

Equity Valuation

Reference: Bodie et al, Ch 18

Econ 457

Week 11-b

Outline

1. Buybacks
2. Free Cash Flow Models
 - Modigliani and Miller
3. Relative Valuation
 - P/E Ratio
4. Cyclically Adjusted P/E (CAPE)
5. Practice

1. Buybacks

Recently company managers have preferred to return earnings to shareholders via **stock buybacks** rather than through dividends. Buybacks benefit all shareholders through higher prices.

Advantages of stock buybacks include:

- Investors treat dividends as 'sticky'. Any changes to dividend policy are scrutinized. In contrast, stock buybacks are more likely to be considered one-offs, which makes them a good way to distribute excess cash.
- Management may view its stock price as undervalued.
- There may be different tax treatment between dividends and capital gains
- Reduces the amount of equity outstanding, which could improve financial ratios (Earnings per share, Return on Equity)

1. Buybacks

Controversy and Recent Regulation

Despite some advantages, stock buybacks are controversial:

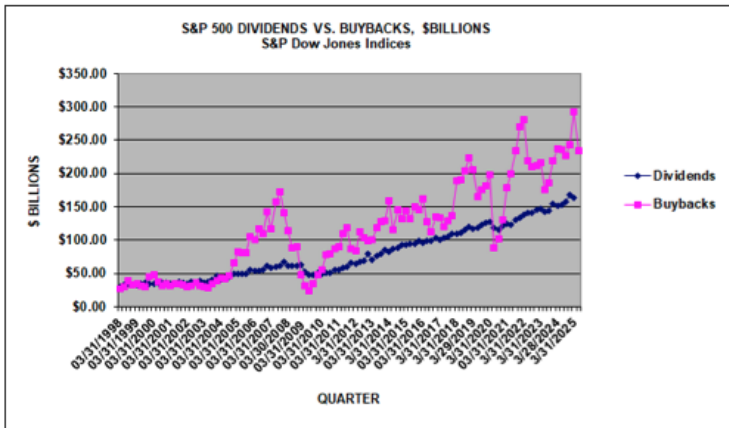
- Prioritizes stock price gains over investments (R&D, capital expenditures)
- Can artificially inflate EPS without improving underlying business performance
- Benefits executives with stock-based compensation more than other stakeholders

Heightened public awareness led to some recent changes in tax and regulatory treatment:

- Inflation Reduction Act (2022): 1% excise tax on share repurchases by public companies
- SEC enhanced disclosure requirements (2023): more detailed reporting on buyback timing and rationale

1. Buybacks

Recent Trends



<https://www.spglobal.com/spdji/en/documents/index-news-and-announcements/20250917-sp-500-buyback-pr.pdf>

2. Free Cash Flow Models

Modigliani and Miller

The Modigliani-Miller theorem states that in perfect capital markets, a firm's value is independent of its capital structure (debt vs. equity mix). The formal proof relies on some key assumptions, including, for example, no taxes, no bankruptcy costs, perfect information and efficient markets.

For the intuition, note that debt is usually cheaper than equity. A more leveraged firm will have more debt, which will seemingly reduce its cost of financing. However, the more leveraged firm is also riskier, so the interest rate on that debt and the required return on equity will both rise, and, in the model, perfectly offsetting the initial benefit. Therefore the weighted average cost of capital is unchanged, even as the mix of debt and equity changes.

2. Free Cash Flow Models

Free Cash Flow to Firm (FCFF)

Definition: Cash flow available to all capital providers (debt and equity holders) before any financing costs.

Calculation:

$$\begin{aligned} FCFF = & \text{EBIT}(1 - \text{Tax Rate}) + \text{Depreciation} \\ & - \text{Capital Expenditures} - \text{Change in Working Capital} \end{aligned}$$

Valuation:

$$\text{Firm Value} = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1 + WACC)^t}$$

Where *WACC* is the weighted average cost of capital

Use Case: Total firm valuation; subtract debt to get equity value

2. Free Cash Flow Models

Free Cash Flow to Equity (FCFE)

Definition: Cash flow available to equity holders after all expenses, taxes, debt payments, and reinvestment needs.

