Macroeconomics Qualifying Exam
Part I (Economics 6110)
27 August 2007

1. Suppose the economy is described by the following set of equations:

$Y = E(Y, r, G, T)$	$E_Y \in (0,1)$, $E_r < 0$, $E_G > 0$, $E_T < 0$
$M/P = L(r + \pi^e, Y)$	$L_i < 0$, $L_Y > 0$, $i = r + \pi^e$
$Y = F(N)$	$F'(N) > 0$, $F''(N) < 0$
$W/P = F'(N)$	$W = \bar{W}$

where the nominal wage W is fixed and unresponsive to current economic conditions, and the only variable input in production is labor N.

a. Assuming $\pi^e = 0$, find expressions for dY/dM and dP/dM. Does an increase in the money supply increase or decrease income? Does an increase in the money supply increase or decrease the price level?

b. Try to illustrate your answer from part (a) graphically. Specifically, show the adjustments that occur in the market for goods and services (Keynesian cross), the market for real money balances, the labor market, the IS-LM graph, and also the AS-AD graph. Please label all axes and curves carefully.

c. What is the impact of an increase in M on the real wage $\bar{W}/P$? Is the real wage procyclical or countercyclical with respect to money supply shocks? Is your finding consistent with evidence in the data concerning the cyclicality of real wages? Explain.

2. Consider the following version of the neoclassical growth model discussed in class:

$U = \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\theta}}{1-\theta}$ $\qquad \theta > 0,\ \beta \in (0,1)$

$\sum_{t=0}^{\infty} \frac{c_t}{\bar{r}_{0,t}} \leq k_0 + \sum_{t=0}^{\infty} \frac{w_t}{\bar{r}_{0,t}}$ $\qquad \bar{r}_{0,t} = \prod_{j=0}^{t}(1+r_j),\ k_0$ given

$\lim_{t\to\infty} \frac{k_{t+1}}{\bar{r}_{0,t}} = 0$ $\qquad$ (No Ponzi Condition)

Households in this economy maximize lifetime utility U by choosing an optimal consumption plan $\{c_t\}_{t=0}^{\infty}$ subject to the lifetime budget constraint (second equation) and the no-ponzi-game-condition. Households take the price of labor w_t and the price of capital r_t as given when formulating optimal consumption/saving plans. Additionally, the growth rates of technology and the population are both equal to zero. Thus, one need not draw any distinction between economy-wide variables and their intensive form (per effective worker) counterparts.

a. Provide an interpretation of the lifetime budget constraint. What is a ponzi scheme? How does the no-ponzi-game-condition rule out such schemes?

b. Construct the lagrangian that characterizes the households optimization problem. Indicate what variables are being maximized over.

c. Derive the full set of first-order-conditions that characterize the solution to the household's maximization problem.

d. Derive the intertemporal Euler condition relating the change in consumption to the real interest rate r_t and the discount factor β.

e. Interpret the Euler condition derived in part d. Explain intuitively why this condition must hold along an optimal consumption trajectory.

f. Assume that firms transform capital and labor into output using the production function $Y = K^{\alpha}L^{1-\alpha}$ and that capital depreciates at a constant rate δ. Find expressions for the steady state values of capital k^* and consumption c^* in terms of β, δ, and α.

g. Construct a *phase diagram* in (k_t, c_t) space that illustrates the joint dynamics of capital and consumption over time. Indicate what regions of the phase diagram lead to stable dynamics and what regions lead to unstable dynamics. Does this model exhibit the *saddle path* property? Justify your answer fully.

h. Suppose there is an unanticipated permanent **reduction** in the discount factor β. Illustrate graphically how this affects the phase diagram constructed in part g. Illustrate graphically what happens to the steady state values k^* and c^* following the reduction in β. Assuming that the economy is initially on its balanced growth path before the fall in β, describe the ensuing transition path to the new steady state.