

"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 \Rightarrow to measure the contribution of different factors to economic growth & to compute the rate of an economy's technological progress.
- Cobb-Douglas production function \Rightarrow 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 ($0 < \alpha < 1$)

β = output elasticity of L ($\alpha + \beta = 1$)

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

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

- 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:

$$\text{solow residual} = \% \Delta Y - \alpha(\% \Delta K) - (1 - \alpha)\% \Delta L$$
- 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

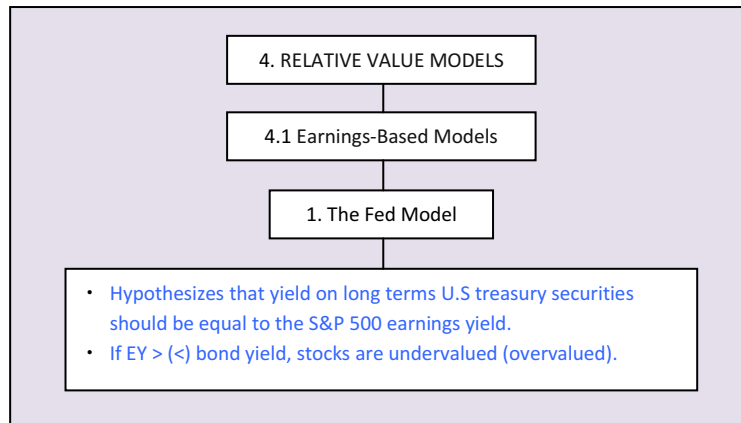
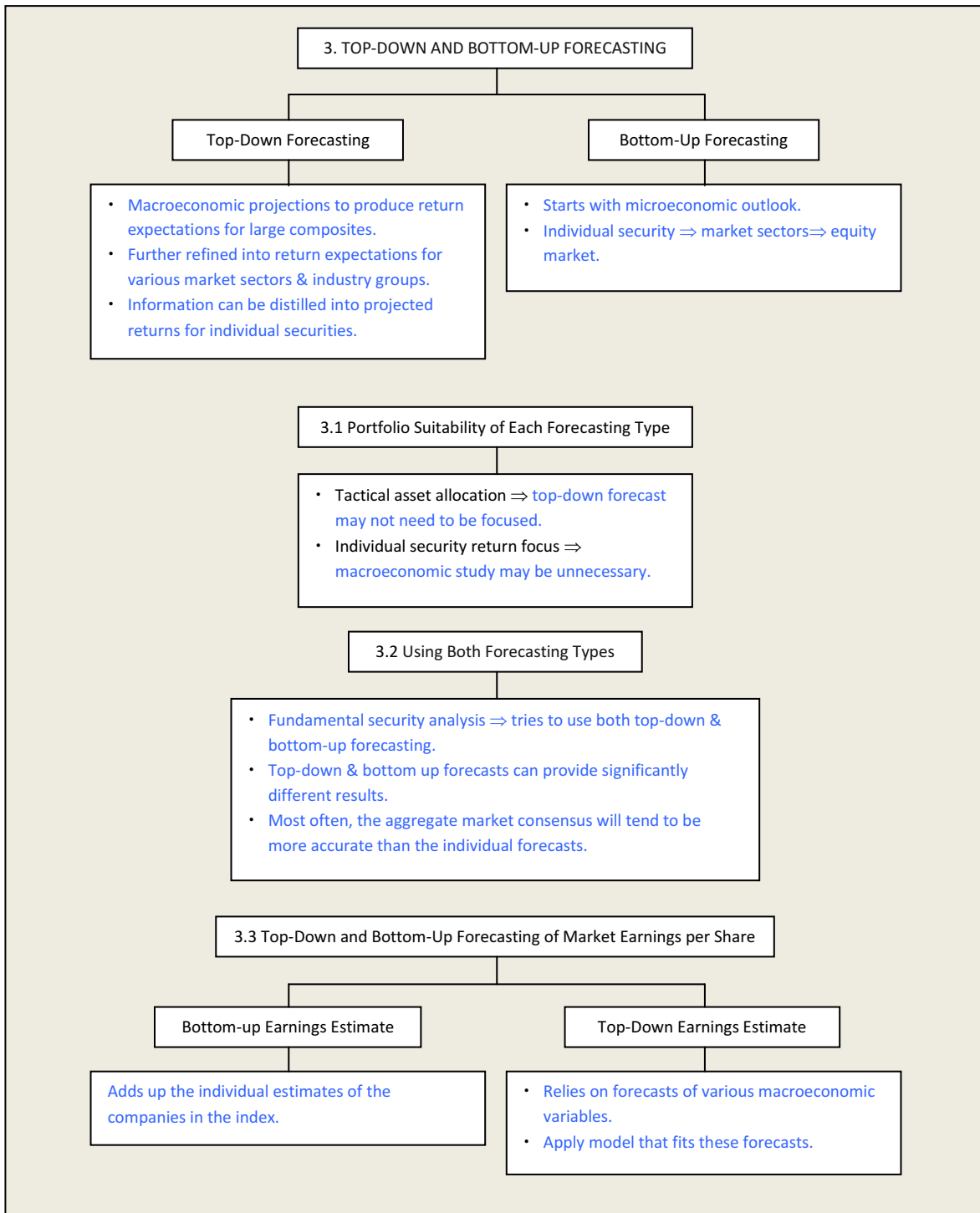
- DDM can be used to estimate value of an equity market index.
 - Assumption \Rightarrow growth in corporate earnings & dividends is the same as the growth rate in GDP.
- H-model \Rightarrow valuation model that assumes that dividend growth rates are expected to decline in a linear fashion (from super-normal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



Benefits & Criticisms of Fed Model

Benefits

- Model typically makes use of expected earnings as an input, which is consistent with DCF analysis.
- When $IR \downarrow$, 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

- $\frac{P}{10 \text{ year MA}(E)} = \frac{\text{Value of the S\&P 500 price index}}{\text{Avg. of previous 10 year's reported earnings}}$
- 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

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

Equity q Ratio

- $\frac{\text{Aggregate MV of equity}}{\text{Market Value of firm's net worth}}$
- 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.