Steps to Formulate Capital Market Expectations

Problems with Producing Capital Market Forecasts

Statistical Tools for Capital Market Expectations

Gordon Growth Model

- Limitations to using economic data include time lag between collection and distribution, data are often revised, data definitions and methodologies change, and data indices are rebased over time.
- Data measurement errors and biases include transcription errors, survivorship bias, and appraisal (smoothed) data instead of actual returns. Appraisal data gives correlations and standard deviations that are biased downwards.
- Values from historical data must be adjusted as economic, political, regulatory, and technological environments change. These are regime changes and result in nonstationary data.
- Using ex post data to determine ex ante risk and return can be problematic.
- Using historical data can lead to patterns that are unlikely to occur in the future. Data mining—in which variables appear to have a relationship by change—is an example of this.
- Forecasts may not account for conditioning information. Accounting for current conditions avoids assuming economic relationships will persist over time.
- Misinterpretation of correlations versus causality. An alternative to correlation for uncovering predictive relationships is a multiple regression.
- Falling into psychological traps including anchoring, status quo, confirming evidence, overconfidence, prudence, and recallability traps.
- Model and input uncertainty.

Step 1. Determine expectations needed according to investor's tax status, allowable asset classes, and time horizon. Time horizon is particularly important.

Step 2. Look at drivers of historical performance to establish a range for future performance. The drivers can be used to forecast future performance and compare it to past results.

Step 3. Identify the valuation model used and its requirements.

Step 4. Collect the best data possible as faulty data will lead to faulty conclusions. These issues should considered in data evaluation.

- Calculation methodologies and error rates.
- Data collection techniques and data definitions.
- Investability and correction for free float.
- Turnover in index components.
- Potential biases.

Step 5. Use experience and judgment to interpret investment conditions and decide on values for required inputs.

Step 6. Formulate capital market expectations. Any assumptions and rationales should be required. Determine if what was specified in Step 1 has been provided.

Step 7. Monitor performance and use it to refine the process. If actual performance varies significantly from forecasts, the process and model should be refined.

$$\hat{R}_i = \frac{\text{Div}_0(1+g)}{P_0} + g = \frac{\text{Div}_1}{P_0} + g$$

where:

$\hat{R}_i$ = expected return on stock i

Div_t = dividend in period t

P_0 = current stock price

g = growth rate

Advantage is the theoretical accuracy of modeling based on future cash flows. Disadvantage is not accounting for current market conditions. Thus more suitable for long-term valuation.

- **Projecting historical data** is most straightforward. Historical mean return, standard deviation, and correlations are projected into the future. Arithmetic mean is used for standard deviation and for single period returns, but geometric mean is more accurate for multiple periods.
- **Shrinkage estimators** are weighted averages of historical data and other estimates which shrink influence of historical outliers. Mean return and covariance are the parameters adjusted most often. Useful for small datasets with unreliable historical estimates.
- **Time series analysis** forecasts a variable using previous values. Can be used to forecast means or variances. Stocks, futures, and foreign exchange exhibit volatility clustering in which high or low volatility is persistent across periods. That is,

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

  where σ_t^2 is current period volatility and θ is a rate of decay.
- **Multifactor models** are used to forecast returns and covariances and reduce the forecasting procedure to a common set of factors. Eliminates noise present in a sample and ensures consistent forecasts given a consistent covariance matrix.

Grinold-Kroner Cash Flow Model

Components of the Grinold-Kroner Model

Risk Premium Approach

International Capital Asset Pricing Model

- **Expected income return** is the current yield investors expect to receive.

$$\text{expected income return} = \frac{D_1}{P_0} - \Delta S$$

- **Expected nominal earnings growth** is real growth in stock price plus expected inflation.

$$\text{expected nominal earnings growth} = i + g$$

- **Repricing return** is expected change in the P/E ratio.

$$\text{expected repricing return} = \Delta\frac{P}{E}$$

- Grinold-Kroner model is the sum of these components.

$$\begin{aligned}\hat{R}_i &= E(\text{income return}) + E(\text{nominal earnings growth}) + E(\text{repricing return}) \\ &= \left(\frac{D_1}{P_0} - \Delta S\right) + (i+g) + \left(\Delta\frac{P}{E}\right)\end{aligned}$$

$$\hat{R}_j = \frac{D_1}{P_0} + i + g - \Delta S + \Delta\frac{P}{E}$$

where:

$\hat{R}_j$ = expected return on stock j (compound annual growth rate)

$\frac{D_1}{P_0}$ = dividend yield

i = expected inflation

g = real growth rate

ΔS = percentage change in shares outstanding

$\Delta\frac{P}{E}$ = percentage change in P/E ration (repricing term)

$$\hat{R}_i = R_F + \beta_i(\hat{R}_M - R_F)$$

where:

$\hat{R}_i$ = expected return on asset i

R_F = risk-free return

β_i = sensitivity of asset i returns to global market

$\hat{R}_M$ = expected return on the global investable market

Using $\beta_i = \rho_{i,M}\sigma_i/\sigma_M$, we can solve for the risk premium as

$$\text{RP}_i = \rho_{i,M}\sigma_i\frac{\hat{R}_M - R_F}{\sigma_M}$$

- Estimates a bond yield, $\hat{R}_B$, and adds an equity risk premium.
- To find $\hat{R}_B$, risk premia are added together.

$$\begin{aligned}\hat{R}_B = &\text{ real risk-free rate} + \text{inflation risk premium} + \text{default risk premium} \\ &+ \text{liquidity risk premium} + \text{maturity risk premium} + \text{tax premium}\end{aligned}$$

- Inflation premium represents loss in purchasing power over time. Can be measured by comparing inflation-indexed bonds to non-inflation-indexed bonds.
- Default risk premium compensates for non-payment. Can be measured by comparing yields on bonds with different credit risks.
- Liquidity risk premium compensates for holding illiquid bonds.
- Maturity risk premium reflects yield differences in different maturities.
- Tax premium accounts for different tax treatments.

