Framework

- ORGANIZING THE TASK: FRAMEWORK AND CHALLENGES
  1. A Framework for Developing Capital Market Expectations
  2. Challenges in Forecasting
- TOOLS FOR FORMULATING CAPITAL MARKET EXPECTATIONS
  1. Formal Tools
  2. Survey and Panel Methods
  3. Judgment
- ECONOMIC ANALYSIS
  1. Business Cycle Analysis
  2. Economic Growth Trends
  3. International Interactions
  4. Economic Forecasting
  5. Using Economic Information in Forecasting Asset Class Returns

Forecasting Tools

The tools for formulating capital market expectations

- formal tools
  - statistical tools
  - discounted cash flow models,
  - the risk premium approach,
  - financial market equilibrium models,
- Survey and panel methods,
- Analyst judgment.

Formal Tools - Statistical tools

I. Statistical tools:

- 1. Projecting historical data: historical mean return, standard deviation, and correlations for a data set into the future.
  - ✓ The arithmetic mean is the best when projecting for a single year
  - ✓ The geometric mean is best for projecting over several years.
  - ✓ The geometric mean is always smaller than the arithmetic mean when the variance of returns is non-zero.
  - ✓ The difference between the two measures increases as the variance of returns increases

Formal Tools - Statistical tools

- 2. Shrinkage estimators: weighted averages of historical data and some other estimate, where the weights and other estimates are defined by the analyst.
  - ✓ Shrinkage estimators reduce (shrink) the influence of historical outliers through the weighting process.
  - ✓ The mean return and covariance are the parameters most often adjusted with shrinkage estimators.
  - ✓ This tool is most useful when the data set is so small that historical values are not reliable estimates of future parameters.

Formal Tools - Statistical tools

3. Time-Series Estimators

Time-Series Estimators involve forecasting a variable on the basis of lagged values of the variable being forecast and often lagged values of other selected variables.

$$\sigma_t^2 = \theta\sigma_{t-1}^2 + (1-\theta)\varepsilon_t^2$$
$$0 < \theta < 1$$

Volatility clustering is the tendency for large (small) swings in prices to be followed by large (small) swings of random direction. Volatility clustering captures the idea that some markets represent periods of notably high or low volatility

Formal Tools - Statistical tools

- 4. Multifactor models

$$R_i = \alpha_i + \beta_{i,1}F_1 + \beta_{i,2}F_2 + \varepsilon_i$$

two-factor multifactor model:

$$\sigma_i^2 = \beta_{i,1}^2\sigma_{F_1}^2 + \beta_{i,2}^2\sigma_{F_2}^2 + 2\beta_{i,1}\beta_{i,2}Cov(F_1F_2) + \sigma_{\varepsilon,i}^2$$
$$Cov(i,j) = \beta_{i,1}\beta_{j,1}\sigma_{F_1}^2 + \beta_{i,2}\beta_{j,2}\sigma_{F_2}^2 + (\beta_{i,1}\beta_{j,2} + \beta_{i,2}\beta_{j,1})Cov(F_1F_2)$$

✓ By relating the returns on all assets to a common set of return drivers, a multifactor model simplifies the task of estimating covariances

Formal Tools - Statistical tools

Exhibit 1
Factor Covariance Matrix

	Global Equity	Global Bonds
Global Equity	0.0225	0.0022
Global Bonds	0.0022	0.0025

Exhibit 2
Market Factor Sensitivities and Residual Risk

	Sensitivities		
	Global Equity	Global Bonds	Residual Risk
Market I	1.20	0	12.0%
Market2	0.90	0	7.0%
Market 3	0	0.95	1.8%

5. Given the data in Exhibits 1 and 2, the covariance between Market land Market 2 is closest to:

A.0.0017

B.0.0225

C.0.0243

Formal tools- DCF models

II. Discounted cash flow models

- correct emphasis on the future cash flows of an asset and the ability to back out a required return
- do not account for current marker conditions such supply and demand so these models are viewed as being more suitable for LT valuation

$$P_0 = \frac{Div_1}{\widehat{R}_i - g} \rightarrow \widehat{R}_i = \frac{Div_1}{p_0} + g$$

Earning growth rate (g) = GDP growth rate + excess corporate growth (for the index companies)

- ✓ The growth rate is proxied by the nominal growth in GDP = the sum of the real growth rate in GDP + the rate of inflation.
- ✓ More advanced analysis: The growth rate can be adjusted for any differences between the economy's growth rate and that of the equity index. this adjustment is referred to as the excess corporate growth rate.

Formal tools- DCF models

- **Grinold and Kroner** step further by including a variable that adjusts for stock repurchases and changes in market valuations as represented by P/E ratio

$$\widehat{R_i} = \frac{Div_1}{P_0} - \Delta S + i + g + \Delta\left(\frac{P}{E}\right)$$

where

$\widehat{R_i}$= the expected rate of return on equity

Div_1/P_0= the expected dividend yield

ΔS= percentage change in shares outstanding (positive or negative)

i= expected inflation rate

$\Delta P/E$ the per period percent change in the P/E multiple

The term ΔS is negative in the case of net positive share repurchases is a positive repurchase yield in such cases.

Formal tools- DCF models

- **Grinold and Kroner**
  - Equation consists of three components:

1. Expected income return: D/P - △S
   - ✓If ΔS is negative (shares have been repurchased), stockholders are assumed to receive cash; thus, the percentage change in the number of shares outstanding is added
   - ✓If ΔS is positive, however, stockholders are assumed to pay cash. The percentage change in the number of shares outstanding is subtracted
2. Expected nominal earnings growth return: i + g
3. Expected repricing return: △P/E
   - ✓The expected nominal earnings growth return and the expected repricing return constitute the expected capital gains.