

Economics 136: Financial Economics
Section Notes for Week 8

1 Multi-Stage Growth Models: Review

This example illustrates why you can't use ROE as the earnings growth rate when ROE doesn't remain constant. Consider a company with initial capital stock (K_0) of \$100 that earns an ROE of 10% years 0 through 5 and plows back all earnings into capital during this time. From year 6 onward the company earns an ROE of only 5% and pays out all earnings as dividends. What is the growth rate of earnings in each period?

<i>Time</i>	<i>ROE</i>	<i>Capital(K)</i>	<i>Earnings(E)</i>	<i>B</i>	<i>Div(D)</i>	<i>EarningsGrowth</i>
0	10%	\$100	—	—	—	—
1	10%	\$110	$\$10 = K_0 * 10\%$	1	0	—
2	10%	\$121	$\$11 = K_1 * 10\%$	1	0	$(11 - 10)/10 = 10\%$
3	10%	\$133.10	$\$12.10 = K_2 * 10\%$	1	0	$(12.1 - 11)/11 = 10\%$
4	10%	\$146.41	$\$13.31 = K_3 * 10\%$	1	0	$(13.31 - 12.1)/12.1 = 10\%$
5	10%	\$161.05	$\$14.64 = K_4 * 10\%$	1	0	$(14.64 - 13.31)/13.31 = 10\%$
6	5%	\$161.05	$\$8.05 = K_5 * 5\%$	0	\$8.05	$(8.05 - 14.64)/14.64 = -45.01\%$
7	5%	\$161.05	$\$8.05 = K_5 * 5\%$	0	\$8.05	$(8.05 - 8.05)/8.05 = 0\%$
8	5%	\$161.05	$\$8.05 = K_5 * 5\%$	0	\$8.05	$(8.05 - 8.05)/8.05 = 0\%$
9	5%	\$161.05	$\$8.05 = K_5 * 5\%$	0	\$8.05	$(8.05 - 8.05)/8.05 = 0\%$
10	5%	\$161.05	$\$8.05 = K_5 * 5\%$	0	\$8.05	$(8.05 - 8.05)/8.05 = 0\%$

2 Predictability of Stock Returns: Dividend to Price Ratio

In lecture we saw graphs of historical values of the dividend to price ratio (D/P) and the price to earnings ratio (P/E) for the U.S. stock market. Each ratio showed a tendency to revert to its long-run average value.

Suppose the dividend to price ratio is high. What could happen to restore it to its long-run average value?

- Dividends could fall.
- Stock prices could rise.

Campbell and Shiller investigate which one (or what combination of the two) of these things tends to happen in the historical data.

Basically, they run regressions to find out whether a high D/P predicts falling dividends over the next 10 years or rising prices over the next 10 years or both. What they find is that the D/P ratio has no predictive power for dividend growth, therefore, the D/P ratio must be predictive of future price changes. The regression (or scatterplot) of 10 year price growth on D/P ratio shows that this is the case.

For example, if $D/P = 0.10$ prices are predicted to grow by about 50% over the next 10 years. However, if $D/P = 0.022$ then prices are predicted to fall by 30% over the next 10 years. When a similar analysis is carried out using the price to earnings ratio, Campbell and Shiller find that it is still prices (as opposed to earnings) that do most of the adjusting to cause the P/E ratio to revert to its long-run average.

3 Efficient Markets Hypothesis

“A capital market is said to be efficient if it fully and correctly reveals all relevant information in determining security prices.” (Malkiel from New Palgrave Dictionary of Money and Finance).

3.1 Weak form of the EMH

Stock prices immediately incorporate all information contained in past prices and returns.

3.2 Semi-strong form of the EMH

Stock prices immediately incorporate all publicly available information (such as prices, earnings forecasts, and published facts about the firm’s business operations)

3.3 Strong form of the EMH

Stock prices immediately incorporate all publicly and privately available information (including information held only by insiders).

3.4 What the EMH does and does not say

The EMH **DOES NOT** say that investors cannot earn high expected returns (high expected returns are normal for financial assets whose payoffs are very risky).

The EMH **DOES NOT** say that investors cannot ever get lucky and earn higher returns than were expected (this is perfectly natural with uncertainty).

The EMH **DOES** say that investors cannot expect to be lucky; they cannot expect to earn a higher return than is normal compensation for the risk of holding that asset.

3.5 Examples

Which of the following observations appear to indicate market inefficiency? For each observation, explain whether the observation appears to contradict the weak, semi-strong, or

strong form of the efficient market hypothesis.

(a) Historically, stocks have produced a larger average annual return than bonds.

ans: This result is exactly what we'd expect in an efficient market in which stocks returns are more risky than bond returns.

(b) There is disputed evidence that stocks that have depreciated unusually in the recent past continue to do so in the near future (momentum).

ans: It appears that using knowledge of past returns can help predict a negative abnormal return in the near future. If so, then all forms of the efficient markets hypothesis are violated.

(c) Stocks of companies that announce unexpectedly high earnings appear to offer high returns in both of the two days prior to the public announcement, and stocks of companies that announce unexpectedly low earnings appear to offer negative returns in both of the two days prior to the public announcement.

ans: It appears that some people are using inside information to make abnormal returns. If so, then the strong form of the efficient markets hypothesis is violated.

(d) A small investor earns a higher return investing in an S&P500 tracking fund than if she had purchased the equivalent amount of each stock in the S&P500 individually.

ans: This result is exactly what we'd expect in an efficient market with transaction costs; it does not indicate market inefficiency.

4 Conditional Expectations

The conditional expectation of a random variable is the best guess of its value given the information you have. The conditional expectation of random variable, X given all information that is known at time t , I_t can be written two ways. Either the information set can be conditioned upon explicitly,

$$E[X|I_t]$$

or equivalently, one can write,

$$E_t[X]$$

4.1 Law of Iterated Expectations

The law of iterated expectations says that your best guess today of your best guess in the future of X is your best guess today of X .

$$\begin{aligned} E_t[E_{t+1}[X]] &= E_t[X] \\ E_t[X - E_{t+1}[X]] &= 0 \end{aligned}$$

5 Mutual Fund Fees Example From Lecture

Find the effective annual return to investors for a 2 year investment of \$10,000 in the two Treasury bond mutual funds given as examples in lecture. Assume the return on the portfolio of bonds held by both funds is 2.8% per year.

Merrill ST US Govt A Fund (MDUGX) Fee Structure:

Expense Ratio	0.88%
Front Load	3.50%
Deferred Load	0.00%

Vanguard Sh-Tm Fed Inv Fund (VSGBX) Fee Structure:

Expense Ratio	0.20%
Front Load	0.00%
Deferred Load	0.00%

ans: For Merrill you pay \$350 up front and thus earn returns on \$9,650. So you end up with,

$$\begin{aligned} \$9,659 * (1 + 0.028 - 0.088)^2 &= \$9,659 * (1.0192)^2 = \$10,024.12 \\ R_{ann} &= \left(\frac{\$10,024.12}{\$10,000} \right)^{1/2} - 1 = 0.12\% \end{aligned}$$

ans: For Vanguard you pay \$0 up front and thus earn returns on all \$10,000. So you end up with,

$$\begin{aligned} \$10,000 * (1 + 0.028 - 0.002)^2 &= \$10,000 * (1.026)^2 = \$10,526.76 \\ R_{ann} &= \left(\frac{\$10,526.76}{\$10,000} \right)^{1/2} - 1 = 2.60\% \end{aligned}$$