Calculation:

$$FCFE = FCFF - \text{Interest Expense}(1 - \text{Tax Rate}) + \text{Increases in net debt}$$

Valuation:

$$\text{Equity Value} = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1 + r_E)^t}$$

Where r_E is the required return on equity (cost of equity)

Use Case: Direct valuation of equity, particularly useful for leveraged firms

2. Free Cash Flow Models

Modigliani and Miller

Implication of Modigliani and Miller Theorem for Valuation:

- Firm value depends only on underlying cash flows, not financing decisions
- Focus valuation on operating performance rather than capital structure
- Provides foundation for free cash flow valuation methods

Note that in practice, when valuing the same firm using FCFF (discounted at WACC) versus FCFE (discounted at cost of equity), the implied equity values are rarely equal. This suggests that Modigliani Miller assumptions don't hold perfectly in practice - not surprising given the restrictive assumptions.

3. Relative Valuation

The dividend discount model valued a company based on its earnings and a discount rate. Using the modeled valuation, an investor could then determine whether the market price was too high or too low, and either sell or buy accordingly.

An alternative approach would be to compare the market price of a company to the price of either other, similar companies OR compared to the price of that company over time.

This approach requires *normalizing* the market price by something, in order to account for observable differences across comparison companies. A common approach is to normalize the price by **earnings**, although there are other possibilities too.

3. Relative Valuation

P/E Ratio

Reminder that the value of a perpetuity is given by:

$$P_0 = \frac{c}{k}$$

Where P_0 is the current price, c is the payment amount, and k is the discount rate.

The value of a company that has no expected growth is similar to a perpetuity, with the payment amount equal to earnings (E).

$$P_0 = \frac{E}{k}$$

3. Relative Valuation

P/E Ratio

Still thinking about companies with no expected growth (i.e. perpetuities), the Price-Earnings Ratio is:

$$P_0/E = \frac{1}{k}$$

Because the earnings cancels out.

For illustrative purposes, assume that $k = 12.5\%$. Then the P-E Ratio would be $1/0.125 = 8$.

In words: investors should be willing to pay \$8 billion for a company with a required return of 12.5%, no-growth prospects, and earnings next year of \$1 billion.

3. Relative Valuation

P/E Ratio

Of course, companies also have growth prospects, which should increase their value. We can define the value of a company as follows:

$$\begin{aligned} P_0 &= PV(\text{no-growth}) + PV(\text{Growth Opportunities}) \\ &= \frac{E_1}{k} + PVGO \end{aligned}$$

Where $PVGO$ is $PV(\text{Growth Opportunities})$

3. Relative Valuation

P/E Ratio

Dividing this by E_1 and doing a little rearranging gives an expression for the P/E Ratio:

$$\frac{P_0}{E_1} = \frac{1}{k} \left(1 + \frac{PVGO}{E/k} \right)$$

The term $\frac{PVGO}{E/k}$ is the ratio of the growth opportunities to the no-growth scenario for the firm. And the term $\frac{1}{k}$ is what we say earlier about the PE ratio for a no-growth firm.

In words, the PE ratio is the value of a perpetuity multiplied by one plus the ratio of PVGO to the no-growth value. Firms with higher PVGOs will have higher PE ratios. Investors are willing to pay more for companies with better growth prospects.

3. Relative Valuation

P/E Ratio - Earnings

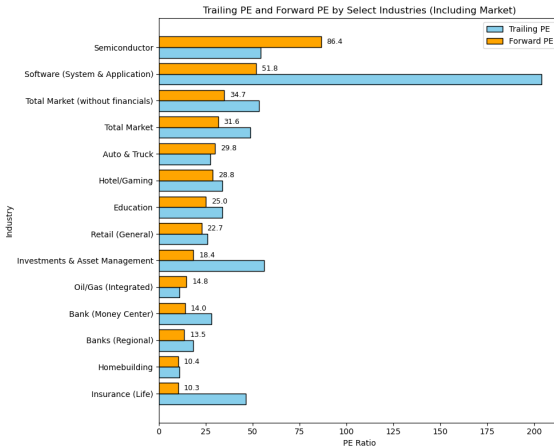
In order to estimate the P-E Ratio you need to know the earnings.

