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News, Present Values, and the Stock Market

The Present Value Model

We assume for now Rational Expectations. Hence the expectations operator refers to the conditional mathematical expectations operator. In one-period:

$$P_t = \frac{D_{t+1}}{1+k_e} + \frac{E_t P_{t+1}}{1+k_e} \qquad (1)$$

Where k_e is the required return on equity, $E_t(Z_{t+1}) = E(Z \mid \text{information available at time t+1})$. Assume at time t, that D_t is known.

Then the **Generalized Dividend Valuation Model** is given by

$$P_t = \frac{D_{t+1}}{1+k_e} + \frac{E_t D_{t+2}}{(1+k_e)^2} + ... + \frac{E_t D_{t+n}}{(1+k_e)^n} + \frac{E_t P_{t+n}}{(1+k_e)^n} \qquad (2)$$

Note that this expression (2) implies, under certain conditions:

$$P_t = \frac{D_{t+1}}{1+k_e} + \frac{E_t D_{t+2}}{(1+k_e)^2} + \frac{E_t D_{t+3}}{(1+k_e)^3} + ... + \frac{E_t D_{t+\infty}}{(1+k_e)^\infty} = \sum_{n=1}^{\infty} \frac{E_t D_{t+n}}{(1+k_e)^n} \qquad (3)$$

Equation (2) rules out "bubbles". The Gordon Growth Model assumes that dividends are expected to grow deterministically at rate g, such that $D_{t+n} = (1+g)^n \times D_t$

$$P_t = \frac{D_t \times (1+g)^1}{(1+k_e)^1} + \frac{D_t \times (1+g)^2}{(1+k_e)^2} + ... + \frac{D_t \times (1+g)^\infty}{(1+k_e)^\infty} \qquad (4)$$

$$P_t = D_t \times \left[\frac{(1+g)^1}{(1+k_e)^1} + \frac{(1+g)^2}{(1+k_e)^2} + ... + \frac{(1+g)^\infty}{(1+k_e)^\infty} \right] = \frac{D_t}{(k_e - g)} \qquad (5)$$

In general, D will not grow in a smooth deterministic fashion, nor will k_e be constant.

"News" in the Context of the Present Value Model

By analogy to (1), price of an asset in period t+1 is then given by:

$$P_{t+1} = \frac{D_{t+2}}{1+k_e} + \frac{E_{t+1} P_{t+2}}{1+k_e} \qquad (1')$$

$$E_t P_{t+1} = \frac{E_t\, D_{t+2}}{1+k_e} + \frac{E_t (E_{t+1} P_{t+2})}{1+k_e} = \frac{E_t\, D_{t+2}}{1+k_e} + \frac{E_t P_{t+2}}{1+k_e} \qquad (1'')$$

The last term after the second equal sign in (1") obtains by the "Law of Iterated Expectations", *viz.*,

$$E_t (E_{t+1}(Z_{t+3})) = E_t Z_{t+3}$$

Now decompose the change in the price of the asset:

$$P_{t+1} - P_t \equiv (E_t P_{t+1} - P_t) + [(P_{t+1} - E_t P_{t+1})] \qquad \text{(i)}$$

The first term is the expected portion of the price change. The second term in the brackets is the unexpected portion. This second portion can be further broken up.

$$P_{t+1} - P_t = (E_t P_{t+1} - P_t) + \left[\frac{D_{t+2} - E_t D_{t+2}}{(1+k_e)} + \frac{E_{t+1} P_{t+2} - E_t P_{t+2}}{(1+k_e)} \right] \qquad \text{(ii)}$$

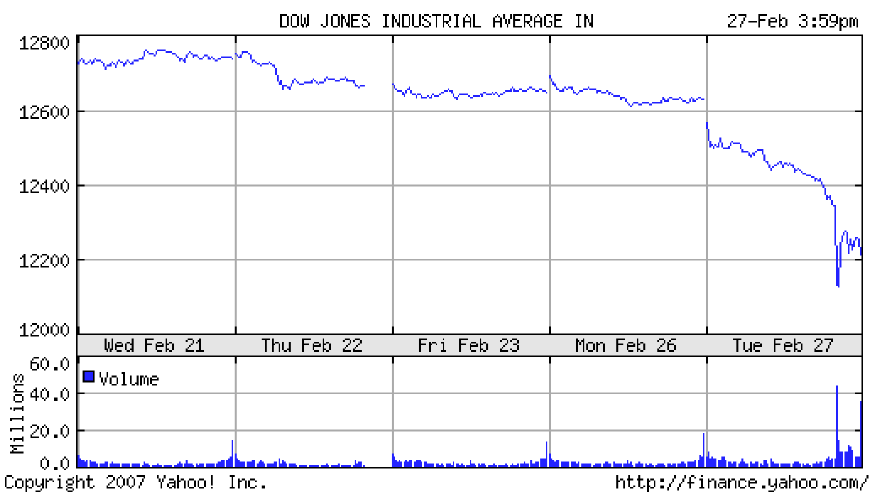
"News" includes the dividends announced for period t+2. It is unforecastable. This news may also affect people's expectations regarding *D* in the future, and hence *P* in the future (which in turn affects expectations of *P* in period t+2). Hence, new information directly results in a new price, and revisions in expectations. Notice the second term in the square bracket is

