estimated using current accounting data is 6.22% at December 1992. The average of 9.67% yields a more reasonable estimate of the risk premium than the equal-weighted sample: 4.43% using five-year treasuries as a proxy for the risk-free rate. Differences between the estimates of the expected rate of return based on analysts' forecasts and the estimates based on current accounting data (i.e., the measure of ex ante bias) are also reported in the rightmost column of panel B of table 3. The average difference, though smaller in the value-weighted analyses than in the equally weighted analyses (1.60% compared with 2.84%), is still significantly positive (*t*-statistic of 4.90).

6. *Variation in the Implied Expected Rate of Return with Changes in the Percentage of Analysts Making Buy Recommendations*

Having documented a bias in the estimates of the expected rate of return based on analysts' forecasts of earnings, we now examine how the bias varies across analysts' recommendations. It is well known that analysts seldom issue sell recommendations. To the extent that our samples examined thus far contain a majority of firms with buy recommendations, the observed positive bias in the expected rate of return using analysts' forecasts simply may be capturing the analysts' expectation of the abnormal returns, which can be earned from these stocks. To examine this notion, we compare estimates of the expected rates of return for stocks where the consensus forecast is comprised of analysts with differing recommendation types.

6.1 SAMPLE DESCRIPTION

I/B/E/S provides data on the percentage of analysts whose forecasts comprise the consensus who also make either a strong buy or a buy recommendation. We repeat the analyses described in section 4.3 for subsamples with various percentages of these types of recommendations. Descriptive statistics are provided in table 4, panel A. The choice of the five partitions of the data is based on a desire to maintain a sufficient number of observations to provide reasonable confidence in the regression output in each year. We restrict the sample to those consensus forecasts that are comprised of at

[27] The mean estimate (*t*-statistic) of the expected rate of return based on perfect foresight forecasts is 10.63% (14.35).

TABLE 4

Variation in the Implied Expected Rate of Return with Changes in the Percentage of Analysts Making a Buy Recommendation—Minimum of Five Analysts Following Firm

Panel A: Descriptive statistics by percentage of buy recommendations

	$90 \leq$ % Buy ≤ 100		$70 \leq$ % Buy ≤ 90		$50 \leq$ % Buy < 70		$30 \leq$ % Buy < 50		$0 \leq$ % Buy < 30	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Accuracy: $\lvert FE_{jt+1}\rvert / p_{jt}$	0.017	0.008	0.017	0.008	0.019	0.008	0.026	0.010	0.041	0.011
Bias: FE_{jt+1}/p_{jt}	−0.010	−0.004	−0.009	−0.003	−0.010	−0.003	−0.016	−0.004	−0.027	−0.004
$eps^{Cons}_{jt+1}/bps_{jt}$	0.140	0.157	0.164	0.162	0.159	0.153	0.134	0.131	0.108	0.112
eps_{jt}/bps_{jt-1}	0.125	0.150	0.152	0.151	0.143	0.140	0.120	0.120	0.091	0.101
p'_{jt}/bps_{jt}	3.860	3.011	3.435	2.686	2.848	2.305	2.371	1.921	2.029	1.649
$(p'_{jt} - bps^*_{jt})/bps_{jt-1}$	3.649	2.313	2.844	1.948	2.005	1.438	1.485	1.016	1.032	0.704
N	135		227		263		176		154	