Ideally, you would have an estimate for forward earnings. This could come from company guidance, or analyst consensus, or your own analysis.

An often used substitute is earnings over the trailing twelve months (ttm). While not ideal, this is easily observed and readily available.

2. Price/Earnings Ratio

PE Ratios across Industries



Data Source: Aswath Damodaran, available on his NYU website

2. Price/Earnings Ratio

PE Ratios in the Auto Industry

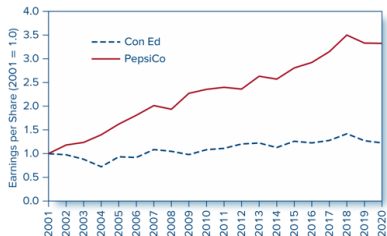
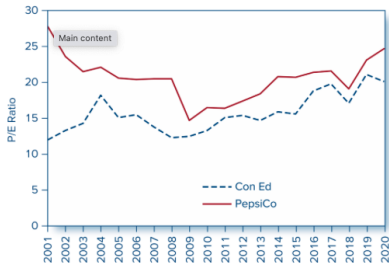
Table: PE Ratios in the Auto Industry, July 2025

	Market Cap \$ bn	Share Price, \$ (as of 7-16)	EPS, TTM	PE Ratio, TTM
Ford (F)	44.6	11.25	1.25	9.00
General Motors (GM)	51.1	53.33	7.16	7.45
Honda (HMC)	41.8	30.53	3.64	8.39
Tesla (TSLA)	1,037	321.88	1.74	184.99
BYD Company (BYD)	172.6	93.73	4.30	21.77

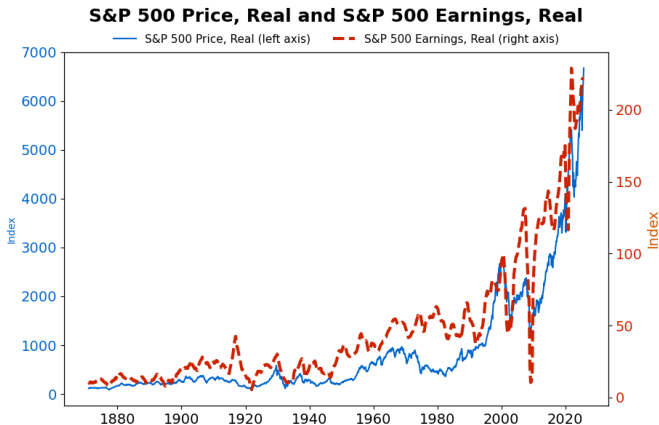
Data from Yahoo Finance, as of 7-16-2025.

2. Price/Earnings Ratio

Do PE Ratios Predict Earnings Growth?



4. Cyclically Adjusted P/E (CAPE)



Data Source: Robert Shiller, available on his Yale website

4. Cyclically Adjusted P/E (CAPE)

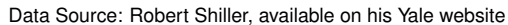
Definition

Define the Cyclically Adjusted P-E Ratio (CAPE) as the "stock price divided by average real earnings over the previous 10 year."

- Adjusted for inflation (real earnings)
- 10 years is long enough to smooth over business cycles

Accordingly, we would expect the CAPE to smoother than the PE ratio.

Historical CAPE



4. Cyclically Adjusted P/E (CAPE)

A Good Measure of Value?

The inverse of the PE is the *earnings yield*: E/P .