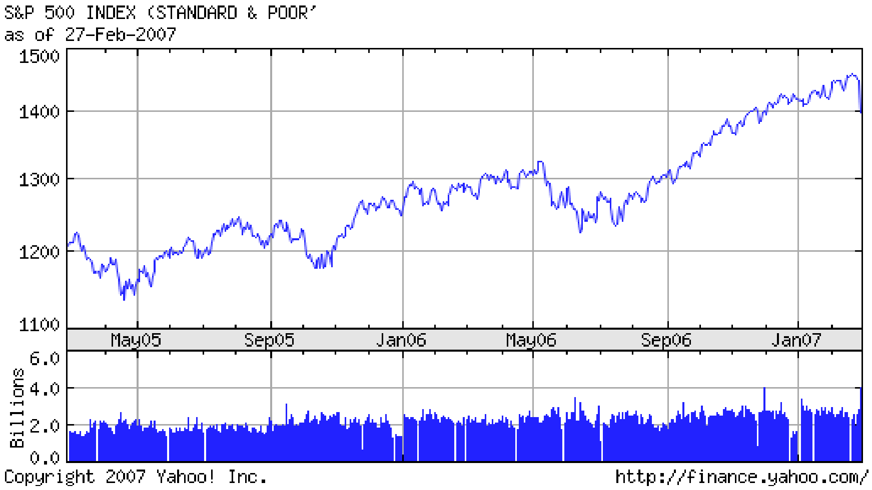
$$\frac{E_{t+1} P_{t+2} - E_t P_{t+2}}{(1+k_e)}$$

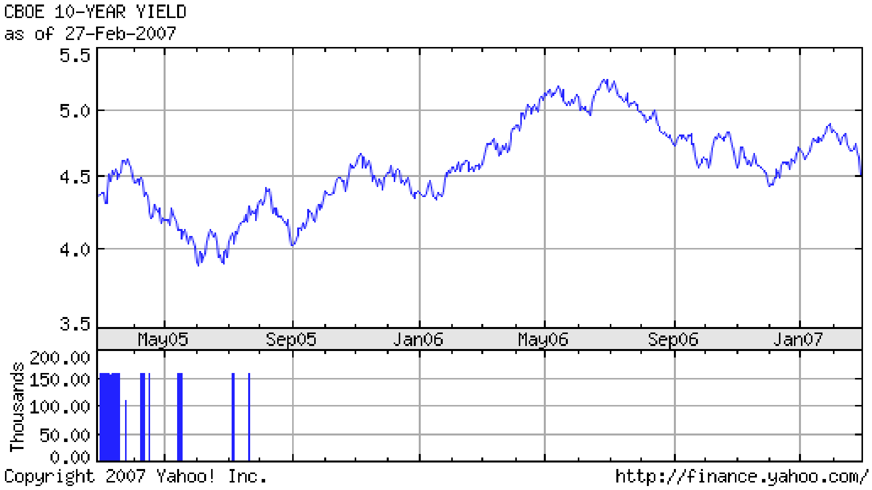
which is the change in the expectations regarding the asset price in period t+2, based upon what the market knew in period t+1 versus what it knew in period t.

Note that other "news" that doesn't affect *D* in period t+2 could still affect expected asset prices in the future, and hence the asset price today.

An example: The stock market







What equation (3) says is that the price will evolve as expectations of dividends into the future change over time.

$$P_t = \frac{D_{t+1}}{1+k_e} + \frac{E_t D_{t+2}}{(1+k_e)^2} + \frac{E_t D_{t+3}}{(1+k_e)^3} + \ldots + \frac{E_t D_{t+\infty}}{(1+k_e)^\infty} = \sum_{n=1}^{\infty} \frac{E_t D_{t+n}}{(1+k_e)^n} \qquad (3)$$

Those dividend streams depend in part upon the earnings that firms are expected to earn in the future. As the economy looks more likely to slow down, expectations of earnings (and hence dividends) are likely to be revised downward.

In addition, there is no reason the required return on equity has to remain constant. If it varies over time, then (3) becomes:

$$P_t = \frac{D_{t+1}}{1+k_{e,t}} + \frac{E_t D_{t+2}}{(1+k_{e,t})(1+k_{e,t+1})} + \frac{E_t D_{t+3}}{(1+k_{e,t})(1+k_{e,t+1})(1+k_{e,t+2})} + \ldots + \frac{E_t D_{t+\infty}}{(1+k_{e,t})\ldots(1+k_{e,t+\infty-1})} \qquad (3')$$

To the extent that the required return varies with the interest rate (say on the 3 month Treasury) and risk aversion, an additional source of variation is introduced into the stock price.