Explaining Earnings Per Share Growth

HAROLD BIERMAN, JR., AND JEROME E. HASS

HAROLD BIERMAN, JR., is the Nicholas H. Noyes professor of business administration in the Johnson Graduate School of Management at Cornell University in Ithaca, NY.
hb29@cornell.edu

JEROME E. HASS is the James B. Rubin professor of finance in the Johnson Graduate School of Management at Cornell University in Ithaca, NY.
jeh27@cornell.edu

Many factors determine stock prices. Two of the more important are earnings per share and expected earnings per share growth. The purpose of this article is to focus on the fundamental factors that determine earnings growth, including the role of share repurchase, and to offer a simple method of calculating the expected long-term growth rate of earnings per share.

Chan, Karceski, and Lakonishok [2003] reported a high correlation between the price to earnings ratio and the consensus growth forecasts across the IBES universe of U.S. firms for the period 1951–1997. They found, however, that security analysts' long-term growth estimates tend to be overoptimistic and contribute very little to predicting realized growth over long horizons. The finance literature has tended to focus on the behavior of earnings growth and growth persistence and the ability of analysts to predict earnings rather than on the fundamental determinants of earnings growth. Chan, Karceski, and Lakonishok tried to predict earnings growth over one to five years using the "simple textbook model" explanatory variables, including earnings yield (to try to capture the market's growth expectations), sustainable growth (calculated as the product of return on book equity times the retention rate), and R&D intensity (the ratio of R&D expenditures to sales); their results, with R-squares in the neighborhood of 0.015, were not good.

Many factors affect short-term earnings per share growth and some of those factors can mask the fundamental determinants of the actual growth in earnings per share. We argue that expected long-term growth is important for stock valuation.

GROWTH THROUGH RETENTION

Assume a firm has assets (real assets, such as plant and equipment, as well as intangible assets, such as technical know-how and brand awareness), positive net income, and the opportunity to invest in additional assets. Suppose the firm's board of directors sets a policy of retaining a fraction, b, of net income. If 1) the earnings from existing assets are expected to continue, 2) current earnings that are retained are expected to earn rate r, and 3) the fraction of earnings not retained $(1 - b)$ is paid as cash dividends, the *retention* growth rate will then be

$$g = br \tag{1}$$

This formula is a standard and sometimes is referred to as *sustainable growth* with zero debt, however, it holds only as long as the assumptions behind it are reasonable.

An elaborate rationale can be built for the assumptions. For example, the assumption

that the earnings from existing assets are repeated is consistent with the notion that earnings are net of depreciation and amortization expenses, which are non-cash flow expenses, but that capital expenditures equal to depreciation and amortization expense are necessary to sustain the existing earnings stream.

Next, we consider the utilization of incremental debt of D. We obtain the return on new investments, r, by coupling the retained earnings with additional borrowings. The following formula captures the essential elements:

$$r = r_A + [r_A - k(1 - T)](D/E) \tag{2}$$

where r_A is the after-tax return on incremental assets purchased with retained earnings and additional debt, k is the before-tax cost of the additional debt, T is the corporate income tax rate, and D/E is the ratio of incremental debt to incremental retained earnings. The resultant growth rate of earnings for the firm using debt of D is

$$\begin{aligned} g = br &= b\{r_A + [r_A - k(1 - T)](D/E)\} \\ &= br_A + b[r_A - k(1 - T)](D/E) \end{aligned} \tag{3}$$

Equation (3) shows the effect of incremental financial leverage on the growth rate of total equity earnings. The growth rate of equity earnings is the growth rate that would occur from retention without additional debt plus a leverage effect (if the firm earns r_A independent of the amount invested), which is positive as long as the after-tax return on incremental invested capital is greater than the after-tax cost of debt.

One might incorrectly argue that maximizing growth achieves the objective of maximizing shareholder value. In an ideal world, the retention rate should be set so as to maximize the stock price. This is achieved by increasing the retention rate up to the point where the incremental after-tax return on investment equals the after-tax weighted-average cost of capital (WACC). Retention beyond that point might further increase earnings but not generate shareholder value. Given that the cost of equity represents the return that shareholders could earn on other comparable-risk investments, retaining earnings beyond the point where the incremental after-tax return on investment is less than the WACC destroys value, because the excess retention is effectively denying the shareholders the opportunity to invest that excess at a higher return with comparable risk.

GROWTH IN EARNINGS PER SHARE THROUGH SHARE REPURCHASE

Stock repurchase has become a significant means of distribution for many firms. There are at least six important reasons firms use stock repurchases rather than cash dividends:

- Stock repurchase provides a means of distributing excess cash, but is more flexible (far less visible and predictable) than cash dividend payments. Although a firm must declare its intent to repurchase stock (in order to avoid what could otherwise be considered insider trading), the time period over which it executes the repurchase and the rate of repurchase is very flexible compared to cash dividends.
- Stock repurchase is more tax efficient than cash dividends from a tax-paying individual investor's perspective because it defers the payment of taxes for those investors who hold rather than sell shares and, for many years prior to the Tax Act of 2003, the capital gains associated with share price increases fueled by repurchasing were taxed at lower rates than cash dividends. Seldom discussed, stock repurchases are also more attractive than cash dividends from the perspective of managers who are holding stock options, because the repurchase results in relatively higher stock prices compared to cash dividends.
- Stock repurchase allows firms to repurchase undervalued stock.
- Stock repurchase is a means for firms to change their capital structure (i.e., issue debt and use the proceeds to repurchase shares); often this move is a defensive measure in a hostile takeover situation.
- Stock repurchase counters the dilution effect of incentive stock options.
- Stock repurchase causes earnings per share and the stock price to increase in comparison to cash dividends of the same amount.

