1. What caused the hyper-inflation in Germany during between 1922 and 1923? What caused the hyper-inflations in several South American countries during the 1980s?

2. Use the equation of exchange to explain how changes in money supply growth, the velocity of money, or the growth rate in real GDP would affect the inflation rate.

3a. What is the difference between the real and nominal interest rate?

b. If expected inflation increases 5%, what is likely to happen to nominal interest rates? real interest rates? Explain using a graph of the supply and demand for loans.

4. If inflation over the next year turns out to be higher than expected, how are debtors (borrowers) and creditors (lenders) affected?

Use the income tax schedule listed below to answer the questions that follow:

1998 Tax Schedule X -- Use if your filing status is Single

<table>
<thead>
<tr>
<th>If the amount on Form 1040, line 39, is:</th>
<th>But not over ---</th>
<th>Enter on Form 1040, line 40</th>
<th>of the amount over ---</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$25,350</td>
<td>........</td>
<td>15%</td>
</tr>
<tr>
<td>25,350</td>
<td>61,400</td>
<td>$3,802.50 +</td>
<td>28%</td>
</tr>
<tr>
<td>61,400</td>
<td>128,100</td>
<td>$13,896.50 +</td>
<td>31%</td>
</tr>
<tr>
<td>128,100</td>
<td>278,450</td>
<td>$34,573.50 +</td>
<td>36%</td>
</tr>
<tr>
<td>278,450</td>
<td>........</td>
<td>$88,699.50 +</td>
<td>39.6%</td>
</tr>
</tbody>
</table>

5. If your taxable income is $40,000, what is:
   a. your tax bill.
   b. your marginal tax rate.
   c. your average tax rate.

6a. Suppose that inflation over the next year is 10% and your taxable income rises from $40,000 to $44,000 (a 10% increase). Explain how inflation has increased your tax bill in real terms and reduced your real after tax income using the tax table above and assuming no indexing.

b. Assume that the income tax system above was indexed to reflect the 10% inflation. What would your tax bill with $44,000 of taxable income be?

c. Explain why the "bracket creep" described above occurs with a "progressive" income tax but not a "proportional" income tax.

7. Currently, the capital gains tax is not indexed. Explain how inflation makes people worse off through the capital gains tax.

8. Government bonds indexed to inflation have recently been introduced. As discussed in class, this is how they would work:

An investor buys an inflation-indexed bond for $1,000, paying 4%. That would mean a first-year interest payment of $40. Suppose inflation during the year is 3%. At the end of the year, the value of the bond would be "marked up" to reflect inflation, so the face (or maturity) value of the bond would be raised by 3% to $1,030. From then to the bond's maturity, the 4% interest would be paid on the higher principal amount (which might be adjusted again to reflect future inflation). The 4% interest rate would remain the same. But because the principal amount has risen from $1,000 to $1,030, the interest payment would rise from $40 to $41.20 (a 3 percent increase) in the second year. If there is inflation in the second year, the face value of the bond is again marked up and interest payments are adjusted accordingly.
a. Based on the above description, what are the real and nominal rates of return (yields) on a one year indexed bond paying 4% if inflation is 0%? 10%? (Assume that $1000 is paid for the bond either way).
b. If the above bond were not indexed but had a 4% coupon rate, what would the real and nominal rates of return be if inflation over the next year turned out to be 0%? 10%? (Again, assume that $1000 is paid for the bond either way.)
c. If inflation expectations rise, what will happen to the price of non-indexed bonds? the nominal yield on those bonds?
d. Based on your answer to c, explain how indexed bonds can be used to derive an estimate of financial markets’ expectations regarding future inflation.

9. An adjustable rate mortgage (ARM) adjusts the interest rate that is charged on a home loan over time. Explain why banks generally are willing to accept a lower interest rate for an ARM than a fixed rate mortgage.

10. What are “menu costs”?

Answers.

1. The hyper-inflations were caused by the governments printing large quantities of money. In the case of Germany, the money was printed to pay off war debts. In the case of the South American countries, the money was printed largely to finance government operations.

