

## Lecture 5: Stock Market Index Analysis

### Today's questions

- Market-level analysis:

- How do macroeconomic variables & policies affect the stock market?
- How can we apply the security valuation techniques we learned last time to valuing the stock market portfolio?
- How do we estimate the inputs to valuation models at the market level?

### The components of market analysis

- We begin exploring

- the top-down, three-step market industry company investment process with market analysis.

- The 2 components:

- 1) The macroanalysis

- of the relationship between the aggregate securities markets & the aggregate economy.

- 2) The specific microvaluation

- of the stock market employing the valuation approaches introduced last time.

### Macromarket analysis

- If the market is efficient, the stock market should reflect expectations on the economy

- Is it possible to predict future market movement using macroeconomic variables?

- Cyclical indicator approach

- Economic activity & security markets

- Money supply & the economy

- Monetary policy & stock returns

- Inflation & interest rate

- World security markets.

## The Business Cycle

- is the short-run alternation between economic downturns & economic upturns.
- A depression
  - is a very deep & prolonged downturn
- Recessions
  - are periods of economic downturns
  - when output & employment are falling
- Two consecutive quarters of negative GDP growth define a recession.
- Expansions,
  - sometimes called recoveries,
  - are periods of economic upturns when output and employment are rising.

## Cyclical Indicator approach to forecasting the economy

- This approach contends that ~~monetary~~
  - the aggregate economy expands &
  - contracts in discernible periods (business cycles)
- Cyclical indicator categories:
  - 1) Leading Indicators:
    - Economic series that usually reach peaks or troughs ~~before~~ the corresponding peaks or troughs in aggregate economy activity.
  - 2) Lagging Indicators:
    - Economic series that usually reach peak or troughs ~~after~~ the corresponding peaks or troughs in aggregate economy activity
  - 3) Coincident Indicators:
    - Economic series that usually reach peaks or troughs at the same time as the corresponding peaks or troughs in aggregate economy activity.

## Leading Economic Indicators

1. Average weekly hours, manufacturing
2. Average weekly initial claims for unemployment insurance
3. Manufacturers' new orders, consumer goods & materials
4. Index of supplier deliveries - vendor performance
5. Manufacturers' new order, nondefense capital goods
6. Building permits, new private housing units
7. Stock prices, 500 common stocks
8. Money supply, M2
9. Interest rate spread, 10-year Treasury Bonds less federal funds
10. Index of consumer expectations

## Coincident Economic Indicators

1. Employees on nonagricultural payrolls
2. Personal income less transfer payments
3. Industrial production
4. Manufacturing & trade sales

## Lagging Economic Indicators

1. Average duration of unemployment
2. Inventories to sales ratio, manufacturing & trade
3. Labor cost per unit of output, manufacturing
4. Average prime rate
5. Commercial & industrial loans
6. Consumer installment credit to personal income ratio
7. Consumer price index for services

## Economic activity & security markets

- Stock Market as a Leading Indicator
  - Stock prices reflect expectations of earnings, dividends, and interest rates.
  - Stock prices consistently turn before the economy does
  - Thus, to predict movements in stock prices
    - one must look at highly leading indicators.

## Composite series & ratio of series.

- A composite time series combines multiple economic series  
For example; the composite leading indicator index,
  - which is widely reported in the press each month
  - as an indicator of the current & future state of the economy
- There also are composite coincident & lagging indicator series
- The ratio of these composite series can also be used in the analysis
  - Ratio of coincident to lagging tend to lead the economy

## Limitations of the cyclical indicator approach.

### 1) False signals:

- This is when a series that is moving in one direction suddenly reverses &
- nullifies a prior signal. Occurs for volatile series.

### 2) Currency of the data & revisions:

- Some data series take time to be reported,
- but a bigger problem are revisions in data
- especially if the revision changes the direction implied by the original data.

### 3) Economic sectors not represented:

- Examples include

- the service sector
- import-export, and
- international series

## Surveys of sentiment & expectations.

• Consumer expectations are considered relevant

- as the economy approaches cyclical turning points

## Money supply & the economy

- Friedman & Schwartz (1963) showed:
  - Declines in the rate of growth of the money supply have preceded business contraction.
  - Increases in the rate of growth of the money supply have preceded economic expansions
- Friedman (1969) suggested:
  - A transmission mechanism through which changes in the growth rate of the money supply affect the aggregate economy
  - Fed Reserve plays the central role through open market operations.

## Money supply & stock prices

- Studies examine whether changes in the growth rate of money supply precede changes in stock prices
- Earlier researches indicated a strong positive & leading relationship between money supply changes & stock prices
- Later, others found that changes in the growth rate of the money supply consistently lagged stock returns
- (but were still positive)
- It was also found that stock prices adjust very quickly to unexpected changes in money supply growth.

