The Returns and Risks From Investing

Chapter 6
Charles P. Jones, Investments: Analysis and Management,
Ninth Edition, John Wiley & Sons
Asset Valuation

• Function of both return and risk
  – At the center of security analysis

• How should realized return and risk be measured?
  – The realized risk-return tradeoff is based on the past
  – The expected risk-return tradeoff is uncertain and may not occur
Return Components

• Returns consist of two elements:
  – Periodic cash flows such as interest or dividends (income return)
    • “Yield” measures relate income return to a price for the security
  – Price appreciation or depreciation (capital gain or loss)
    • The change in price of the asset

• Total Return = Yield + Price Change
Risk Sources

- **Interest Rate Risk**
  - Affects income return

- **Market Risk**
  - Overall market effects

- **Inflation Risk**
  - Purchasing power variability

- **Business Risk**

- **Financial Risk**
  - Tied to debt financing

- **Liquidity Risk**
  - Marketability without sale prices

- **Exchange Rate Risk**

- **Country Risk**
  - Political stability
Risk Types

• Two general types:
  – Systematic (general) risk
    • Pervasive, affecting all securities, cannot be avoided
    • Interest rate or market or inflation risks
  – Nonsystematic (specific) risk
    • Unique characteristics specific to issuer

• Total Risk = General Risk + Specific Risk
Measuring Returns

• For comparing performance over time or across different securities

• Total Return is a percentage relating all cash flows received during a given time period, denoted $CF_t + (PE - PB)$, to the start of period price, $PB$

$$TR = \frac{CF_t + (PE - PB)}{PB}$$
Measuring Returns

- Total Return can be either positive or negative
  - When cumulating or compounding, negative returns are problem
- A Return Relative solves the problem because it is always positive

\[ RR = \frac{CF_t + PE}{PB} = 1 + TR \]
Measuring Returns

• To measure the level of wealth created by an investment rather than the change in wealth, need to cumulate returns over time

• Cumulative Wealth Index, \( CWI_n \), over \( n \) periods =

\[
WI_0 (1 + TR_1) (1 + TR_2) ... (1 + TR_n)
\]
Measuring International Returns

• International returns include any realized exchange rate changes
  – If foreign currency depreciates, returns lower in domestic currency terms

• Total Return in domestic currency =

\[
RR \times \frac{\text{End Val. of For.Curr.}}{\text{Begin Val. of For.Curr.}} - 1
\]
Measures Describing a Return Series

- TR, RR, and CWI are useful for a given, single time period
- What about summarizing returns over several time periods?
- Arithmetic mean, or simply mean,

\[ \bar{X} = \frac{\sum X}{n} \]
Arithmetic Versus Geometric

• Arithmetic mean does not measure the compound growth rate over time
  – Does not capture the realized change in wealth over multiple periods
  – Does capture typical return in a single period

• Geometric mean reflects compound, cumulative returns over more than one period
Geometric Mean

• Defined as the n-th root of the product of n return relatives minus one or \( G = \left( (1 + TR_1)(1 + TR_2) \cdots (1 + TR_n) \right)^{1/n} - 1 \)

• Difference between Geometric mean and Arithmetic mean depends on the variability of returns, \( s \)

\[
(1 + G)^2 \approx (1 + \bar{X})^2 - s^2
\]
Adjusting Returns for Inflation

• Returns measures are not adjusted for inflation
  – Purchasing power of investment may change over time
  – Consumer Price Index (CPI) is possible measure of inflation

\[
TR_{IA} = \frac{(1 + TR)}{(1 + CPI)} - 1
\]
Measuring Risk

• Risk is the chance that the actual outcome is different than the expected outcome

• Standard Deviation measures the deviation of returns from the mean

\[ s = \left( \frac{\sum (X - \bar{X})^2}{n - 1} \right)^{1/2} \]
Risk Premiums

• Premium is additional return earned or expected for additional risk
  – Calculated for any two asset classes
• Equity risk premium is the difference between stock and risk-free returns
• Bond horizon premium is the difference between long- and short-term government securities
Risk Premiums

- Equity Risk Premium, ERP, =
  \[
  \left[ \frac{(1 + TR_{CS})}{(1 + RF)} \right] - 1
  \]

- Bond Horizon Premium, BHP, =
  \[
  \left[ \frac{(1 + TR_{GB})}{(1 + TR_{TB})} \right] - 1
  \]
The Risk-Return Record

• Since 1920, cumulative wealth indexes show stock returns dominate bond returns
  – Stock standard deviations also exceed bond standard deviations

• Annual geometric mean return for the S&P 500 is 10.0% with standard deviation of 19.4%
END