Problem Set 2 Suggested Solutions

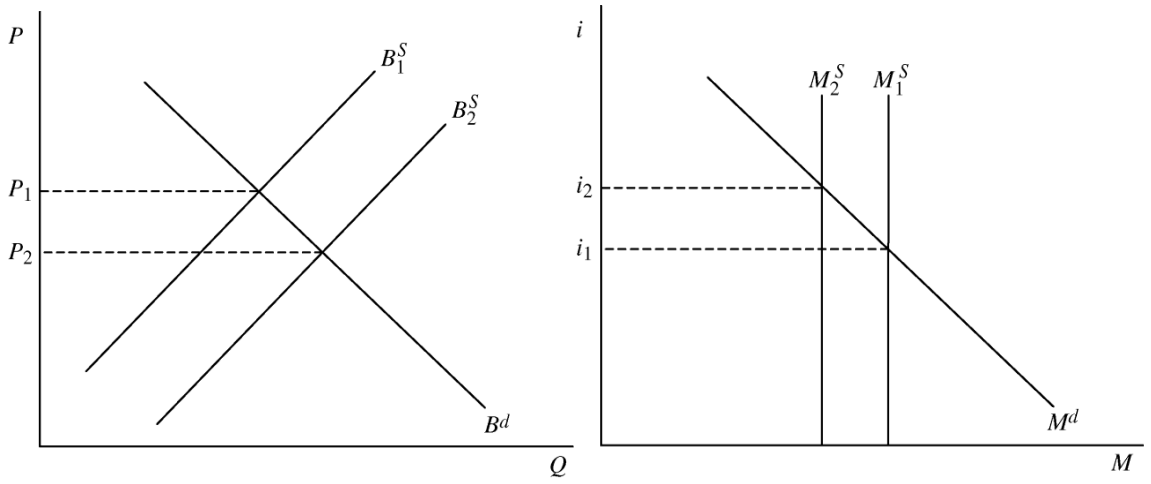
Chapter 5: Questions 1, 10, 20-25

1.(a) Less, because your wealth has declined; (b) more, because its relative expected return has risen; (c) less, because it has become less liquid relative to bonds; (d) less, because its expected return has fallen relative to gold; (e) more, because it has become less risky relative to bonds.

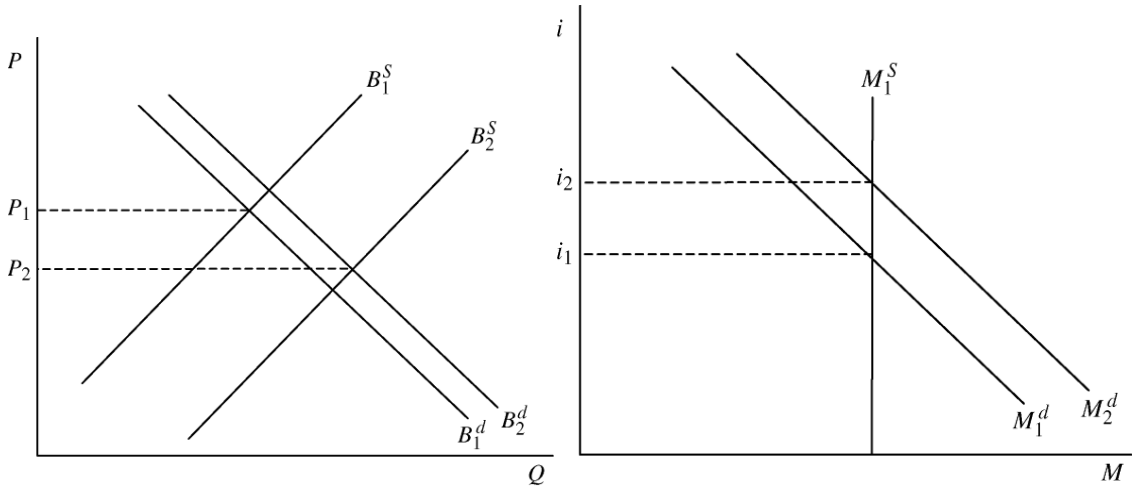
10. Interest rates should rise. The large federal deficits require the Treasury to issue more bonds; thus the supply of bonds increases. The supply curve, *Bs*, shifts to the right and the equilibrium interest rate rises. Some economists believe that when the Treasury issues more bonds, the demand for bonds increases because the issue of bonds increases the public's wealth. If this is the case, the demand curve, *Bd*, will also shift to the right, and it is no longer clear that the equilibrium interest rate will rise. Thus there is some potential ambiguity in the answer to this question.

20. (a) The expected return on the stock portfolio is 0.25(12%) + 0.25(10%) + 0.25(8%) + 0.25(6%) = 9%. The expected return on the bond portfolio is 0.6(10%) + 0.4(7.5%) = 9%. The expected return on the commodities portfolio is 0.2(20%) + 0.25(12%) + 0.25(6%) + 0.25(4%) + 0.05(0%) = 9.5%. Since the commodities portfolio has the higher expected return, you should choose that. (b) In choosing between the stock or bond portfolio, they both have the same expected return. However, since there is less uncertainty over the outcomes in the bond portfolio than the stock portfolio, a risk-averse individual should choose the bond portfolio.