## Monetary policy & stock returns

- The recent focus had been on monetary policy rather than money supply.
- Monetary policy variable
  - are significant predictors of future stock returns
  - along with dividend yield
- The single best measure of monetary policy:
  - the Federal Reserve discount rate
  - (the interest rate the Fed charges commercial banks for loans)
- In the UK, this will be the Ropo rate (or Base rate) set by the Bank of England.

## Inflation, interest rates, and security prices

- Inflation & Interest rates
  - Generally move together
    - Theory predicts 1-to-1 co-movement
    - $r = (1+R)(1+E(i))-1$
    - From the Fisher Equation.
  - Investors are not good at predicting inflation
- Inflation Rates & Bond Prices
  - Negative relationship
  - More effect on longer term bonds
- Inflation, Interest Rates & Stock Prices
  - Not direct & not consistent
  - Effect varies over time

## Analysis of world security markets

- Leading economic series
  - are available for virtually all the developed countries,
  - and the empirical relationships to the economy
  - are quite similar to those of the U.S.
- Real GDP growth
  - is typically consistent with what
  - is implied by the leading series
- Other factors include
  - The monetary environment
  - The inflation outlook

## Microvaluation analysis

- The purpose is to estimate specific values
  - for an aggregate stock market series
  - using the various valuation models
  - with market-wide data rather than a company's data.
- Valuation Techniques:
  - Discounted Cash Flows:
    - The Dividend Discount Model (DDM)
    - The Free Cash Flow to Equity Model (FCFE)
  - Relative Valuation Techniques:
    - The Earnings Multiplier Technique.

- What we are going to discuss is different from the well known measure: market capitalization
- This is the market value of all outstanding stocks in the market.

$\text{Stock Market} = \text{Current shares} \times \text{Current Stock Market Capitalization} \times \text{Outstanding Price.}$

- Summing up this value for all traded stocks on the market
  - gives the stock market capitalization
    - an idea of the size of the market
- Usually, we also look at the Market Capitalization to GDP ratio
  - which can be more meaningful.

Page 23 Market valuation using the reduced-form DDM

- the reduced-form DDM

- is also known as the Gordon Growth Model

- In the context of the market index, we can state it as follows:

$$\boxed{V = \frac{D_1}{k-g}}$$

where:

$V$  = the value of the stock market portfolio at time  $t$

$D_1$  = the expected dividend in period 1, equal to  $D_0(1+g)$ .

$k$  = the required rate of return on the stock market portfolio

$g$  = the expected long-run growth rate of earnings and dividend for the stock market portfolio

- discuss each of the components of the equation for the stock market portfolio

- dividend  $D_1$

- required rate of return  $k$ :

- Nominal risk-free rate (NIRFR)

- Equity risk premium

- dividend growth rate  $g$ :

- Return on equity (ROE)

- Retention rate (RR)

### Example

- We will follow Brown & Reilly and use mid-2011 figures for the U.S. market (S&P Industrials Index)
- The S&P Industrials is an equally weighted index of 500 industrials that come from the Global Industry Classification Standard (GICS) sector:

• Dividend  $D_1$  :  $D_1 = D_0(1+g)$

-  $D_0$ : past 52-week dividend estimate

In our example,  $D_0 = \$34.16$

• Towards  $K$ : (1) Nominal risk-free rate, NRFR

- NRFR: yield on governments bonds with maturity matching the holding period of interest:

our example:

Bond	Yield
1-year treasury bill	0.80%
10-year Treasury note	3.20%
30-year treasury bond	4.30%

• Towards  $K$ : (2) Equity risk premium

- difference between stock market returns & the NRFR
- various techniques of estimation exist (see Roilly & Brown).
- Range of typical values: 2.5% - 6%

• Towards  $K$ : (3) Putting it together

$$K = \text{NRFR} + (\text{Equity Premium})$$

Risk Premium

NRFR	0.02	0.04	0.06
0.008	0.028	0.048	0.068
0.032	0.052	0.072	0.092
0.043	0.063	0.083	0.103

• Towards  $g$ : (1) The RR

- The retention rate is

where,

$\frac{D}{E}$  = is the expected dividend payout (dividend-to-earnings) ratio

$$RR = 1 - \frac{D}{E}$$

→ The RR varies over time

- reasonable range: 45% - 70%.

- we will often use a medium estimate of 55%

• Towards g: (2) The ROE

- the return on equity can be expressed as

$$\text{ROE} = \frac{\text{Net income}}{\text{Equity}} = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}}$$

$$= (\text{Net profit margin}) \times (\text{Total asset turnover}) \times \text{leverage.}$$

- This is known as the DuPont Model/Equation/Identity, as it was first adopted by the DuPont Corporation in the 1920s.

• Towards g: (2) The ROE

- In sum, the ROE for U.S. equity has varied between 11% & 17%.  
• The current estimate would be around 13%.

