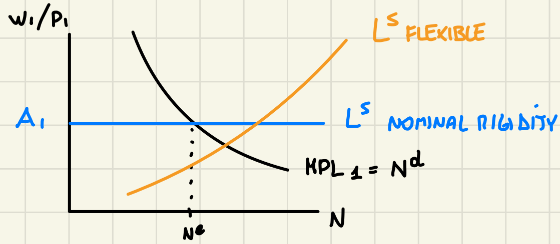
(a) FIRM WOULD HIRE WORKERS UNTIL $MPL_1 = A_1$ and given this the



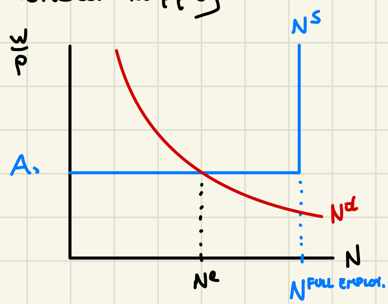
Workers accomodate the labor demand of firms until $\frac{W_1}{P_1} = A_1$.
Since $W_1 = W_0$, this is achieved by hiring more or less people until N^e s.t. $\frac{W_1}{P_1} = \frac{W_0}{P_1} = A'$, id est we are going to achieve $MPL_1 = A_1$ by changes in P_1 due to the employment level.

↳ THEN FIRM is on its labor demand.

(b) Household are not on their labor demand. Given wage stickyness, Household are going to provide inelastically amount of labor (L^S FLAT) until they meet labor demand of firm s.t. $MPL_1 = A_1$.

However, we know that labor demand of household is upward sloping in N, then they are not on labor supply curve

(c) Labor market clears such that FIRM CHOOSE quantity of labor to hire until $MPL_1 = A_1$, and household supply inelastically the quantity demanded.



IMPLICIT ASSUMPTION ; $N^{FULL\ EMPLOYMENT} > N^E$
then market clears with real wage being equal to A_1.

THEN GIVEN
$$\begin{cases} Y_1 = C_1 \\ Y_1 = A_1 N_1 \\ A_1 = W_0/P_1 \end{cases} \implies A_1 N_1 = C_1 \implies N_1 = \frac{C_1 P_1}{W_0} = N^e$$

(d) In steady state we know that PERFECT DICOTHOMY WORKS

Then given $Y = C$ $\quad C = AN$ and given $[LD] = [LS]$ we get

$$[LD] \downarrow \quad \frac{W}{P} = A \qquad [LS] \downarrow \quad \frac{W}{P} = \chi \frac{N^{\varphi}}{C}$$

$$A = \chi \frac{N^{\varphi}}{C^{-\gamma}} = \chi \frac{N^{\varphi}}{(A N)^{-\gamma}}$$

$$N^{\varphi+\gamma} = \left(\frac{1}{\chi} A^{1-\gamma} \right)$$

$$N = \left(\frac{1}{\chi} A^{1-\gamma} \right)^{\frac{1}{\varphi+\gamma}}$$

$$C = Y = AN = A \left(\frac{1}{\chi} A^{1-\gamma} \right)^{\frac{1}{\varphi+\gamma}}$$

$$C^{-\gamma} = \beta Q E[(P/P) C^{-\gamma}] \longrightarrow 1 = \beta Q \longrightarrow Q^{-1} = \beta \longrightarrow R = Q$$

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

(e) Yes, it holds: any change in M would be offset by a movement in the price level

A EXOGENOUS, and in steady state we have

$$\left.\begin{aligned} N &= N^{ss}(A; \chi, \varphi, \gamma) \\ C &= C^{ss}(A; \chi, \varphi, \gamma) \\ Y &= Y^{ss}(A; \chi, \varphi, \gamma) \\ W/P &= (W/P)^{ss}(A) \end{aligned}\right\} \text{REAL VARIABLE DO NOT DEPEND ON } M$$

(f) SOLVE FOR OUTPUT AND MONEY MARKET IN SHORT RUN

$$Y_1 = A_1 N_1$$

$$W_1/P_1 = A_1 \longrightarrow P_1 = W_0/A_1$$

$$W_1 = W_0$$

$$W_0/P_1 = \chi N_1^{\varphi} C_1^{\gamma}$$

$$C_1^{-\gamma} = \beta E[Q_1 \frac{P_1}{P_2} C_2^{-\gamma}]$$

$$Y_1 = C_1$$

$$M_1/P_1 = \xi^{1/\nu} (1 - Q_1^{-1})^{-1/\nu} C_1^{\gamma/\nu}$$

$$\hookrightarrow \frac{M_1}{W_0} A_1 = \xi^{1/\nu} (1 - Q_1^{-1})^{-1/\nu} \left(\beta Q_1 \frac{P_1}{P_2} C_2^{-\gamma} \right)^{-1/\nu}$$

$$\frac{M_1}{W_0} A_1 = \xi^{1/\nu} (1 - Q_1^{-1})^{-1/\nu} \left(\frac{1}{\beta Q_1} \frac{P}{P_1} \right)^{1/\nu} C^{\gamma/\nu}$$

