

Equity Securities

TOPIC 4: ESTIMATING SUSTAINABLE GROWTH



Student learning outcomes

- 4.1 Define and calculate historical growth
- 4.2 Define and estimate the quantitative fundamental determinants of growth
- 4.3 Define qualitative determinants of growth

Slides drafted within La Trobe School of Economics & Finance based on Damodaran (2002).

4.2

References

- **Damodaran, A. (2002).** Investment Valuation. John Wiley & Sons: Hoboken. Chapter 11.



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Introduction

- Growth is central to the estimation of firm's expected future cash flows from which the firm's value is derived
- Estimates for a firm's growth can be derived from three sources:
 - Historical growth rates
 - Consensus estimates from analysts
 - Forecast fundamentals

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Outcome 4.1

Historical growth rates

- Historical growth may not always be a good indicator of future growth, but it nevertheless provides a good starting point
- In measuring historical growth, there are several measurement issues which must be considered
 - Averaging methodology
 - Arithmetic average
 - Geometric average
 - Linear regression
 - Log-linear regression
 - Dealing with negative numbers

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Outcome 4.1

Realised holding period return

- Averaging methodology

$$\text{Arithmetic average} = \frac{\sum_{t=0}^{t=n-1} g_t}{n}$$

Weights the percentage change in each period equally, and ignores compounding

$$\text{Geometric average} = \left(\frac{E_0}{E_n} \right)^{(1/n)} - 1$$

Considers compounding but ignores data between the first and last data items

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Outcome 4.1

Historical growth rates

- The problems with arithmetic and geometric averaging are partly overcome with OLS regression
 - Linear regression

Regress the EPS in each period against each time period:

$$E_t = a + bt$$

where b is the dollar measure of change per time period, which can be divided into the average EPS per period to convert into a percentage

- Regress the natural log of the EPS in each period against each time period:

$$\ln(E_t) = a + bt$$

where b is the percentage measure of change per time period

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Outcome 4.1

Historical growth rates



- The EPS for General Electric (GE) from 1991 to 2000 is provided at right

Year	EPS
1991	0.42
1992	0.41
1993	0.40
1994	0.58
1995	0.65
1996	0.72
1997	0.82
1998	0.93
1999	1.07
2000	1.27

- Calculate the historical growth rate for GE using:
 - Arithmetic growth
 - Geometric growth
 - Linear regression
 - Log-linear regression

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Outcome 4.1

Historical growth rates

- Negative earnings
 - Measures of historical growth are distorted by negative earnings numbers
 - If EPS_{t-1} is negative, the calculation of percentage change in earnings:

$$\% \text{ change in EPS in period } t = (EPS_t - EPS_{t-1}) / EPS_{t-1}$$
 yields a meaningless number
 - There are various approaches to dealing with negative numbers
 - Use the linear regression method
 - Use EPS_t or EPS_{t-1} in the denominator, whichever is positive
 - Use absolute values
 - Accept the conclusion that historical growth rates are not a useful method of estimating future growth rates

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Outcome 4.1

Historical growth rates



- Aracruz, a Brazilian paper and pulp manufacturer, reported a loss in EPS of -0.067 reais in 1998 and a profit of 0.065 reais in 1999

- Estimate a 1999 growth rate for Aracruz

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Outcome 4.1

Historical growth rates

- A number of observations have been made about using historical growth as an estimation of future growth
- Little (1960) frequently found a negative correlation between growth rates in consecutive periods of varying length, and the average correlation across the two periods was close to zero (0.2)
- Small firms have more volatile growth rates than large firms
- Earnings growth rates are more volatile than sales growth rates
- Growth rates on larger firms tend to be less than for smaller firms, as firms find it increasingly difficult to scale up for growth and increase their market share

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Outcome 4.2

Fundamental growth rates

- Besides using historical growth rates, two other methods are often used to estimate future growth rates – using a consensus of estimates provided by analysts and estimating future growth based on fundamentals
- Growth rates based on fundamentals can be estimated at three levels:
 - Growth in earnings per share
 - Growth in net income
 - Growth in operating income

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Outcome 4.2

Growth in earnings per share

- The sustainable growth rate is the rate of EPS or DPS growth that can be sustained for a given level of return on equity, keeping the capital structure constant over time and without issuing additional common stock
- An estimate of a firm's sustainable growth rate can be used
 - as an estimate for the stable growth rate in a Gordon Growth Model (GGM) valuation
 - as the mature growth rate in a multi-stage Dividend Discount Model (DDM), in which we use the GGM valuation model to define the terminal value
- The sustainable growth rate is given by:

$$g = b \times ROE$$

where b = retention ratio and ROE = return on equity

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Outcome 4.2

Growth in earnings per share

- In the year just ended, a company began with shareholder's equity of \$1,000,000, earned \$250,000 in net income and paid dividends of \$100,000
- Calculate the company's sustainable growth rate and demonstrate it's proof**