Singer and Terhaar Analysis

Survey and Panel Methods

Cyclical and Trend Economic Growth

Characteristics of Business Cycle Phases

In the survey method, economists and analysts are polled about their expectations for the economy or capital markets.

If the group polled is fairly constant over time, this is the panel method.

Adjustment to ICAPM for illiquidity and market segmentation. Liquidity is not typically a concern for developed markets, but can be for real estate and private equity. The latter may have lock-up periods.

In segmented markets, capital doesn't flow freely across borders like in integrated markets. Frequently caused by government investment restrictions. Two assets with the same risk can have different returns because capital cannot flow to the higher return asset.

To adjust for partial market segmentation, find the ERP for a global market and a local market and take a weighted average. The weighting is the degree of integration.

- **Initial recovery**
  - Duration of a few months
  - Falling inflation and large output gap
  - Low or falling short-term interest rates
  - Bond yields bottoming out and rising stock prices
- **Early upswing**
  - Duration of a year to several years
  - Increasing growth with low inflation and output gap is narrowing
  - Rising short-term interest rates
  - Flat or rising bond yields and rising stock prices
- **Late upswing**
  - Inflation increases and output gap eliminated
  - Central bank limits growth of money supply
  - Rising bond yields and stock prices, but increased risk and volatility
- **Slowdown**
  - Duration of a few months to longer than a year
  - Inflation still strong and falling inventory levels
  - Bond yields have peaked, may be falling and yield curve may invert
  - Falling stock prices
- **Recession**
  - Duration of six months to a year
  - Inflation tops out and large declines in inventory
  - Falling short-term interest rates
  - Falling bond yields and stock prices increase in later stages

- Cyclical economic growth
  - Inventory cycle is 2–4 years.
    - Measured using inventory-to-sales ratio
    - Increases as businesses gain confidence in the economy and add to inventories.
  - Business cycle is 9–11 years with five phases.
    1. Initial recovery
    2. Early upswing
    3. Late upswing
    4. Slowdown
    5. Recession
- Trend-growth
  - GDP is usually measured in real terms.
  - Output gap is difference between a long-term trending GDP and current GDP.
  - A recession is decreases in GDP over two consecutive quarters.

Effects of Inflation on Asset Classes

Consumer and Business Spending in the Business Cycle

Taylor Rule

Effects of Monetary and Fiscal Policy on the Yield Curve

Consumer confidence increases during recovery and consumers begin to spend more. At the same time, stock prices rise. Consumers continue spending until the economy shows definite signs that it has peaked and reversed. Then they save more until the cycle starts over.

Business spending is more volatile, particularly on inventory and investments. The peak of inventory spending signals a decline.

Inflation is negative for bonds and bonds will decline in price during a expansion and rise in price during an recession.

Low inflation can be positive for equities. Equities provide an inflation hedge when inflation is moderate and when prices can be passed on to the consumer. Inflation above 3% can be bad because the central bank may restrict economic growth.

Deflation results in declining economic growth and asset prices. Also reduces value of real assets financed with debt. If leverage is used, declines in value lead to steeper declines in the equity position.

		Monetary Policy	
		Stimulative	Restrictive
Fiscal Policy	Stimulative	Yield curve is steep and economy is likely to grow	Yield curve is flat and economy is unclear
	Restrictive	Yield curve is moderately steep and economy is unclear	Yield curve is inverted and economy is likely to contract

$$r_{\text{target}} = r_{\text{neutral}} + \frac{(\text{GDP}_{\text{expected}} - \text{GDP}_{\text{trend}}) + (i_{\text{expected}} - i_{\text{target}})}{2}$$

where:

r_{target} = short-term interest rate target

r_{neutral} = neutral short-term interest rate

$\text{GDP}_{\text{expected}}$ = expected GDP growth rate

$\text{GDP}_{\text{trend}}$ = long-term GDP growth rate trend

i_{expected} = expected inflation rate

i_{target} = target inflation rate

Components of Economic Trend Growth Rate

Government Policies to Enhance Growth

Exogenous Shocks

Macroeconomic, Exchange Rate, and Interest Rate Links

- Provide infrastructure needed for growth, but interfere with the economy as little as possible.
- Have a responsible fiscal policy. Consistently high budget deficits lead to high inflation. They are also accompanied by trade deficits, which may lead to devaluation of the currency. Also, public borrowing may crowd out private borrowing.
- Have tax policies that are transparent, consistently applied, pulled from a wide base, and not overly burdensome.
- Promote competition in the marketplace to increase economic efficiency. Technological advances and openness to foreign competition to reduction of tariffs are important factors for growth.

- Changes in employment levels
  - Population growth
  - Rate of labor force participation
- Changes in productivity
  - Spending on new capital inputs
  - Total factor productivity growth

Macroeconomic links are similarities in business cycles across countries. International trade and capital flows are linked, so a recession in one country dampens exports and investment in another.

Exchange rate links are formed by adoption or pegging of one country's currency by another. Countries are not always successful in maintaining a peg, and so there is a risk premium with the weaker country having higher interest rates.

Interest rate differentials reflect differences in economic growth and monetary and fiscal policy. In theory, real interest rate differentials would not exist. Countries with high real interest rates should see their currency increase.

Exogenous shocks are unanticipated events that occur outside the normal course of an economy. These events are not built into market prices like endogenous events.

Can be caused by natural disasters, political events, or changes in government policy.

Negative shocks are more common. Often spread to other countries in a process called contagion.