Panel B: Summary of results of estimation by percentage of buy recommendations

		Regression: $\frac{eps^{Cons}_{jt+1}}{bps_{jt}} = \gamma_0 + \gamma_1 \frac{p'_{jt}}{bps_{jt}} + \mu_{jt}$ (4) Estimates based on analysts' consensus earnings forecasts				Regression: $\frac{eps_{jt}}{bps_{jt-1}} = \delta_0 + \delta_1 \frac{p'_{jt} - bps^*_{jt}}{bps_{jt-1}} + \zeta_{jt}$ (5) Estimates based on current accounting data			
Recommendation	N	γ_0	γ_1	Adj. R^2	$\hat{r} = \gamma_0 + \gamma_1$	δ_0	δ_1	Adj. R^2	$\hat{r} = \delta_0$
$90 \leq$ % Buy ≤ 100	135	0.100	0.012	7.90%	11.20%	0.109	0.012	18.18%	10.94%
		(7.93)	(3.32)		(9.93)	(5.12)	(1.46)		(5.12)
$70 \leq$ % Buy ≤ 90	227	0.098	0.021	16.82%	11.84%	0.102	0.020	17.42%	10.22%
		(9.87)	(7.73)		(14.29)	(10.23)	(5.88)		(10.23)
$50 \leq$ % Buy < 70	263	0.080	0.029	34.28%	10.82%	0.028	0.028	30.29%	8.90%
		(13.67)	(12.69)		(20.84)	(10.96)	(10.96)		(18.09)
$30 \leq$ % Buy < 50	176	0.060	0.031	28.31%	9.18%	0.033	0.033	26.85%	7.23%
		(7.04)	(6.80)		(16.25)	(8.38)	(8.38)		(13.25)
$0 \leq$ % Buy < 30	154	0.032	0.037	32.00%	6.86%	0.044	0.044	30.09%	4.60%
		(3.13)	(9.60)		(8.85)	(5.60)	(9.67)		(5.60)

(Continued)

TABLE 4 — *Continued*

Panel C: Mean differences in (*t*-statistics for) estimates of expected rate of return

		Estimates based on analysts' consensus earnings forecasts					Estimates based on current accounting data			
		$90 \le \% \le 100$	$70 \le \% \le 90$	$50 \le \% < 70$	$30 \le \% < 50$	$0 \le \% < 30$	$90 \le \% \le 100$	$70 \le \% \le 90$	$50 \le \% < 70$	$30 \le \% < 50$
Estimates based on analysts' consensus earnings forecasts	$70 \le \% \le 90$	−0.64%								
		(−0.79)								
	$50 \le \% < 70$	0.38%	1.02%							
		(0.50)	(2.11)							
	$30 \le \% < 50$	2.02%	2.66%	1.64%						
		(2.50)	(4.76)	(3.96)						
	$0 \le \% < 30$	4.34%	4.97%	3.96%	2.31%					
		(5.46)	(9.01)	(8.90)	(5.04)					
Estimates based on current accounting data	$90 \le \% \le 100$	0.26%								
		(0.15)								
	$70 \le \% \le 90$		1.61%				0.72%			
			(3.14)				(0.30)			
	$50 \le \% < 70$			1.92%			2.04%	1.32%		
				(5.04)			(1.03)	(1.81)		
	$30 \le \% < 50$				1.95%		3.72%	3.00%	1.68%	
					(6.38)		(1.82)	(4.77)	(3.96)	
	$0 \le \% < 30$					2.27%	6.35%	5.63%	4.31%	2.63%
						(7.15)	(3.15)	(8.25)	(7.40)	(5.29)