2. The equation of exchange is MV=Py where M is the money supply, v is the velocity of money, P is the price level, and y is real GDP. This equation implies that

% change in P = % change in M + % change in V - % change in y

Thus, inflation (% change in P) will be greater if the money supply grows at a faster rate, if the velocity of money increases, or if the growth rate in real GDP falls.

3a. The nominal interest rate indicates how many additional dollars must be paid back for a one year loan, whereas the real interest rate indicates how much additional purchasing power must be paid back for a one year loan. The real interest rate equals the nominal interest rate minus the inflation rate.
b. If expected inflation increases by 5, both the loan supply and loan demand curve shift upwards by 5. The upward shift in the supply curve indicates that lenders require a 10% higher interest rate to make a loan when inflation expectations are 5 higher. The upward shift in the demand curve indicates that borrowers are willing to pay a 5% higher nominal interest rate when inflation expectations are 5 higher. The new intersection of the curves will be at a nominal interest rate that is 5% higher than it was originally. As a consequence, the nominal rate will increase by 5% and the real interest rate will be unchanged. This is reflected in the diagram below.
4. If inflation is higher than expected, lenders lose and borrowers win. The reason is that inflation erodes the purchasing power of what is paid back. Since the lender is the person receiving the money in the future, they are receiving less purchasing power than they expected when they agreed to the loan. The borrower benefits because they are paying back less in terms of purchasing power than they expected at the beginning of the loan.

5a. $7904.50 = $3802.50 + 0.28(40,000 - 25,350)
   b. 28%
   c. 19.7% = 7904.5/40000

6a. Your tax bill would now be 9024.50 which is a 14.2% increase in taxes. Since your before tax income went up 10% and your tax bill went up 14.2%, your nominal after-tax income would rise less than 10% and your real after tax income would have to drop.
   b. Your tax bill would be 8694.95. This would be computed by raising the cut-offs in the tax-brackets by 10% each and applying a 15% rate to the first $27,885 and 28% to the next 16115 (44,000 - 27,885). Indexing the cut-offs for the brackets assures that if income rises at the rate of inflation, the tax bill rises at the same rate.
   c. Bracket creep wouldn't occur in a proportional income tax system because the tax rate is unaffected by the level of income in a proportional system. In a progressive system, if inflation increases nominal income, people "creep" into a higher bracket and pay a higher tax rate.

7. If there is no inflation and an asset does not change in value, there is no capital gains tax to be paid. If there is 20% inflation and the asset price keeps pace with inflation, a capital gain equal to 20 percent of the original price is realized and a tax must be paid on the gain. The greater is the inflation, the greater is the capital gains tax that must be paid.

8a. The nominal rate is 4% if inflation is 0%; 14% if inflation is 10%. The real rate is 4% in either case. With indexed bonds, the real rate of interest is fixed. The nominal rate of interest moves point for point with the inflation rate.
   b. If the bond was not indexed, the nominal rate is fixed at 4%. At inflation of 0%, the real rate is 4%; at inflation of 10%, the real rate is -6%.
   c. As inflation expectations rise, the amount people are willing to pay for a non-indexed bond will drop and this will lead its nominal yield to rise.
   d. Since indexed bonds promise a fixed real yield and non-indexed bonds promise a fixed nominal yield, the difference in the yields can be used as a measure of inflation expectations. If an indexed bond promises 4% real and a non-indexed bond promises 7% nominal, the average investor must believe that inflation will be 3%. If they thought inflation was going to be higher than 3%, everyone would buy the indexed bonds and sell the non-indexed. This would cause the price of indexed bonds to rise (and yields fall) and the reverse to happen for non-indexed bonds. Eventually the yields would differ by the amount of inflation expected.

9. Banks prefer ARMs because the interest rate risk is shifted to the borrower.

10. Menu costs are the costs associated with changing advertised prices when there is inflation. This cost would be relevant for menus in restaurants as well as companies that advertise in catalogs or put price stickers on merchandise.