

---

# VALUATION

---

## The Articulation of Price–Earnings Ratios and Market-to-Book Ratios and the Evaluation of Growth

**Stephen H. Penman**

*Journal of Accounting Research*

vol. 34, no. 2 (Autumn 1996):235–59

Penman evaluates the connection between the price–earnings ratio (P/E) and the market-to-book ratio (P/B) and how both ratios relate to current and future earnings growth. After developing the mathematical relationship, he conducts an empirical analysis and reaches the following conclusions: P/Es are related to current return on equity but are poor indicators of future growth, and P/Bs reflect the impact of future profitability and thus are good indicators of earnings growth.

---

Price–earnings ratios (P/Es) and market-to-book ratios (P/Bs) are widely used by investment analysts to evaluate common stock. The measures have been used in a variety of ways over the years. For example, P/E has been viewed as a capitalization rate, and P/B has been used to classify stocks as “growth” versus “value.” Penman discusses the relationship between P/E and P/B with a particular emphasis on how they relate to the firm’s return on equity (ROE).

After deriving an expression for P/E by using the concept of “cum-dividend” earnings, Penman conducts an empirical analysis with data from 1968 through 1985. First, he ranks 20 portfolios by their P/Es (actually, he uses E/P to avoid dividing by 0) observed during each year in the 1968–85 period. Second, he computes the median

---

Stephen H. Penman is at the University of California at Berkeley. The abstract was prepared by David Smith, CFA, the University of Albany.

portfolio growth rates in earnings per share (EPS) for the ranking year and the nine subsequent years. Not surprisingly, he finds that low (high) P/Es are associated with relatively low (high) subsequent earnings growth. Furthermore, when earnings in Year 0 are unusually high (low) for low (high) P/E firms, rather than for both high- and low-P/E firms, an earnings reversal typically takes place in Year +1. This earnings reversal is termed the “Molodovsky effect.” Finally, Penman points out that P/E can be considered a capitalization rate only when current earnings contain all relevant information about future earnings.

After reranking the data into 20 portfolios based on P/B, Penman computes residual income for Year 0 through Year +9 relative to the portfolio formation year. He computes residual income as EPS minus 10 percent of the beginning-of-period book value. The results show an inverse relationship between P/B and residual income.

How do P/E and P/B relate to one another? Penman computes median P/B values by examining his 20 P/E portfolios. In general, high P/Es are associated with high P/Bs. He reconfirms this finding by ranking portfolios based on P/B. In the 1968–85 period, about two-thirds of the time, above-median values of P/E are accompanied by above-median values of P/B.

In a related analysis, Penman splits the sample into three parts: P/Bs below 0.90, above 1.10, and between 0.90 and 1.10. Again, after ranking the 20 portfolios on P/Es—but this time within each P/B class—he analyzes residual income. Two consistent patterns emerge. First, the higher the P/B, the higher the residual earnings, irrespective of the P/E. Second, within each of the three P/B classes, portfolios with higher P/Es are associated with higher earnings in the years after portfolio formation. These empirical observations are consistent with the predictions of Penman’s model.

Penman’s predictions and the empirical results indicate that P/Es do not effectively predict future growth in earnings because the growth rate in future earnings depends largely on the current (often transitory) profit level. Hence, P/E reflects future profitability only

to the extent that it takes into account the current ROE. Taken a step further, P/E is determined by the level of expected future ROE relative to the current ROE. Only when P/B equals 1.0 is the P/E based purely on the level of current ROE.

Current P/Bs are, however, related to future growth, which is reflected in the growth in book value through the addition of future earnings. P/Bs, which are not affected by current earnings, are a better measure of future ROE than are P/Es.

Penman then turns to the predictive ability of current ROE. He forms 20 portfolios on the basis of current ROE. The ROE level is found to be related to P/E only in extreme (very high or very low ROE) portfolios in which the typical negative correlation between current versus future ROE makes clear the likely direction of future ROE changes.