ECO462 Practice

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November 3, 2023

Problem 1.

1. *What are the units of inflation rate, real interest rate, and nominal interest rate?*
2. *Do the units depend on the holding period of a zero coupon bond?*

1. Real interest rate is a scalar quantity. We can check this by noting that the formula for the value of a bond is

$$B(t,h) = B_0 \exp\left[-hr^*(t,h)\right].$$

For this formula to make sense, we must have that $r^*(t,h)$ is a scalar quantity, just by expanding out the power series for exp. Note that we have that

$$(1+i) = (1+r^*)(1+n).$$

Therefore we must have that the units of interest rate and nominal intest rate must be the same. Now note that inflation measures the rate of change in price relative to a base year, so if we measure the inflation rate from base year N, to year $N+h$, the inflation rate i will be the ratio of $N\$$ to $N+h\$$, i.e $[i] = [n] = \frac{\$_{N+h}}{\$_N}$

Problem 2. *Can we trade in continuous time?*

No we can not. Our computers work in discrete time so we are limited to trading in discrete time. However, we assume that we operate in continuous time for computations, since if we have a real interest rate r compounded over period T, we can compound $r/2$ over 2 periods of $T/2$ and recieve a greater payoff. Taking the limit gives us the exponential.

Problem 3. *Can we buy or sell an index such as the S&P 500?*

No we can not. An index isnt an asset, it is just a measure of the markets performance, by aggregating certain stocks, with the intention to capture general market movements. One can simulate purchasing an index fund by creating a portfolio with the stocks and weightings used to calculate the index. ETF's function like this. A company compiles a portfolio of stocks to try and capture the market movement. ETF's can be bought and sold as such.

Problem 4. *Ruppert 2.14.1*