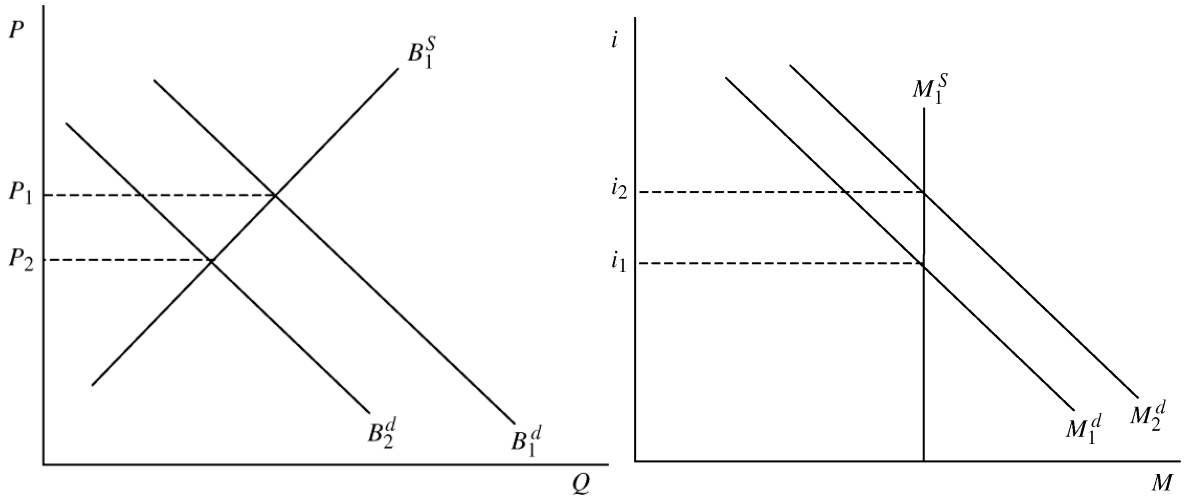
21. When the Fed sells bonds to the public, it increases the supply of bonds, thus shifting the supply curve *Bs* to the right. The result is that the intersection of the supply and demand curves *Bs* and *Bd* occurs at a lower price and a higher equilibrium interest rate, and the interest rate rises. With the liquidity preference framework, the decrease in the money supply shifts the money supply curve *Ms* to the left, and the equilibrium interest rate rises. The answer from bond supply and demand analysis is consistent with the answer from the liquidity preference framework.



22. In the bond framework, when the economy booms, the demand for bonds increases. The public's income and wealth rises while the supply of bonds also increases, because firms have more attractive investment opportunities. Both the supply and demand curves (*Bd* and *Bs*) shift to the right (shown in graph below), but as is indicated in the text, the demand curve probably shifts less than the supply curve so the equilibrium interest rate rises. Similarly, when the economy enters a recession, both the supply and demand curves shift to the left, but the demand curve shifts less than the supply curve so that the interest rate falls. The conclusion is that interest rates rise during booms and fall during recessions: that is, interest rates are procyclical. The same answer is found with the liquidity preference framework. When the economy booms, the demand for money increases (shown in graph below); people need more money to carry out an increased amount of transactions and also because their wealth has risen. The demand curve, *Md*, thus shifts to the right, raising the equilibrium interest rate. When the economy enters a recession, the demand for money falls and the demand curve shifts to the left, lowering the equilibrium interest rate. Again, interest rates are seen to be procyclical.



23. In the bond supply and demand analysis, the increased riskiness of bonds lowers the demand for bonds. The demand curve *Bd* shifts to the left, and the equilibrium interest rate rises. The same answer is found in the liquidity preference framework. The increased riskiness of bonds relative to money increases the demand for money. The money demand curve *Md* shifts to the right, and the equilibrium interest rate rises.



24. (a) Solving for the equilibrium gives:
-0.6 Quantity + 1140 = Quantity + 700;
1.6 Quantity = 440; or Quantity = 275.
Using the bond supply equation Price = 275 + 700 = 975. (b) The expected interest rate on a one-year discount bond with face value of $1000 and current price of $975 is given as *i* = (1000 - 975)/975 = 0.0256, or 2.56%.