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Outcome 4.2

Growth in earnings per share

- A firm's return on equity can be estimated using the three-factor duPont model, which also allows the analyst to consider the factors driving firm growth
- The three-factor duPont model allows the examination of the contribution of three factors to a firm's ROE – profitability, efficiency and financial leverage
- The contribution of these factors is given by:
 - Profit margin: the ability of the firm to extract a profit from its sales
 - Asset turnover ratio: the efficiency with which the firm uses its assets to generate sales
 - Assets to equity ratio: the degree to which the assets are internally financed (i.e. financed by equity rather than debt)

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Outcome 4.2

Growth in earnings per share

- The three-factor duPont model is:

$$ROE_{j,t} = \text{Profitability}_{j,t} \times \text{Efficiency}_{j,t} \times \text{Leverage}_{j,t}$$

$$= \frac{\text{Income}_{j,t}}{\text{Sales}_{j,t}} \times \frac{\text{Sales}_{j,t}}{\text{Assets}_{j,t}} \times \frac{\text{Assets}_{j,t}}{\text{Equity}_{j,t}}$$

- Estimated sustainable growth is:

$$g_{j,t} = b_{j,t} \times ROE_{j,t}$$

$$= \text{Retention Ratio}_{j,t} \times \text{Profitability}_{j,t} \times \text{Efficiency}_{j,t} \times \text{Leverage}_{j,t}$$

$$= \frac{\text{Income}_{j,t} - \text{Dividends}_{j,t}}{\text{Income}_{j,t}} \times \frac{\text{Income}_{j,t}}{\text{Sales}_{j,t}} \times \frac{\text{Sales}_{j,t}}{\text{Assets}_{j,t}} \times \frac{\text{Assets}_{j,t}}{\text{Equity}_{j,t}}$$

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Outcome 4.2

Growth in earnings per share

- Baggai Enterprises has an ROA of 10%, retains 30% of earnings and has an equity multiplier of 1.25
- Mondale Enterprises also has an ROA of 10%, but it retains two-thirds of earnings and has an equity multiplier of 2.00
- Calculate and compare the dividend growth rates of the two companies**

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Outcome 4.2

Growth in earnings per share

- Dell Corporation (DELL) is not currently paying a dividend. It's historical ratios are shown below.

Year	Profit Margin (%)	Asset Turnover (x)	Financial Leverage (x)
2000	6.83	2.56	2.28
1999	6.60	2.75	2.41
1998	8.00	3.27	3.08

- You believe that these ratios are not sustainable. You estimate for the next ten years a margin of 5%, turnover of 2.5x and a leverage of 2.0x

- Calculate Dell's sustainable growth rate**

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Outcome 4.2

Growth in earnings per share

- After 10 years you estimate Dell's ratios will revert to industry averages; i.e. a margin of 4.5% reflecting declining margins in the industry, turnover of 1.5x, closer to industry efficiency, and leverage of 2.0x, a modest reduction from recent levels
- You also believe that as a mature company it will need to offer a dividend payout ratio of 15%
- DELL's trailing EPS is \$0.76, and you estimate its beta at 1.45
- The risk-free rate is 5.0% and the equity risk premium is 5.7%
- **Calculate a value for DELL based on an appropriate DDM valuation model**

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Outcome 4.2

Growth in net income

- If we assume that a firm can raise additional equity capital then the growth in net income may differ from growth in EPS
- We can recast the growth formula to replace b with the reinvestment ratio (RIR)

$$g = RIR \times ROE$$

$$RIR = \frac{\text{Capital expenditure} - \text{Depreciation} + \Delta \text{Non-cash WC}}{EBIT(1 - \text{Tax Rate})}$$

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Outcome 4.3

Qualitative aspects of growth

- Qualitative factors are important in estimating growth, and show up in the estimation of the quantitative inputs into the value model
 - The quality of management is important in determining a firm's ability to generate growth in returns on capital
 - Marketing strengths of the firm are important in determining the ability of the firm to achieve the required operating margins and turnover ratios necessary for growth
 - The effectiveness of a firm's reinvestment strategies is reflected in its return on capital
 - The competitiveness of the market determines the excess returns available in the market

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