

# Investment Basics: XXXI. Sustainable Growth Models

## INTRODUCTION

Many firms state their financial objectives in terms of a growth target for a parameter such as earnings per share. Research on the sources firms use to raise new capital has shown that there is a reluctance to raise new equity capital (Ross, Westerfield and Jaffe, 1993, p409), and yet without the injection of new equity capital there are limits to growth for the firm. The rate at which a firm can grow, without resorting to external equity finance or altering its present financial structure, is consequently a parameter of great interest to management.

## THE HIGGINS SUSTAINABLE GROWTH MODEL

Higgins (1977) showed that for a given dividend payout ratio, profit margin, sales to assets ratio and capital structure, the maximum (or sustainable) rate at which a firm can grow whilst maintaining its financial parameters is given by:

$$SG = RI/NPAT*NPAT/S*S/NA*NA/E$$

This can be expanded to give:

$$SG = RI/NPAT*PBIT/S*NPBT/PBIT*(1-T)*S/NA*NA/E \quad (1)$$

where NPAT = net profit after tax  
 NPBT = net profit before tax  
 PBIT = operating profit before interest and tax  
 S = turnover  
 T = firm's tax rate  
 E = book value of equity  
 RI = retained income for the year  
 NA = net assets (i.e. total assets less interest bearing current liabilities)

Concelling like factors leads to the simplified version:

$$SG = RI/E$$

The correct formulation requires that the opening book value of the equity, not the closing book value should be used in the denominator of the ratio. It can be argued with some justification that the appropriate way to express the return on an investment ought to be as percentage of the opening investment for the period rather than the closing value. However, traditionally in financial analysis, returns such as ROE are expressed as a percentage of the closing equity. Using the value of closing equity in equation (1) will lead to an incorrect value for the sustainable growth rate.

Thus the sustainable growth equation (1) should be amended by the introduction of the factor  $E/E_0$  (closing equity/opening equity). Thus

$$SG = RI/NPAT*PBIT/S*S/NA*(1-T)*NPBT/PBIT*NA/E*E/E_0$$

Combining  $NA/E$  and  $E/E_0$  and using the opening value of NA gives the factor  $NA_0/E_0$  where both variables are derived from the opening balance sheet. The expression for the sustainable growth equation can then be rewritten as:

$$SG = RI/NPAT*PBIT/S*S/NA_0*(1-T)*NA_0/E_0*NPBT/PBIT \quad (2)$$

Factor one characterises the impact of reinvested funds on the growth rate. The next two factors identify the growth potential of the firm resulting from its operations. Factor four modifies the growth as a result of taxation. The impact of the addition of debt to the capital structure of the firm is shown by factors five and six, the former being related to the debt/equity ratio and the latter to the interest cover ratio.

Now taxation rates are reasonably stable, as are interest rates, particularly if the firm is using fixed interest borrowings. There is obviously a limit to the extent to which debt may be used. This leaves only the operating variables, profit margin and asset turnover, and the retention ratio as sources of growth potential for the firm. In the long run a firm may achieve a high degree of efficiency in its operations, limiting improvements in these ratios. Thus the only truly long run source of growth potential for the firm, outside of the raising of new equity capital, is the income which it retains.

## OTHER SUSTAINABLE GROWTH MODELS

A common form of the sustainable growth equation appearing in the literature is:

$$SG = RR*ROE \quad (3)$$

which (if closing equity is used in the definition of ROE) is in fact an approximation. The correct formulation can, with a little algebra, be shown to be

$$SG = (RR*ROE)/(1-RR*ROE) \quad (4)$$

(For modest retention ratios in low inflation economies, the error made in assuming the denominator equals one would be small).

However if ROE is defined using opening equity (using the symbol  $ROE_0$ ), equation (3) does correctly measures the sustainable growth rate.

The Boston Consulting Group presented the following formulation, which defined the sustainable growth rate in a firm's assets (Zakon, 1968):

$$SG = [D/E*(R-i)*p] + R*p \quad (5)$$

where

R = return on assets after tax  
 i = interest rate after tax  
 p = retention ratio  
 D/E = debt to equity ratio (book values)

Although the model highlights the crucial term  $(R-i)$ , – the difference between the operating returns of the firm and its cost of debt – the Higgins formulation does give better insight into the crucial variables which determine the sustainable growth rate of the firm.

## SUSTAINABLE GROWTH MODELS IN FINANCE TEXTS

Twenty six modern finance texts were scanned to establish the way in which they dealt with the concept of sustainable

growth. Five use the Higgins (1977) model (based on closing equity), two the BCG model, and six the retention ratio model. Of the latter, two provide the correct version (equation 4), the other four the approximate version. (Only two of these four mention that their model is an approximation). The remaining half of the texts make no mention of the concept.

**AFFORDABLE GROWTH RATE**

The sustainable growth rate is the maximum feasible growth rate of the firm when all the financial parameters are held constant. A related concept, which may be termed the affordable growth rate of the firm can be defined as the maximum feasible growth rate at a given target leverage, when all other financial parameters remain constant. In other words, the difference is that sustainable growth is determined at the existing leverage, whereas affordable growth is determined at the target leverage. Unless the firm's capital structure is at its target level, the affordable growth rate is the better indicator of the long term sustainable growth rate. Actual leverage is converted to target leverage by multiplying actual leverage by

$$\frac{100 - \frac{\text{actual debt}}{\text{capital}}}{100 - \frac{\text{target debt}}{\text{capital}}}$$

**SUSTAINABLE GROWTH AND THE RAISING OF NEW EQUITY**

If no new equity is sold, the only growth in book value comes from retained earnings, i.e.  $E = E_0 + RR * NPAT$ . However, if new equity is sold, Clarke, Wilson, Daines and Nadauld (1988, p227) show that the growth in book value per share is given by:

$$BV/BV_0 = (1 + g_s) = (1 + SG) * (1 + \alpha * g_s) / (1 + g_s) \tag{6}$$

where  $\alpha$  = Share price/ $BV_0$   
 $g_s$  = proportional increase in the number of issued shares  
 = (Number of new shares issued)/(opening number of shares)

Thus if the new shares are not sold at book value, the growth in book value per share will differ from the sustainable growth rate. Therefore the magnitude of a firm's share price has an influence on its sustainable growth rate when new equity is to be sold i.e. for a given degree of dilution in issued shares, the greater the share price relative to the book value per share, the greater the firm's sustainable growth rate.

**CONCLUSION**

In conclusion it may be said that the concept of a sustainable growth rate is an important one which has been introduced into finance texts over the past decade. It addresses the strategically important question of whether or not the firm's proposed plans can be funded within its existing financial parameters. It is easily calculated and gives the analyst valuable insights into any potential funding problems the firm may experience in the future.

**REFERENCES**

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