Using the median consensus analysts' forecast and the percentage of buy recommendations from the summary I/B/E/S database, we estimate the expected rate of return by percentage of buy recommendations for all firms with at least five analysts included in the consensus. Panel A reports descriptive statistics by percentage of buy recommendations. The variables are as defined in the notes to table 1. Panel B reports the results of estimating regression (4) using I/B/E/S consensus forecasts and regression (5) using current accounting data cross-sectionally using all available observations of that percentage of buy recommendations. Within the percentage of buy recommendations, observations with any of the dependent or independent variables in the top and bottom 2% of observations are removed to reduce the effects of outliers. The reported numbers are the summary means across the annual regressions and the related Fama and Macbeth [1973] *t*-statistics. The last column for each regression in panel B reports the annual estimates of expected rate of return by percentage of buy recommendations. Panel C reports summary means of the differences in estimates across the annual regressions and the related Fama and Macbeth [1973] *t*-statistics. t is the reference date around which all variables are identified. Mean, median, and std. dev. are the mean, median, and standard deviation of the respective variables across all N observations. FE_{jt+1} is the actual earnings per share for year $t+1$ as reported by I/B/E/S less the first median consensus forecast of earnings per share for year $t+1$ released at least 14 days after the announcement of year t earnings. p_{jt} is the price per share as of the end of the fiscal year t. eps^{Cons}_{jt+1} is the first median consensus forecast of earnings per share for firm j for year $t+1$ released at least 14 days after the announcement of year t earnings. eps_{jt} is the I/B/E/S actual earnings per share for firm j for year t. bps_{jt} is the common book value of equity per share for firm j at time t. $p'_{jt} = \frac{p_{jt+\tau}}{(1+\hat{r})^{\tau/365}}$ is the price per share for firm j at time $t+\tau$ (one day after the earnings announcement date), $p_{jt+\tau}$, adjusted for stock splits and stock dividends since the end of the fiscal year, discounted to year-end using the estimated discount rate. bps^*_{jt} is the common book value of equity per share for firm j at time t less net income per share for firm j for year t plus I/B/E/S actual earnings per share for firm j for year t.

least five analysts so that it is possible for a firm to appear in any of the partitions.[28]

The mean and median forecast error is always negative; that is, analysts are optimistic, regardless of the percentage of buy recommendations in the consensus. For example, the median deflated forecast error is −0.004 when the percentage of buy recommendations is greater than 90%, between 30% and 50%, and less than 30%.

Both the return-on-equity and the price-to-book ratio tend to be higher for the observations where there are more buy recommendations comprising the consensus. For example, the median forecasted return-on-equity for the subsamples where greater than 90% of the analysts recommend buy and where between 70% and 90% recommend buy is 0.157 and 0.162, respectively, while the median forecasted return-on-equity for the subsample where less than 30% of the analysts recommend buy is 0.112. The median price-to-book ratio for the subsamples where greater than 90% of the analysts recommend buy and where between 70% and 90% recommend buy is 3.011 and 2.686, respectively, while the median price-to-book ratio for the subsamples where less than 30% of the analysts recommend buy is 1.649.

6.2 ESTIMATES OF IMPLIED EXPECTED RATES OF RETURN

The results from the estimation of regression (4) based on price, I/B/E/S forecasts of earnings, and current book value and from the estimation of regression (5) based on price and current accounting data are summarized in table 4, panel B. We focus our discussion on the estimates of the implied expected rates of return obtained from these regression parameters. These estimates are also included in panel B.

The estimates of the expected rates of return implied by I/B/E/S analysts' forecasts decline almost monotonically with the percentage of buy recommendations associated with the forecasts of earnings comprising the consensus; the means of these estimates are 11.20%, 11.84%, 10.82%, 9.18%, and 6.86%. The estimates of the expected rates of return based on prices and current accounting data show a pattern that is very similar to that of those based on analysts' forecasts. The mean estimates of the expected rate of return for each of the groups of data decline monotonically with the percentage of buy recommendations associated with the forecasts of earnings comprising the consensus; the means of these estimates are 10.94%, 10.22%, 8.90%, 7.23%, and 4.60%. This suggests that analysts' recommendations are consistent with the implied expectations of raw rates of return; they do not appear to be based on expectations of abnormal returns.

Differences between the estimates of expected rate of return based on percentage of buy recommendations are included in table 4, panel C. Comparing the expected rates of return based on prices and current accounting

[28] Our findings and conclusions are unchanged when firms with consensus forecasts comprised of less than five analysts are included.

data with the estimates based on analysts' forecasts reveals that, even when the analysts are not recommending to buy, their forecasts imply a rate of return that is higher than expectations based on current accounting data; these mean differences between the estimates based on analysts' forecasts and estimates based on current accounting data are 0.26%, 1.61%, 1.92%, 1.95%, and 2.27%. Four of these differences are significant. This pervasive optimism in the expected return measured by comparing analysts' return expectations with return expectations based on current accounting data is quite similar to the pervasive optimism observed when comparing expectations of future earnings with actual realizations of earnings (see table 4, panel A).

