Practice Midterm

1. (30p)
   a. Show graphically and explain what we mean by the substitution and income effect in the context of consumption-leisure choice and the labor market. What is the condition for the labor supply curve to be upward sloping?
   b. Suppose now we have the complete labor market equilibrium as given by

\[
N^D = N^D \left( \frac{W}{P}, \bar{K} \right), \quad N^D_{W/P} = \frac{1}{F_{NN}} < 0, \quad N^D_{K} = -\frac{F_{NK}}{F_{NN}} > 0
\]

(1)

\[
W / P = g(N^S), \quad g_N > 0
\]

(2)

\[
[N \equiv ] \quad N^D = N^S
\]

(3)

where \(N^D\) is the labor demand, \(W\) is the nominal wage, \(P\) is the price level, \(\bar{K}\) is the capital stock, \(N^S\) is labor supply and \(N\) is equilibrium employment. We assume that the expected price is equal to the actual price \((P = P^e)\).

Assume that the government introduces a value added (consumption) tax that changes the utility maximization problem for the representative consumer to max \(U \equiv U(C, 1-N^S)\) s.t. \(P(1+t_C)C = WN^S\).

Derive algebraically and show graphically the effects of the consumption tax on equilibrium labor and real wage.

2. (20p) Consider the static Keynesian model:

\[
Y = C(Y - T) + I(i) + G, \quad 0 < C_{Y-T} < 1
\]

\[
\frac{\bar{M}}{P} = L(i, Y), \quad L_Y > 0
\]

Assume \(L_r = 0\).

Show graphically and discuss the effectiveness of monetary and fiscal policy.
3. (50p) Consider a closed economy with fixed prices \((P=P_0=1)\) for convenience, a given stock of capital \((K)\) and wealth effects in the demand for money and consumption function:

\[
Y = C + I(R) + G, \quad I_R < 0 \quad (1)
\]

\[
C = C(Y^D, A), \quad 0 < C_{Y+B-T} < 1, \quad C_A > 0 \quad (2)
\]

\[
Y^D = Y + B - T - \frac{\dot{B}}{R} \quad (3)
\]

\[
T = T_0 + t(Y + B - \frac{\dot{B}}{R}), \quad 0 < t < 1 \quad (4)
\]

\[
M = l(Y, R, A), \quad l_y > 0, \quad l_R < 0, \quad 0 < l_A < 1 \quad (5)
\]

\[
A = \bar{K} + M \quad (6)
\]

\[
\dot{M} + \frac{\dot{B}}{R} = G + B - T \quad (7)
\]

As usual \(\dot{B} = \frac{dB}{dt}\) and \(\dot{M} = \frac{dM}{dt}\)

a. Interpret the equations of the model. Give a credible interpretation for the definition of consumption function and wealth (i.e. why we don’t have the bonds in the aggregate wealth)

b. Show that under bond financing disposable income is simply income minus government spending and thus private consumption rises only with \(Y - G\).

c. Using b) derive the effects on output of an increase in government spending in the short run under bond financing \((AD_G)\)

d. Using b) derive the effects on output of an increase in debt in the short run under bond financing \((AD_B)\)

e. Derive the stability condition under bond financing.

f. Show that the short run and long run effects of a debt financed rise in public spending are identical.