• Towards g (3) Putting it together

$$g = RR \times ROE$$

example:

assuming  $RR = 0.55$  &  $ROE = 0.13$

$$\therefore g = 0.55 \times 0.13 = 0.0715 = 7.1\%$$

Combining all elements

- Having estimated  $D_0$ ,  $K$ , and  $g$  we simply compute

$$V = \frac{D_1}{K-g} = \frac{D_0(1+g)}{K-g}$$

In our example:

$$\rightarrow D_0 = \$34.16 \quad \rightarrow K: \text{range of values; we. } 0.028, 0.072, 0.103$$

$$\rightarrow g = 0.07$$

$\rightarrow$  since the model requires  $K > g$ , can only use two of these values; implied values: \$18,275 & \$1,108.

$\rightarrow$  so, estimates are very sensitive to parameter choices

$\rightarrow$  to justify current market price of \$1,770, would need  $K$  of approx. 0.09

## Market valuation using FCFE

### Definition of FCFE

- The Free cash flow to Equity (FCFE)

$FCFE = \text{Net income} + \text{Depreciation} - \Delta \text{in non-cash working capital}$   
-  $\text{capital expenditures} - \text{Principal debt repayments} +$   
 $\text{New debt issues.}$

- The model

$$V = \sum_{t=1}^{\infty} \frac{FCFE_t}{(1+k)^t}$$

- Assuming constant growth

$$V = \frac{FCFE_1}{k-g} = \frac{FCFE_0(1+g)}{k-g}$$

### Example:

Returning to the 2011 S&P Industrials example:

- 2010 FCFE estimated to be \$ 72.00

- using  $g=0.07$  and  $k=0.072$

yields  $V = \frac{72(1+0.07)}{(0.072-0.07)} = \$38,500$

- using  $g=0.07$  and  $k=0.103$

yields  $V = \frac{FCFE_0(1+g)}{k-g} = \frac{72 \times (1+0.07)}{0.103-0.07} = \$2,335$

- using  $g=0.06$  &  $k=0.103$

yields  $V = \frac{FCFE_0(1+g)}{k-g} = \frac{72 \times (1+0.06)}{0.103-0.06} = \$1,758$

- Once again, valuations are very sensitive to estimates

- The result differ from those implied by the DDM.

## Relative Valuation: Price/Earnings

- The rationale

- the current price equals the current value,  $P = V$

- the ratios of both to earnings are therefore also equal,

$$\frac{P}{E} = \frac{V}{E}$$

so, trivially,  $V = (\frac{P}{E})^* E$

- to estimate value using the P/E approach, we therefore need two components:

- Estimate of next-period earnings per share
- Estimate of next-period P/E ratio

- In the formulas above:

- $P$  is the current price

- there are a number of choices for  $E$ :

- theoretically, it is more appropriate to use the forward value  $E_1$  (the expected next-year earnings)

- In practice, the trailing value  $E_0$  (the last year's actual earnings) are often used, as they are readily available.

page 43

- Relative valuation: Price/Earnings

- Estimating expected earnings per share

- Obtain a forecast of future Gross Domestic Product

- Estimate future Sales per share as predicted values

- from a regression at forecast GDP

- Estimate Aggregate Operating Profit Margin

- Use historical series

- Estimate change due to changes in

- utilization      • unit labor costs

- rate of inflation      and      • foreign competition.

- Multiply Sales

Forecast of EBIT = Sales forecast  $\times$  Profit Margin forecast

EBIT (earnings before interest and tax).

- Estimate Interest Expense + Tax Rate

~~EBITDA~~

$$\text{Estimate of net earnings per share} = \text{EBIT} - \text{Interest} - \text{Tax}$$

### • Estimating P/E ratio (Earnings multiplier)

- Assuming the expected price equals the value,
  - we can replace  $V$  by  $P$  and
  - divide both sides by  $E_I$  to obtain.

$$\frac{P}{E_I} = \frac{D_I/E_I}{k-g}$$

- we thus have the earnings multiplier as a function of
  - the dividend payout ratio,
  - the required rate of return, and
  - the sustainable growth rate.
- Each term can be estimated as in the basic DDM approach

### Other relative valuation ratios

- The price-to-book-value ratio ( $P/BV$ )
- The price-to-cash-flow ratio ( $P/CF$ )
- The price-to-sales ratio ( $P/S$ )

### Microvaluation of world markets

- 3 Important Factors:

- The basic valuation model & concepts apply globally
- while the models & concepts are the same,
  - the input values can & will vary dramatically across countries
- The valuation of non-domestic (particularly emerging) markets
  - will almost certainly be more onerous
  - because of several additional variables or constraints
  - that must be considered such as
    - exchange rate risk & country or
    - political risk.