Long-run theory: Prices flexible and economy is always at potential

$$Y = C(Y, r) + I(r) + G$$

$$Y = \overline{Y}$$

where $\overline{Y}$ denotes potential. If $C$ falls, $S$ rises and $r_n$ falls, causing $I$ to rise.

Changes in natural interest rate ensure we are always at potential.

Keynesian theory is different: prices are sticky, so a rise in the savings rate $s$ leads to a fall in production $Y$, so savings stock, $S = sY$ will not necessarily rise. Here a rise in the savings rate leads to a recession and an interest rate that is "too high."

So far, have developed a simple model illustrating forces impinging on all interest rates at any point in time. But have only derived the real rate, not nominal one.

Inflation premium. Recall the quantity theory

$$\pi = g_m - g_y$$

Equilibrium *nominal* interest rate under certainty

$$i = r_n + \pi$$

High money growth *raises* nominal rates. Fisher effect

Natural nominal rate

In practice, there is uncertainty re inflation. So the Fisher equation is

$$i = r_n + \pi^e$$

where $\pi^e$ denotes expected inflation

But with risk aversion, we would also add a risk premium $\rho$

$$i = r_n + \pi^e + \rho$$

Observe that a high $\rho$ would raise real rates (in expectation.)

Long-run bonds

Expectations Theory of the Term Structure

Option 1. Invest today in a one-year bond, and next year use proceeds to invest in another one-year bond:

$$(1 + i_1)(1 + Ei_2)$$

Option 2: invest today in a 2 year bond:

$$(1 + i_{2l})(1 + i_{2l})$$

By arbitrage

$$(1 + i_1)(1 + Ei_2) = (1 + i_{2l})(1 + i_{2l})$$

Taking logs and noting $\log(1 + x) \approx x$:

$$i_{2l} = \frac{i_1 + Ei_2}{2}$$

More generally

$$i_{nl} = \frac{\sum_{z=1}^{z=n} \mathbf{E} i_z}{n}$$

$$i_{nl} = \frac{\sum_{z=1}^{z=n} \mathbf{E}(r_t + \pi_t)}{n} + \rho.$$

$\rho$ is a risk premium; sometimes called the term premium or liquidity premium.

Important insight: expectations of future affect long-run rates *today.*

Budget deficits/Future money growth/Debt monetization (risk premium)

But not only theory. Market Segmentation Hypothesis: This says that markets for bonds of different maturities are segmented. In this case, bond yields of different maturities are not necessarily related, as in previous theory

For instance, Asian governments purchase long-bonds and are not concerned with profits (other motives such as currency intervention). In this case, long yields could be low, and would not necessarily reflect expectations of low short rates in the future. A "flight to quality" to long bonds would have a similar effect. Generally, this theory emphasizes that bonds might have valuable characteristics—such as usefulness as collateral—aside from monetary ones.

In general, economists use former theory and *not* this one. But both theories confer useful insights.

Bonds prices and yields: inverse relationship.

E.g., buy for 80, get back 100. 25% return.

But if interest rates rise to 50%, bond only worth 66 now. Make a capital loss.

In practice this is a big issue if you don't hold bond to maturity

Default risk another issue

For sovereign bonds, Debt/GDP ratio is key to fiscal sustainability

Ratio crudely indicates ability to pay: values around 1 indicate problems with impending fiscal burden