

# Investments

## Session 7. Security Analysis

EPFL - Master in Financial Engineering  
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Spring 2010

# Outline

## I. Macroeconomic and Industry Analysis

- The Global and the Domestic Economy
- Demand and Supply Shocks
- Federal Government Policy
- Business Cycles
- Industry Analysis

## II. Equity Valuation Models

- The Present Value Model
- A Simple Two-Period Model
- The Gordon Model
- Stock Prices and Investment Opportunities
- The Price-Earnings Ratio

## III. Financial Statement Analysis

- The Ins and Outs of Cash Flow

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# The Global Economy

- The international economy might affect a firm's export prospects, the price competition it faces from competitors, or the profits it makes on investments abroad.
- National economic environment can be a crucial determinant of industry performance.
- The global environment presents political risks of far greater magnitude than are typically encountered in U.S.-based investments.
- Other political issues important to economic growth:
  - ▶ protectionism and trade policy
  - ▶ the free flow of capital
  - ▶ the status of a nation's work force.

# The Domestic Macroeconomy

- The first step in forecasting the performance of the broad market is to assess the status of the economy as a whole.
- The ability to forecast the macroeconomy *better* than your competitors can translate into spectacular investment performance.
- Some of the key economic statistics used to describe the state of the macroeconomy
  - ▶ *Gross Domestic Product (GDP)*: measure of the economy's total production of goods and services. Related measure: *Industrial Production* (focused more on the manufacturing side of the economy).
  - ▶ *Unemployment Rate*: the percentage of the total labor force yet to find work. Related measure: *Capacity Utilization Rate* (ratio of actual output from factories to potential output).

## The Domestic Macroeconomy (cont.)

- ▶ **Inflation**: the rate at which the general level of prices is rising. High rates of inflation often are associated with “overheated” economies. There is a trade-off between Inflation and unemployment. Related measure: **The Output Gap** (the difference between the economy’s actual output and the level of production it can achieve with existing labour, capital, and technology without putting sustained upward pressure on inflation).
- ▶ **Interest Rates**: real interest rates are key determinants of business investment opportunities.
- ▶ **Budget Deficit**: (the difference between government spending and revenues.
- ▶ **Sentiment**: consumers’ and producers’ optimism or pessimism concerning the economy.

## Demand and Supply Shocks

- A demand shock is an event that affects the demand for goods and services in the economy. Demand shocks are usually characterized by aggregate output moving in the same direction as interest rates and inflation.
- A supply shock is an event that influences production capacity and costs. Supply shocks are usually characterized by aggregate output moving in the opposite direction of inflation and interest rates.
- Typically, you want to identify the industries that will be most helped or hurt in any macroeconomic scenario you envision. Examples:
  - ▶ if you forecast a tightening of the money supply, you might want to avoid industries such as automobile producers that might be hurt by the likely increase in interest rates, and favor industries with below-average sensitivity to macroeconomic conditions.
  - ▶ if you have an optimistic view of the business cycle, you might favor investments with a greater sensitivity to the business cycle.

# Fiscal Policy

- The government has two broad classes of macroeconomic tools: those that affect the demand for goods and services and those that affect the supply.
- *Fiscal policy* is a demand-oriented tool. It refers to the government's spending and tax actions.
- Decreases in government spending directly deflate the demand for goods and services. Similarly, increases in tax rates immediately siphon income from consumers and result in fairly rapid decreases in consumption.
- Fiscal policy has the most immediate impact on the economy. However, it requires enormous amounts of compromise between the executive and legislative branches. Thus, the formulation and implementation of fiscal policy is usually painfully slow and involved.



# Monetary Policy

- *Monetary policy* refers to the manipulation of the money supply to affect the macroeconomy and is the other main leg of demand-side policy.
- It works largely through its impact on interest rates. Increases in the money supply lower short-term interest rates, ultimately encouraging investment and consumption demand.
- Monetary policy is easily formulated and implemented but has a less direct impact than the fiscal policy.
- The most widely used tool is the open market operation, in which the Fed buys or sells bonds for its own account. When the Fed buys securities, it simply “writes a check”, thereby increasing the money supply.
- Open market operations occur daily, allowing the Fed to fine-tune its monetary policy.

## Supply-Side Policies

- *Supply-side policies* treat the issue of the productive capacity of the economy.
- The goal is to create an environment in which workers and owners of capital have the maximum incentive and ability to produce and develop goods.
- Whereas demand-siders look at the effect of taxes on consumption demand, supply-siders focus on incentives and marginal tax rates.
- In some situations, reductions in tax rates can lead to increases in tax revenues because the lower tax rates will cause the economy and the revenue tax base to grow by more than the tax rate is reduced.

