Lecture 13

Material for lecture 13 will use the following transparencies.
Popular Views of the Stock Market

• Prices reflect `fundamentals’
  (people make money by figuring out `true’ relationship between company data and prices)

• Prices reflect `crowd psychology’
  (people make money by predicting what others will do)
Famous `Bubbles`

- Tulip Mania
- South Sea Bubble
- The 1920s in the US
- The `tronics´ boom (late 50s US)
- The dot.com boom ??
Why Fundamentals Might Matter

Consider a world of certainty.

\[ i = \text{constant riskless rate} \]
\[ d_t = \text{dividend payment at } t \]
\[ (1+g) = \frac{d_t}{d_{t-1}} = \text{growth rate of dividends} \]

Stock Price \( P \) follows from Present Value of Annuity Formula:

\[
P = \frac{d_1}{(1+i)} + \frac{d_2}{(1+i)^2} + \frac{d_3}{(1+i)^3} + \ldots
\]

\[
= \frac{(1+g)d_0}{(1+i)} + \frac{(1+g)^2 d_0}{(1+i)^2} + \frac{(1+g)^3 d_0}{(1+i)^3} + \ldots
\]

\[
= \frac{d_0}{1+i-g} + \frac{d_0}{(1+i-g)^2} + \frac{d_0}{(1+i-g)^3} + \ldots
\]
Why Fundamentals might matter (ctd.)

Using present value formula

\[ P = \frac{d_0}{i-g} \]

So price-dividend ratio depends on `growth opportunities' of firm!

Facts:
- price/ earnings or price/ dividend ratios are high in industries with high growth expectations.
- Can we explain last 30 years with promise of `third industrial revolution'?
Expectation Formation

- Up to 1960s: Adaptive Expectations.
  (people interpolate from past data)

- Modern View: Rational Expectations.

Why the change in economists viewpoint: stagflation of the 70s.
Theory of Rational Expectations

Rational expectation (RE) = expectation that is optimal forecast (best prediction of future) using all available information:

\[ X^e = X^f \]

Think of forecast from `best possible’ statistical model’

2 reasons expectation may not be rational:

1. Not best prediction
2. Not use available information

Rational expectation, although optimal prediction, may not be accurate (RE is not `perfect foresight’)

Rational expectations is an attractive assumption because
- it is costly not to have optimal forecast
- people cannot be fooled systematically

Key Implications:
1. A change in the way a variable moves leads to a change in the way expectations are formed
2. Forecast errors on average = 0 and are not predictable.

Direct Evidence on Expectation Formation
- Analyst inflation forecast biased upwards
- Foreigns analysts’ stock return forecasts biased down
Efficient Markets Theory

Returns and Expected Returns

\[ \text{RET}_{t+1} = \frac{P_{t+1} - P_t + D_{t+1}}{P_t} \]

\[ \text{RET}_{e_{t+1}} = \text{people's expectation} \]

`Optimal Forecast` RET\(_{of_{t+1}}\) is conditional expectation under `best possible statistical model`:

\[ \text{RET}_{of_{t+1}} = \text{E}_t \text{ RET}_{t+1} = \frac{\text{E}_t P_{t+1} - P_t + \text{E}_t D_{t+1}}{P_t} \]
Let $\text{RET}^*$ denote equilibrium expected return, determined by demand and supply for stocks.

If people expect $\text{RET}^*$, they are willing to hold outstanding supply.

So market equilibrium requires

$$\text{RET}^e = \text{RET}^*$$

At the same time, Rational Expectations implies:

$$\text{RET}^e = \text{RET}^f$$

Efficient Markets Theory puts both together:

$$\text{RET}^f = \text{RET}^*$$

$$\frac{E_t P_{t+1} - P_t + E_t D_{t+1}}{P_t} = \text{RET}^*$$
Is this saying nothing ???

What does this equation \( \text{RET}_f = \text{RET}^* \) help us understand, if \( \text{RET}^* \) is taken as given ?

Key Insight: the equilibrium price is not based on systematically biased expectations

So can’t make money (easily) by `outguessing the market’
Price Adjustment that justifies EM

If \( \text{RET}_f > \text{RET}^* \Rightarrow P_t \uparrow, \text{RET}_f \downarrow \)
If \( \text{RET}_f < \text{RET}^* \Rightarrow P_t \downarrow, \text{RET}_f \uparrow \)

until \( \text{RET}_f = \text{RET}^* \)

• Prices adjust until all unexploited profit opportunities eliminated
• Adjustment works even if there are uninformed, irrational participants in market
Efficient markets does not necessarily rule out bubbles

Whether bubbles or fundamentals are more important, nobody can make money from public information

Economists tend to think that bubbles do not have first order effects, though

Often EM is taken to mean that prices reflect optimal forecast of ‘fundamental value’ (discounted future earnings, perhaps plus ‘risk premium’) of stock
Evidence on Efficient Markets Theory

Favorable Evidence

1. Investment analysts and mutual Funds don't beat the market

2. Stock prices reflect publicly available info: anticipated announcements don't affect stock price (but: insider trading !)

3. Stock prices close to random walk
   If predictions of price changes big, \( \text{RET}^f > \text{RET}^* \) \( \Rightarrow \) predictions of price changes small

4. Technical analysis does not outperform market
Unfavorable Evidence (``anomalies'')

1. Firm specific effects
   (small-firm effect, IPO underperformance)
2. Seasonal Effects (e.g. January)
3. Announcement Effects
   (overreaction)
4. ‘Feel Good’ Effects (Daylight Savings Time, weather in NY, holiday weekends)
5. Predictability
   (i) Mean Reversion
      (prediction using price/earnings ratios works, but only at long horizons; buying stocks that have done badly for a long time beats the market)
   (ii) Momentum
      (buying stocks that have done well for a short time beats the market, but profits rather small)
Verdict on the EM Theory

- until 80s, widely accepted in theory and practice (index funds)
- anomalies have shaken it, but

  (i) returns from anomalies tend to decrease once they are publicized

  (ii) accounting for risk preferences can explain some anomalies (e.g. small firm effect, predictability). So equilibrium determination part changes, but rational expectations part does not (see CAPM in Lec 12).

  (iii) other facts like IPO underperformance tougher for rational expectations

  ➞ many open questions remain
Implications for Investing

1. Published reports of financial analysts not very valuable
2. Should be skeptical of hot tips
3. Stock prices may fall on good news

4. Prescription for Investor
   1. Shouldn't try to outguess market
   2. Therefore, buy and hold
   3. Diversify with index funds;

Even given anomalies, passive investing is better, but certain `styles’ (e.g. holding small firms) might beat market