$$\frac{M_1}{W_0}A_1 = \xi^{1/\nu}\,\frac{\cancel{Q_1^{1/\nu}}}{(Q_1-1)^{1/\nu}}\;\frac{1}{\beta^{1/\nu}\cancel{Q_1^{1/\nu}}}\left(\frac{P}{P_1}\right)^{1/\nu} C^{\gamma/\nu}$$

$$\frac{M_1}{W_0}A_1 = \xi^{1/\nu}\left(\frac{P}{(Q_1-1)\beta P_1}\right)^{1/\nu} C^{\gamma/\nu}$$

$$\frac{M_1}{W_0}A_1 = \xi^{1/\nu}\left(\frac{P}{(Q_1-1)\beta}\;\frac{A_1}{W_0}\right)^{1/\nu} C^{\gamma/\nu}$$

M_1, A_1 EXOGENOUS, $P = P_2$ equilibrium, $C = C_2$ equilibrium, W_0 FIXED

IF $M_1 \uparrow$ Then $Q_1 \downarrow$ and $R_2 = Q_1 \frac{P_1}{P_2} = Q_1 \frac{\overbrace{P_1}^{\text{STICKY}}}{P_2} = Q_1 \underbrace{\frac{W_0}{A_1}}_{\text{EXOGEN}} \underbrace{\frac{1}{P}}_{= P_2}$

Then $R_2 \downarrow$

$\downarrow$

$$C_1^{-\gamma} = \beta E\left[Q_1 \frac{W_0}{A_1}\frac{1}{P} C^{-\gamma}\right]$$

Then IF $M_1 \uparrow$ $Q_1 \downarrow$ and $C_1 \uparrow$ Since from euler equation only C_1 changing. $\Rightarrow$ $C_1 = Y_1$ Then $Y_1 \uparrow$

(g) THE CLASSICAL DICOTHOMY IN SR DOES NOT HOLD AS PROVED ABOVE

(h) In the short run, an increase in money supply would change the nominal interest rate, but since P_1 is determined by W_0 and A_1 Then inflation would NOT change but the real interest rate will do, meaning that consumption would change.

(i) $$\frac{M_1}{W_0}A_1 = \xi^{1/\nu}\left(\frac{P}{(Q_1-1)\beta}\;\frac{A_1}{W_0}\right)^{1/\nu} C^{\gamma/\nu}$$

$$\frac{M_1}{W_0}A_1^{(\nu-1)/\nu} = K\,\frac{1}{(Q_1-1)^{1/\nu}}$$

IF $\nu > 1$ and $A_1 \uparrow$ $Q_1 \downarrow$ because FROM MONEY DEMAND IF A_1 CHANGES, Q_1 CHANGES AS WELL

$$C_1^{-\gamma} = \beta E\left[\underline{Q_1}\,\underbrace{\boxed{\frac{W_0}{A_1}}}_{= P_1}\,\frac{1}{P} C^{-\gamma}\right]$$

$Q_1 \downarrow$ has proven above

$= P_1 \Rightarrow A_1 \uparrow$ means $C_1 \uparrow$ $Y_1 \uparrow$

INTUITIVELY, with nominal price rigidities we had $R_2 = Q_1 \frac{P_1}{P_2} = Q_1 \frac{P_0}{P}$ price where not changing, here they do, and given $P_1 = \frac{W_0}{A_1}$ we have that $R_2 = Q_1 \frac{W_0}{A_1}\frac{1}{P}$ with $Q_1 \downarrow$ and $A_1 \uparrow$ So $R_2 \downarrow$ $\longrightarrow$ EFFECT ON C_1 and Y_1

(j) $(1-\tau_t^N) = \frac{MRS}{MPL} = \frac{\chi N_t^\varphi C_t^\gamma}{A_t}$

$$\tau_t^N = 1 - \frac{\chi N_t^\varphi C_t^\gamma}{A_t} = 1 - \chi N_t^\varphi (A_t N_t)^\gamma A_t^{-1}$$
$$= 1 - \chi N_t^{\varphi+\gamma} A_t^{\gamma-1}$$

IF WE HAVE A DEMAND SHOCK $\beta_1 \uparrow$, $C_1 \downarrow$ $Y_1 \downarrow$ $N_1 \downarrow$ (A_1 EXOGENOUS)
Then

$$\tau_1^N = 1 - \chi (N_1 \downarrow)^{\varphi+\gamma} A_1^{\gamma-1}$$

$$\tau_1^N = \uparrow \implies \tau_1^N \text{ COUNTERCYCLICAL}$$

(k) WITH NOMINAL PRICE RIGIDITIES, The model predicts no change in short run output and consumption due to TFP SHOCKS, while nominal wage rigidities we do predict changes in C and Y

Then I would use LOCAL PROJECTIONS or SVAR To see empirically weather in the data we observe those changes, maybe identyfing The Two models using EXTERNAL INSTRUMENTS To avoid imposing any absurd restrictions.