6.3 SUMMARY

To summarize the analyses in this section, we observe that analysts' recommendations are consistent with their expectations of raw returns; that is, there is a monotonic decrease in expected rate of return as the percentage of buy recommendations declines.[29] Expected rates of return based on analysts' earnings forecasts are higher than expectations based on current accounting data regardless of the analysts' recommendation. An interpretation of this result is that analysts are most-often optimistic, even when they are not issuing buy recommendations.[30] The bias in expected rates of return based on analysts' forecasts is not the result of analysts' expectations of positive abnormal returns isolated in firms with buy or strong buy recommendations. Analysis using subsamples based on recommendations provides further evidence that variations in optimism in analysts' forecasts result in variation in levels of bias in estimates of expected rates of return. Again this suggests that researchers should be cautious when using analysts' forecasts to estimate expected rates of return; differing levels of bias could lead to spurious results and incorrect conclusions.

7. *Summary and Conclusions*

We show that, on average, the difference between the estimate of the expected rate of return based on analysts' earnings forecasts and the estimate based on current earnings realizations is 2.84%. When estimates of the expected rate of return in the extant literature are adjusted to remove the effect of optimistic bias in analysts' forecasts, the equally weighted estimate of the equity risk premium appears to be close to zero. We show,

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[29] Our analysis in section 6 employs equal-weighting because the context examines average effects of bias with differing recommendations. Though answering a somewhat different research question, value-weighted analyses similar to those in section 5 reveal that the expected rate of return monotonically decreases as the percentage of buy recommendations declines.

[30] This result is consistent with Barber et al. [2001], who show that analysts' recommendations (in their case, those summarized in the Zach's database) cannot be used to form profitable trading strategies.

however, when estimates are based on value-weighted analyses, the bias in the estimate of the expected rate of return is lower and the estimate of the expected equity premium is more reasonable, 4.43%.

Results from subsamples formed on the basis of percentage of analysts comprising the consensus recommending buy show that the estimate of the expected rate of return, based on both analysts' forecasts of earnings and on current earnings, declines monotonically as the percentage of analysts recommending buy declines. A comparison of the estimates of the expected rate of return based on the analysts' forecasts, with estimates based on earnings realizations, suggests that analysts tend to be more optimistic than the market even when they are not making buy recommendations. That is, analysts recommend buy when they expect the future raw return to be high and sell when they expect the return to be low regardless of market expectations.

Our paper has two key implications for future research using market price, book value of equity, and accounting earnings to obtain estimates of the implied expected rate of return for a portfolio of stocks. First, since analysts' forecasts are pervasively (though not uniformly) optimistic, estimates of the implied expected rate of return formed using forecasts are pervasively and significantly upward biased. Since all observations are not equally affected by the bias (due to varying degrees of optimism), variation in the estimates of the implied expected rates of return may be partially caused by bias and not by the factors that are the focus of the research question. Bias may be avoided by estimating the rate of return implied by price, book values, and *realized* earnings rather than biased earnings *forecasts*.

Second, value-weighted analyses may be more appropriate in addressing certain issues such as estimating the equity premium, than equal-weighted analyses. The value-weighted analyses may provide more realistic estimates of the expected rate of return than are implied by equally weighted analyses, which may be unnecessarily affected by less representative observations, such as penny stocks, and stocks making losses.

When coupled with results from the papers that demonstrate the troublesome effects of measurement error in firm-specific estimates of the expected rate of return, the results in this study suggest that the extant measures of implied expected rate of return should be used with considerable caution. The challenge is to find means of reducing the measurement error and to mitigate the effects of bias. Easton and Monahan [2005] suggest focusing on subsamples where the measurement error is likely to be small. Our paper suggests that methods based on realized earnings rather than earnings forecasts avoid the effects of bias in analysts' forecasts. Another possible avenue may be to attempt to undo the bias, following, for example, the ideas in Frankel and Lee [1998].

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