2017 Study Session # 7, Reading # 16

"EQUITY MARKET VALUATION"

EY = Earning Yield
TFP = Total Factor Productivity
DCF = Discounted Cash Flow
CPI = Consumer Price Index

2. ESTIMATING A JUSTIFIED P/E RATIO

2.1 Neoclassical Approach to Growth Accounting

- Growth accounting ⇒ to measure the contribution of different factors to economic growth & to compute the rate of an economy's technological progress.
- Cobb-Douglas production function ⇒uses country's labor input& capital stock to estimate the total real economic output.

$$Y = AK^{\alpha}L^{\beta}$$

where
Y = total real economic output
A = TFP
k = Capital stocks
L = Labor Input
α = output elasticity of K (0<α<1)
β = output elasticity of L (α +β=1)

- If we assume constant returns to scale, we can derive following expression from above equation:

$$\frac{\Delta Y}{Y} \approx \frac{\Delta A}{A} + a\frac{\Delta K}{K} + (1-a)\frac{\Delta L}{L}$$

  - Each of the inputs as well as the output is now stated in terms of growth.
- % Δ in capital &labor can be obtained from national accounts.
- Growth in TFP is determined using other inputs & is called Solow residual:

$$solow\ residual = \%\,\Delta Y - a(\%\Delta K) - (1-\Delta)\%\,\Delta L$$

- Factors that contribute to TFP growth:
  - Changing technology
  - Changing trade restriction.
  - Changing laws.
  - Changing division of labor.
  - Changing natural resources.

2.4 Equity Market Valuation

- DDM can be used to estimate value of an equity market index.
  - Assumption ⇒ growth in corporate earnings & dividends is the same as the growth rate in GDP.
- H-model ⇒ valuation model that assumes that dividend growth rates are expected to decline in a linear fashion (from super-normal to the long term sustainable growth).

$$V_0 = \frac{D_0}{r - g_L}\left[(1+g_L) + \frac{N}{2}(g_S - g_L)\right]$$

  - Growth rates (g_S &g_L)& discount rate (r) are in real term (preferred by economists).
  - H-model involves an approximation to the value estimate.

Justified P/E

- Investment attraction of a market index can be evaluated through P/E ratio.
- $\text{Justified}\frac{P}{E} = \frac{\text{Intrinsic Value (through H-Model)}}{\text{Leading Earnings}}$
  - Ratio is warranted by fundamentals.
- Criticisms
  - Inaccurate input data (particularly in developing markets).
  - Difference b/w corporate & GDP growth rates.
  - Hyperinflation, currency instability can diminish the accuracy & reliability of the model.

3. TOP-DOWN AND BOTTOM-UP FORECASTING

Top-Down Forecasting

- Macroeconomic projections to produce return expectations for large composites.
- Further refined into return expectations for various market sectors & industry groups.
- Information can be distilled into projected returns for individual securities.

Bottom-Up Forecasting

- Starts with microeconomic outlook.
- Individual security ⇒ market sectors⇒ equity market.

3.1 Portfolio Suitability of Each Forecasting Type

- Tactical asset allocation ⇒ top-down forecast may not need to be focused.
- Individual security return focus ⇒ macroeconomic study may be unnecessary.

3.2 Using Both Forecasting Types

- Fundamental security analysis ⇒ tries to use both top-down & bottom-up forecasting.
- Top-down & bottom up forecasts can provide significantly different results.
- Most often, the aggregate market consensus will tend to be more accurate than the individual forecasts.

3.3 Top-Down and Bottom-Up Forecasting of Market Earnings per Share

Bottom-up Earnings Estimate

Adds up the individual estimates of the companies in the index.

Top-Down Earnings Estimate

- Relies on forecasts of various macroeconomic variables.
- Apply model that fits these forecasts.

4. RELATIVE VALUE MODELS

4.1 Earnings-Based Models

1. The Fed Model

- Hypothesizes that yield on long terms U.S treasury securities should be equal to the S&P 500 earnings yield.
- If EY > (<) bond yield, stocks are undervalued (overvalued).

Benefits &Criticisms of Fed Model

Benefits

- Model typically makes use of expected earnings as an input, which is consistent with DCF analysis.
- When IR↓, it does correctly suggest that equities become more attractive as an asset class.

Criticisms

- Ignores equity risk premium.
- Ignores growth in earnings.
- Compares a real variable (index level) to a nominal variable.

2. Yardeni Model

- Stated as justified earnings yield on equities:

$$\frac{E_1}{P_0} = Y_b - d \times LTEG$$

where
LTEG = 5 year earnings growth forecast for the S&P 500
Y_b = Moody's A-rated corporate bond yield (as required return)
d = weighting factor

- Model captures default risk premium but not equity risk premium.

3.10-Year Moving Average Price

- $\frac{P}{10\ year\ MA\ (E)} = \frac{Value\ of\ the\ S\&P\ 500\ price\ index}{Avg.of\ previous\ 10\ year's\ reported\ earnings}$
- Many analysts believe that this ratio is mean reverting.
- Both numerator & denominator is inflation adjusted through CPI.
- 10 year moving avg. accounts for business cycle effects on earnings.

4.2 Asset-Based Models

Tobin's q Ratio

- $\frac{MV\ of\ a\ company}{Replacement\ cost\ of\ its\ assets}$
- Theoretical value of ratio is 1.0
- Ratio > (<) 1.0, firm's stock is presumed to be overpriced (underpriced).
- Limitation ⇒ replacement cost is difficult to determine.
- Ratio is mean reverting.

Equity q Ratio

- $\frac{Aggregate\ MV of\ equity}{Market\ Value\ of\ firm's\ net\ worth}$
- Expected value of ratio is 1.0.
- Measure differs from P/B ratio because net worth is based on replacement cost rather than BV of equity.