# Business Cycles

- Economies repeatedly seem to pass through good and bad times. This recurring pattern of recession and recovery is called the *business cycle*.
- The transition points across cycles are called peaks and troughs. A *peak* is the transition from the end of an expansion to the start of a contraction. A *trough* occurs at the bottom of a recession just as the economy enters a recovery.
- One determinant of the broad asset allocation decision of many analysts is a forecast of whether the macroeconomy is improving or deteriorating.
- As the economy passes through different stages of the business cycle, the relative performance of different industry groups might be expected to vary:

## Business Cycles (cont.)

- ▶ *cyclical industries* have above-average sensitivity to the state of the economy. Cyclical industries outperform other industries during recoveries. Examples: producers of durable goods, producers of capital goods.
- ▶ *defensive industries* have little sensitivity to the business cycle. These industries will outperform others when the economy enters a recession. Examples: food producers and processors, pharmaceutical firms, and public utilities.
- The cyclical/defensive classification corresponds well to the notion of systematic or market risk introduced in our discussion of portfolio theory.
- Unfortunately, it is not so easy to determine when the economy is passing through a peak or a trough. For this, we use economic indicators, released to the public on a regular *“economic calendar”*.

## Business Cycles (cont.)

- ▶ leading indicators
  - ★ manufacturer's new orders
  - ★ stock prices
  - ★ money supply
  - ★ index of consumer expectations
  - ★ new orders for nondefense capital goods
- ▶ coincident indicators
  - ★ industrial production
  - ★ employees on nonagricultural payrolls
- ▶ lagging indicators
  - ★ average duration of unemployment
  - ★ ratio of trade inventories to sales
  - ★ change in index of labor cost per unit of output

## Sensitivity to the Business Cycle

- Once the analyst forecasts the state of the macroeconomy, it is necessary to determine the implication of that forecast for specific industries.
- Three factors will determine the sensitivity of a firm's earnings to the business cycle:
  - 1 **Sensitivity of sales.** Example: necessities will show little sensitivity to business conditions (food, drugs, medical services). Other examples: tobacco industry, movies. On the opposite side, machine tools, steel, autos, transportation are highly sensitive to the state of the economy.
  - 2 **Operating leverage** (division between fixed and variable costs). Firms with greater amounts of variable as opposed to fixed costs will be less sensitive to business conditions. Profits from firms with high fixed costs will swing more widely with sales.
  - 3 **Financial leverage.** Interest payments on debt must be paid regardless of sales. They are fixed costs that also increase the sensitivity of profits to business conditions.

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# The Present Value Model

- To determine the price of a treasury bond, we calculate the present value of future cash flows.
- In principle, one can apply the same approach to stock valuation, thinking of the future dividend as a stream of coupon payments. Additional issues need to be addressed:
  - ▶ Unlike the coupon payments, the dividend payouts are uncertain. What are the appropriate discount rates?
  - ▶ Dividends are known to be sticky, and some firms do not even pay dividends. Where do we get information about the growth component of a firm?
  - ▶ Unlike fixed-income securities, stocks do not have maturity dates. How do we take care of dividend payments that are postponed into the infinite future?



## A Simple Two-Period Model

- By definition

$$\tilde{R}_1 = \frac{\tilde{P}_1 + \tilde{D}_1 - P_0}{P_0} \quad (1)$$

- Letting  $I_0$  be the collection of public information available at time 0, it must be

$$E[\tilde{R}_1/I_0] = \frac{E[\tilde{P}_1/I_0] + E[\tilde{D}_1/I_0] - P_0}{P_0} \quad (2)$$

where we take our expectation conditioning on the information available in  $I_0$ .

- Define the *intrinsic value* of the firm

$$V_0 = \frac{E[\tilde{P}_1/I_0] + E[\tilde{D}_1/I_0]}{1 + E[\tilde{R}_1/I_0]} \quad (3)$$

## A Simple Two-Period Model (cont.)

- If the market is efficient, accurately reflecting  $E[\tilde{P}_1/I_0]$ ,  $E[\tilde{D}_1/I_0]$ , and  $E[\tilde{R}_1/I_0]$ , then the market price must agree with the intrinsic value of the firm.
- We can move into the future by applying the two-period recursively:

$$V_0 = \frac{E[\tilde{D}_1]}{1 + E[\tilde{R}_1]} + \frac{E[\tilde{D}_2]}{(1 + E[\tilde{R}_1])(1 + E[\tilde{R}_2])} + \dots$$

$$\dots + \frac{E[\tilde{D}_n]}{\prod_{i=1}^n (1 + E[\tilde{R}_i])} + \dots \quad (4)$$

where all expectations are taken with respect to the information available at time 0,  $I_0$ .

