210C PS3

a) Yes, they can set P_1 s.t. $\frac{W_0}{P_1} = A_1$ thus staying on the labor demand curve

b) No, instead of picking labor supply s.t. $\frac{W_1}{P_1} = \frac{\chi N_1^{\varphi}}{C_1^{-\gamma}}$ they are instead constrained by $W_1 = W_0$. Labor clearing is uniquely determined by $Y_1 = A_1 N_1$, $W_1 = W_0$, and $\frac{W_1}{P_1} = A_1$

c) As stated above the firm chooses P_1 s.t. $P_1 = \frac{W_1}{A_1} = \frac{W_0}{A_1}$

Through the euler eqn, C_1 is determined based on SS levels of P_2 and C_2 and P_1

Through the market clearing condition, $C_1 = Y_1$

The technology equation determines N_1 through Y_1 and A_1

d) Let non-subscripted variables be SS:

$1 = \beta Q \Rightarrow Q = \frac{1}{\beta}$

$A = \chi N^{\varphi} C^{\gamma} = \chi \left(\frac{C}{A}\right)^{\varphi} C^{\gamma} \Rightarrow A^{1+\varphi} = \chi C^{\varphi+\gamma} \Rightarrow C = \left[\frac{A^{1+\varphi}}{\chi}\right]^{\frac{1}{\varphi+\gamma}}$ ← in terms of exogenous values!

$\frac{M}{P} = \xi^{\frac{1}{\nu}} (1-\beta)^{-1/\nu} C^{\gamma/\nu}$

$Y = C$

$N = Y/A$

$\frac{W}{P} = A$

in terms of exogenous values / c

e) Yes, real variables (C, Y, N) are not dependent on the level of M/P

Further, $\frac{M}{P}$ is a constant, so if $M\uparrow$, $P\uparrow$ to compensate canceling any effects of changes to M

f) Let $t=2$ be in SS

$C_1 = \beta^{-\frac{1}{\gamma}} Q_1^{-\frac{1}{\gamma}} \left(\frac{P_1}{P}\right)^{-\frac{1}{\gamma}} C = \beta^{-\frac{1}{\gamma}} Q_1^{-\frac{1}{\gamma}} \left(\frac{W_0}{A_1 P}\right)^{-\frac{1}{\gamma}} C = Y_1$

$M_1 \left(\frac{A_1}{W_0}\right) = \xi^{\frac{1}{\nu}} \left(1 - \frac{1}{Q_1}\right)^{-\frac{1}{\nu}} Y_1^{\frac{\gamma}{\nu}}$

g) No, proof by contradiction. Suppose changing M_1 only affects nominal variables. Then $M_1\uparrow$, Y_1 const, $Q_1\downarrow$. $Q_1\downarrow \Rightarrow Y_1\uparrow$ a contradiction.

h) As we saw in (g), increasing money supply should increase output in the short run. This makes sense. When there is more money but wages are fixed, prices will not respond to changing money supply (since firms are on their labor demand curve) so households will consume more which drives up output to clear the market.

i) The effects of productivity on output are somewhat dependent on the values of ν and γ.

However, since a change to A_1 doesn't cause a 1 to 1 change to Q_1 in most cases, changes in Q_1 cannot completely absorb the affects of productivity changes so Y_1 is affected by changes in A_1.

Intuatively, we would expect Y_1 to increase when A_1 increases, but without values for ν and γ I'm hesitant to say this always will happen

j) It has the same form as we derived in class:

$$(1-\tau_1^N) = \frac{MRS}{MPL} = \frac{\chi N_1^{\varphi}}{C_1^{-\gamma} A_1} = \chi A_1^{\gamma-1} N_1^{\gamma+\varphi} \quad \text{(would be 1 at } N^* \text{ but } N_1 \neq N^*)$$

In a recession, $\beta \uparrow$ meaning $C_1 \downarrow$

By MC, $Y_1 \downarrow$ as well and $N_1 \downarrow$ so $\tau_1^N \uparrow$

This is a countercyclical movement which makes sense since in times of recession there is more distortion in the market

k) The main difference in the models is the response to changes in productivity. The covariance of productivity and output in the short run would be indicative of whether prices or wages are more reasonably sticky in the short run.