To examine the effect of a stock repurchase on earnings per share growth, suppose the firm retains and invests fraction b of current earnings and uses fraction q of current earnings to repurchase stock at the current stock price. Fraction $1 - b - q$ will be paid out as cash dividends. In this case, the growth rate of earnings per share is[1]

$$g = [br + qX]/[1 - qX] \tag{4}$$

where X is the current earnings to price ratio. If $q = 0$, Equation (4) reduces to $g = br$, Equation (1). An alternative formulation results if the repurchase is expressed in terms of a fraction, d, of outstanding shares rather than a fraction of earnings. In this case,

$$g = (br + d)/(1 - d) \tag{5}$$

Example. Suppose a firm earned \$2 per share over the past 12 months and its existing assets are expected to generate the same earnings next year. Further suppose the firm expects to retain 50% of its earnings, earn 12% on those earnings, and use 30% of earnings to repurchase shares at the current stock price of \$40 per share. Dividends are 20% of earnings, so that

$$b = 0.5, \quad r = 0.12, \quad q = 0.3, \quad \text{and}$$
$$X = \frac{\text{Earnings}}{\text{Price}} = 2/40 = 0.05$$

Using Equation (4), the growth rate of earnings per share will be

$$g = [(0.5)(0.12) + (0.3)(0.05)]/[1 - (0.3)(0.05)] = 0.0761 \tag{6}$$

Therefore, if the firm currently has 10 million shares outstanding, net income over the past 12 months would have been \$20 million. If the firm allocates 30% of net income (\$6 million) to repurchase at \$40 per share, it purchases 150,000 shares, and using Equation (5), with $d = 0.015$,

$$g = [(0.5)(0.12) + 0.015]/(1 - 0.015) = 0.0761 \tag{7}$$

Define g_0 as the growth rate with zero share repurchases, but with an unchanged retention rate. It can then be shown that

$$g = \frac{g_0 + d}{1 - d} \tag{8}$$

For the example, g_0 with zero share repurchase is equal to

$$g_0 = br = 0.5(0.12) = 0.06 \tag{9}$$

With a \$10 million dividend and zero share repurchase, the growth rate in earnings per share is 0.06. In the case of \$6 million to repurchase 0.015 of the shares, $d = 0.015$, we again obtain $g = 0.0761$:

$$g = \frac{g_0 + d}{1 - d} = \frac{0.06 + 0.015}{1 - 0.015} = 0.0761 \tag{10}$$

The \$6 million of share repurchases, rather than \$6 million in cash dividends, increases the growth rate of earnings per share from 0.06 to 0.0761.

But now assume the cash dividend is equal to zero and 0.5 of the earnings are used for share repurchases. The firm has \$10 million to be used for share repurchases and $d = 0.025$, allowing the repurchase of 250,000 shares. Now,

$$g = \frac{g_0 + d}{1 - d} = \frac{0.06 + 0.025}{1 - 0.025} = \frac{0.085}{0.975} = 0.0872 \tag{11}$$

or using Equation (5),

$$g = \frac{0.5(0.12) + 0.025}{1 - 0.25} = \frac{0.06 + 0.025}{1 - 0.025} = 0.0872 \tag{12}$$

The growth rate can be further increased by using debt if the after-tax cost of debt is less than the expected return from new investments.

OTHER FACTORS AFFECTING GROWTH

Several factors determine earnings per share growth, and some of these factors are not very stable in the short run. Possible causes of a large fluctuation in earnings per share growth include the following:

- Performance from existing assets varies over time.
- Variation in retention rates due to management's desire to keep cash dividends stable in the midst of changing earnings and cash flows.
- Sale or acquisition of major assets or businesses, as well as one-time expenses and accounting changes that impact reported earnings per share.[2]
- Variation in the fraction of net income used to fund stock repurchase programs as stock price and/or capital structure fluctuates with changes in management preferences.

CONCLUSION

Even though other factors will affect the sequence of earnings, the fact that we can formulate earnings growth models is a big help to an analyst attempting to isolate the direct factors likely to affect future earnings and earnings growth.

If with Equation (5) the forecast of the growth rate of earnings per share is 0.15 (with share repurchase) and with Equation (3) is 0.10 (without share repurchase), the analyst knows that 0.05 of the 0.15 growth rate is the result of share repurchase. The actual growth rate might, in fact, be different in which case the analyst can recompute the actual growth rates with and without the share repurchase.

ENDNOTES

[1]Assuming last year's earnings, Y, can be repeated this year,

$$g = \text{EPS}_1/\text{EPS}_0 - 1 = [(Y + brY)/N_1]/(Y/N_0) - 1$$

where N_1 and N_0 represent the number of shares outstanding. Shares repurchased equal qY/P_0, so

$$N_1 = N_0 - qY/P_0$$

substituting and simplifying results in Equation (4).

[2]Accounting changes includes not only those items that are reported as the result of adopting accounting changes, but also those items that reflect accounting changes, such as the boost in post-2001 reported earnings resulting from a change in accounting for goodwill, wherein firms previously required to amortize goodwill arising from acquisition activities in prior years and over several decades were allowed to cease the amortization unless the intangible assets became impaired.

REFERENCE

Chan, L.K., J. Karceski, and J. Lakonishok. "The Level and Persistence of Growth Rates." *Journal of Finance*, Vol. 58, No. 2 (April 2003), pp. 643–684.