# The Gordon Model

- Using all of the information available at time 0, the market participants agree that:

- the dividend growth is constant

$$E[\tilde{D}_n] = D_0(1+g)^n \quad (5)$$

- the expected return is constant

$$E[\tilde{R}_n] = k \quad (6)$$

where  $g \geq 0$  and  $k \geq 0$ .

- This implies that

$$V_0 = D_0 \sum_{n=1}^{\infty} \left( \frac{1+g}{1+k} \right)^n \quad (7)$$

## The Gordon Model (cont.)

- Suppose that the expected rate of return is always higher than the expected growth rate (if dividends were expected to grow forever at a rate faster than  $k$ , the value of the stock would be infinite - unsustainable):

$$k > g \quad (8)$$

- Letting  $x = \frac{1+g}{1+k} < 1$ , we have

$$\begin{aligned} V_0 &= D_0 (x + x^2 + x^3 + \dots) \\ &= D_0 x (1 + x + x^2 + \dots) \\ &= D_0 x \frac{1}{1-x} \end{aligned} \quad (9)$$

- Now plugging  $x = \frac{1+g}{1+k}$  back in:

$$V_0 = D_0 \frac{1+g}{1+k} \frac{1}{1 - \frac{1+g}{1+k}} = D_0 \frac{1+g}{k-g} \quad (10)$$

## Example

- Consider two companies:
  - 1 X: 100% dividend payout ratio. It provides a stream of dividends  $E[D_n] = \$5$ , maintaining a zero dividend growth  $g = 0$  (a “Cash Cow” firm).
  - 2 Y: 40% dividend payout ratio. In any given year, it plows back  $(1 - 40\%)$  of its earnings to a project generating an expected return of  $K$  per year. That is

$$\begin{aligned}E[D_1] &= \$5 \cdot 40\% \\E[D_2] &= (\$5 + \$5 \cdot (1 - 40\%) \cdot K) \cdot 40\% \quad (11)\end{aligned}$$

maintaining a dividend growth rate of  $g = (1 - 40\%) K$  (a “Growth Prospects” firm):

- The share of Y could rise if  $K$  is larger than the market capitalization rate *[More in class]*

# Price-Earnings Ratio

- The *P/E ratio* (price-to-earnings ratio) of a stock (also called its "P/E", "PER", "earnings multiple," or simply "multiple") is a measure of the price paid for a share relative to the annual net income or profit earned by the firm per share.
- In our previous example, X had a P/E multiple of 8, whereas Y had a P/E larger than 8.
- This observation suggests the P/E ratio might serve as a useful indicator of expectations of growth opportunities.
- *[Diagrams and discussion in class]*

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# The Major Financial Statements

- The *income statement* is a summary of the profitability of the firm over a period of time.
- It presents revenues generated during the operating period, the expenses incurred during that same period, and the company's net earnings or profits.
- The *balance sheet* provides a “snapshot” of the financial condition of the firm at a particular moment.
- It is a list of the firm's assets and liabilities at that moment.
- The *statement of cash flows* details the cash flow generated by the the firm's operations, investments, and financial activities. It is thus organized into three parts:
  - ① Cash from operating activities, can signal when a company is having trouble selling inventory or collecting cash it is owed.



## The Major Financial Statements (cont.)

- ② Cash from investing activities, gives information on how much the company earned in the stock market, or whether it's cutting back on capital expenditures.
  - ③ Cash from financing activities, to see if a company receives cash infusions from outsiders, such as banks or shareholders.
- Ideally, a company's operations should generate excess cash, while its investing and financing sections show negative cash balances. Why? A self-sustaining business can pay down debt and finance new investments internally.
  - Negative cash flow from operations isn't always bad. Because of the high costs of building a business, it's perfectly normal - even desirable - for fast-growing companies to consume more cash than they generate. Typically, such companies tide themselves over with bank loans or equity sales. In other words, they run a surplus in "financing" cash flows.

## The Major Financial Statements (cont.)

- Some examples:
  - ▶ The cash-flow statement can shine a light on earnings quality. The cash-flow statement reflects how much cash is actually collected. So if earnings soar, but cash collections stall, be wary: Future earnings could be at risk of being dragged down by bad debt.
  - ▶ When inventories grow faster than sales, it might mean demand is softening. Since buying inventory requires cash, an increase here causes cash to fall.
  - ▶ Conversely, when liabilities such as accounts payable increase, so do a company's cash balances. By delaying payments to creditors, management frees up cash.
- General rule: “if operating cash doesn't pick up, bail out”. Example: A debt-ridden firm is raising cash the only way it can - by selling assets. When investing cash flow is positive because of asset sales, that's usually a sick company.