25. (a) The monetary policy action, essentially an open market operation, increases the supply of bonds in the market by a quantity of 80, at any given price. Thus, the bond supply equation will become Quantity = Price - 700 + 80, so that Price = Quantity + 620. (b) As a result of the Federal Reserve action, the new equilibrium is given as:
-0.6 Quantity + 1140 = Quantity +620;
1.6 Quantity = 520; or Quantity = 325.
Using the bond supply curve, Price = 325 + 620 = 945. Thus, the expected interest rate on a one-year discount bond with face value of $1000 and current price of $945 is given as i = (1000 - 945)/945 = 0.0582, or 5.82%. This is an increase from 2.56% in the initial equilibrium, which was calculated in the answer to the previous question. Note that as we will see in Chapter 14, the open market sale leads to a decline in the money supply and so the liquidity preference framework would then also indicate that the interest rate would rise.

Chapter 6: Questions 1, 2, 4, 6, 7, 14, 15, 16, 17, 23, 25

1.Junk bonds are referred to as “junk” in that they are very risky investments, but provide high yields to investors who buy them at very low prices and are therefore compensated with a high risk premium.

2.The bond with a *C* rating should have a higher interest rate because it has a higher default risk, which reduces its demand and raises its interest rate relative to that on the Baa bond.

4. The risk of default would significantly decrease demand for AIG corporate debt, resulting in a much higher yield. After the announcement that the government would provide extraordinary assistance to support AIG and keep it from failing, demand for its corporate debt would rise, and yields would fall.

6. True. When bonds of different maturities are close substitutes, a rise in interest rates for one bond causes the interest rates for others to rise because the expected returns on bonds of different maturities cannot get too far out of line.

7. Since TIPS bonds are traded much more lightly than their nominal counterparts, demand for these bonds is somewhat lower than comparable U.S. treasuries; hence the higher yield (controlling for the effects of inflation) represents a

liquidity premium. Note that because this liquidity effect is relatively small, inflation compensation will generally be larger than the liquidity premium, implying that nominal bond yields overall will be higher than TIPS of comparable maturity.

14. (a) Under the expectations theory of the term structure, if 30-year bonds become less desirable, this will increase the demand for bonds of other maturities, since they are viewed as perfect substitutes. The result is higher price and lower yield at all other maturities, and an increase in yield at the end of the yield curve. In other words, the yield curve would steepen at the end, and flatten somewhat along the rest of the curve. (b) Under the segmented markets theory, the assumption is that each type of bond maturity is an independent market, and therefore not linked in any particular way. Thus changes in long rates won't affect shorter- and medium-term bond yields. Thus, the yield curve under the segmented markets theory will result in a jump in the 30-year rate, with the remainder of the yield curve unchanged.

15. Investor A, even though she receives a lower expected return, clearly prefers to hold short-term debt, perhaps because it is more liquid. Investor A's preferences are consistent with the segmented markets theory. Investor B is apparently maximizing expected return, but since he is indifferent between the five- and ten-year bonds, Investor B doesn't appear to favor any particular maturity, and so views the five- and ten-year bonds as essentially perfect substitutes, an assumption consistent with the expectations theory of the term structure.

16. The flat yield curve at shorter maturities suggests that short-term interest rates are expected to fall moderately in the near future, while the steep upward slope of the yield curve at longer maturities indicates that interest rates further into the future are expected to rise. Because interest rates and expected inflation move together, the yield curve suggests that the market expects inflation to fall moderately in the near future but to rise later on.

17. The steep upward-sloping yield curve at shorter maturities suggests that short-term interest rates are expected to rise moderately in the near future because the initial, steep upward slope indicates that the average of expected short-term interest rates in the near future are above the current short-term

interest rate. The downward slope for longer maturities indicates that short-term interest rates are eventually expected to fall sharply. With a positive risk premium on long-term bonds, as in the preferred habitat theory, a downward slope of the yield curve occurs only if the average of expected short-term interest rates is declining, which occurs only if short-term interest rates are expected to fall far into the future. Since interest rates and expected inflation move together, the yield curve suggests that the market expects inflation to rise moderately in the near future but fall later on.

23. (a) The yield to maturity would be 5% for a one-year bond, 6% for a two-year bond, 6.33% for a three-year bond, 6.5% for a four-year bond, and 6.6% for a five-year bond. (b) The yield to maturity would be 5% for a one-year bond, 4.5% for a two-year bond. 4.33% for a three-year bond, 4.25% for a four-year bond, and 4.2% for a five-year bond. The upward sloping yield curve in (a) would be even steeper if people preferred short-term bonds over long-term bonds, because long-term bonds would then have a positive liquidity premium. The downward-sloping yield curve in (b) would be less steep and might have a slight positive upward slope if the long-term bonds have a positive liquidity premium.

25. The liquidity premium for a given year is the current rate on a multi-year horizon bond minus the average of expected one year interest rates over that horizon. Thus, the liquidity premiums for each year are given as:
$l11 = 2 - 2/1 = 0\%$.
$l21 = 3 - (3 + 2)/2 = 0.5\%$.
$l31 = 5 - (4 + 3 + 2)/3 = 2\%$.
$l41 = 6 - (6 + 4 + 3 + 2)/4 = 2.25\%$.
$l51 = 8 - (7 + 6 + 4 + 3 + 2)/5 = 3.6\%$.