1. Graph of money market equilibrium

![Graph of money market equilibrium](image)

a. The nominal interest rate is on the axis because money demand depends on the nominal interest rate. Agents could hold nominal bonds instead of money, so the nominal interest rate is the opportunity cost of money.

b. To lower the nominal interest rate, the Fed increases the nominal money supply. With the price level fixed in the short run, an increase in nominal money reduces real money shifting $M/P$ to the right, and the equilibrium nominal interest rate falls.
C. Monetary neutrality says that if the money supply increases, price increases proportionately in the long run so that there are no effects on real variables. In this case, there also will be no effect on the nominal interest rate because we do not affect the real interest rate or inflationary expectations.

1) The increase in the money supply shifts the real money curve rightwards as in the graph above.

2) The proportionate increase in the price level shifts the real money supply curve back to its initial position.

3) There is no effect on the nominal interest rate. It returns to the initial value.
2. Dividend Problem: For the questions below, assume that the asset in question is a bond with a two year maturity which will pay $100 at the end of the first year and $100 at the end of the second year.

a. Assume that the current interest rate is 5.25% and that it is expected to rise to 5.5% next year. Additionally assume that agents do not care about risk. What is the price today of this two-year bond?

\[ P = \frac{100}{1.0525} + \frac{100}{(1.0525)(1.055)} = 185.06 \]

b. Calculate the yield to maturity and graph the yield curve. Is the slope positive or negative? Explain why.

The yield to maturity is approximately the average of the two interest rates and equals 5.375%. The yield curve therefore shows a one-year bond paying 5.25% and a two-year bond paying 5.375%. It is upward sloping because interest rates are expected to rise.

![Yield Curve](chart.png)

C. Calculate the price of the bond if the Fed raises the current interest rate to 5.5% and the rate is expected to remain there for the coming year. Does the increase in the interest rate increase or decrease the price of the bond?

\[ P = \frac{100}{1.055} + \frac{100}{(1.055)(1.055)} = 184.63 \]

The increase in the interest rate reduces the price of the bond.

d. Return to the assumptions in 1) about interest rates over time, but now assume that agents do care about risk. In fact they want a risk premium of 1%.

Recalculate the price of the bond and explain how risk affects it.

Think of the asset as the combination of a one period bond with a face value of 100 and a two year bond with a face value of 100. There is no risk on the one year bond.
so its discount factor does not change. For the two year bond, the risk premium will raise the discount factor in the first period by 1% from 5.25% to 6.25%. The price of the bond becomes

\[ P = \frac{100}{1.0525} + \frac{100}{(1.0625)(1.055)} = 184.31 \]. Therefore, the aversion to risk reduces the price of the bond. Recall that after one year has passed, the two-year bond has become a one-year bond and will not command a risk premium over other one year bonds.

e. Calculate the yield to maturity under the new assumption about risk and graph the yield curve. How does the slope compare to the slope of your original yield curve?

The yield to maturity is the average of the first-period interest rate with the risk premium, 6.25% and the second period interest rate of 5.5%, yielding 5.875% for the two-year bond. The yield curve is steeper.