Solutions to the Problems: 7.7. , 7.9. a) , b) , 8.7, 8.10

7.7. a) A borrower (who issued bonds denominated in fixed units of currency as opposed to indexed bonds) is hurt if inflation turns out to be less than expected i.e. if $p^e > p$.
So the borrower will expect that his payments are going to be more costly in real term, than they were in the previous situation with higher inflation.
It follows, that lowered inflation expectations between the date when the bonds were issued by the borrower and today , the borrower might try to repay the debt.
In times of falling inflation expectations and nominal interest rates the borrowers would try to repay the mortgages.

b) In the 1970s the interest rates were rising (in US), so the banks would have wanted that the customers would have used their callability option to repay earlier, but the customers would not have wanted to repay. Later in the 1980s , the interest rates were declining and so , as in part a) , the customers had an incentive to repay earlier.

c) If the interest rates are more volatile, than the probability of earlier repayments of the customers increases. By a earlier repayment we mean that the borrower would exercise the option in any given year during increased volatility.

7.9. a) The bond costs 1000 $ in period 0 and pays in period 1 the principal of 1000 $ plus interest of 100 $. So the nominal rate R is 10 % per period. The real rate r is $r = R - p$, but we know here only R. The expected real rate $r^e = R - p^e$ in the next period is uncertain, because we don't know the expected inflation.

b) To compensate for inflation, the bond is now indexed: In period 1 there will be the payment of $1100\$ \cdot (1+p)$ where the bond still costs 1000 $ in period 0. So because $1000 \cdot (1+R) = 1100\$ \cdot (1+p)$, the gross real interest rate $(1+r) = \frac{(1+R)}{(1+p)}$ equals 1.1 , so net real interest rate is 10 % per period. Because inflation is uncertain, we don't know the nominal interest rate.

8.10. a)The nominal interest rate and expected inflation increase by 1 % each, so the real rate is unaffected. The real money demand depends on nominal interest rate and income (and also the transaction costs). If the nominal Interest rate increases, the real demand for money falls.

b) People economize on holding money, so they go to the bank more often so they have higher transactions cost which may be fees or wasted time.

c) Transaction cost were assumed to be small and thus negligible but in this exercise they are taken into account. Especially when we look at hyperinflations, transaction costs are important. We could incorporate them into the households budget constraint:
$Py_t + (1+R)b_{t-1} + m_{t-1} = Pc_t + b_t + m_t + PVTC$ where PVTC is the present value of transaction costs. The LHS of the budget constraint gives us the source of funds. For a given level of these sources, a rise in PVTC lowers the households wealth. If R rises the TC also rise, so there is negative wealth effect because the household has to use increased recourses to hold money. The negative wealth effect is assumed to have the same implications for consumption and leisure (normal goods) in our earlier models. Leisure and consumption are going to decline and work effort increases.

d) If we also take the substitution into account, leisure becomes relatively cheaper compared to consumption because you don't need any money to purchase leisure. The overall effect on consumption is the negative income and negative substitution effect, where the overall effect on leisure is ambiguous. The wealth effect is negative but the substitution effect is positve.

8.7. **8.7.** Quantitiy theory of money: $M \cdot V = P \cdot Y$

$$\ln M + \ln V = \ln P + \ln Y$$ take logs

$$\frac{1}{M}\frac{\partial M}{\partial t} + \frac{1}{V}\frac{\partial V}{\partial t} = \frac{1}{P}\frac{\partial P}{\partial t} + \frac{1}{Y}\frac{\partial Y}{\partial t}$$ derivative w.r.t. time

$$\hat{\Pi} = \hat{P} = \hat{M} + \hat{V} - \hat{Y}$$ growth rates

An anticipated increase in inflation will lead to increasing nominal interest rates:
$\hat{P}\uparrow, R\uparrow, V\uparrow$

Real economic growth: $\hat{Y}\uparrow$

In General: Suppose an increase in monetary growth $\hat{M}$. Now think about dynamics of inflation during the transition from the old to the new Inflation rate.
The monetary growth rate increases , so does Inflation rate. But the nominal interest rate is also going to increase. Thus real demand for money falls. (M/P) For real money to fall it is necessary that during a transition period P grows faster than M to get a gradual adjustment. Due to the increased interest rate V grows as well.