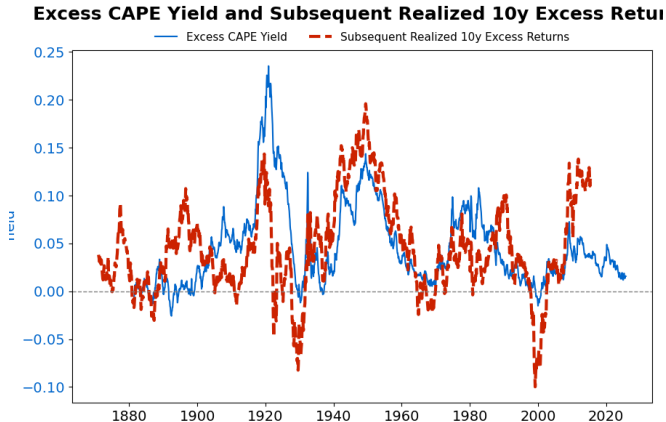
Define the *excess CAPE yield* as

$$\frac{1}{CAPE} - (10\text{y real UST yield})$$

Is this a good measure of value? When CAPE is high (low), the excess CAPE yield is low (high) and suggests future returns will also be low (high).

4. Cyclically Adjusted P/E (CAPE)

A Good Measure of Value?



Data Source: Robert Shiller, available on his Yale website

4. Cyclically Adjusted P/E (CAPE)

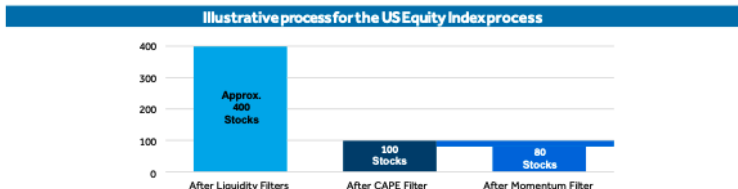
Barclays



4. Cyclically Adjusted P/E (CAPE)

Barclays

- From the remaining eligible stocks, the strategy selects a number of the most undervalued stocks (100 for the US Equity Index, 50 for the Eurozone Equity Index, and 50 for the Japan Equity Index) using the CAPE® ratio as the value indicator subject to the requirement that sector composition of these stocks should be similar to that of the benchmarks.
- The strategy removes 20% of stocks with the lowest price momentum. This is done to help reduce a key risk in value investing known as the value trap, where a stock that appears to be undervalued but fails to provide a positive return over time because of a fundamental problem.
- The remaining 80% of stocks (80 for the US Equity Index, 40 for the Eurozone Equity Index, and 40 for the Japan Equity Index), weighted equally, will represent the index constituents for the following quarter.



1. Jand, Inc. currently pays a dividend of \$1.22, which is expected to grow indefinitely at 5%. If the current value of Jand's shares based on the constant-growth dividend discount model is \$32.03, what is the required rate of return?
2. Computer stocks currently provide an expected rate of return of 16%. MBI, a large computer company will pay a year-end dividend of \$2 per share. If the stock is selling at \$50 per share, what must be the market's expectation for the dividend growth rate?
3. If the dividend growth forecast is revised down to 5%, what will happen to the price of stock? What (qualitatively) will happen to the price-earnings ratio?

4. MF Corp has an ROE of 16% and a plowback ratio of 50%. If the coming year's earnings are expected to be \$2 per share, at what price will the stock sell? The market capitalization rate is 12%. What price do you expect it to sell at in 3 years?
5. Sisters Copr. expects to earn \$6 per share next year. The firm's ROE is 15% and its plowback ratio is 60%. If the firm's market capitalization rate is 10%, what is the present value of its growth opportunities?
6. The FI Corporation's dividends per share are expected to grow indefinitely by 5% per year. If this year's year-end dividend is \$8 and the market capitalization rate is 10% per year, what must be the current stock price? If the expected earnings per share are \$12, what is the implied value of the ROE on future investment opportunities? How much is the market paying per share for future growth?

7. The Duo Growth Company just paid a dividend of \$1 per share. The dividend is expected to grow at a rate of 25% per share for the next three years and then to level off to a 5% per year forever. You think the appropriate market capitalization rate is 20% per year.
- What is the estimate of the intrinsic value of the stock?
 - If the market price is equal to this intrinsic value, what is the dividend yield?
 - What do you expect the price to be one year from now?
 - If the implied capital gain consistent with your estimate of the dividend yield and the market capitalization rate?