Professor Christiano
C-11, Winter 1999

Final Exam

IMPORTANT: read the following notes

• You may not use calculators, notes, or aids of any kind.

• Note the points each question is worth and plan your time accordingly.
The total number of points possible is 100, and the number of points
per question is indicated in parentheses.

• Explain your answers carefully in clear English. We are particularly in-
terested in whether you understand the underlying economic intuition.
Supplement what you say with liberal use of diagrams. Typically, the
phrase, 'explain carefully', sprinkled throughout the exam, means prove
or illustrate what you say with diagrams.

• Write neatly and label all diagrams. We cannot give you credit if we
cannot read your answer.

• Write your name and TA section (whether Thursday or Friday) on each
blue book.

1. (25) Suppose the production function has the following form:

$$f(K, L) = K^{\frac{1}{3}} L^{\frac{2}{3}}.$$

   (a) Under the neoclassical theory of income distribution, the real wage and the real rent on capital are equated to the marginal productivity of labor and capital, respectively. Explain the role in this of the assumption of perfect competition.

   (b) Under the neoclassical theory of income distribution, show that the real income of workers plus the real income of owners of capital equals total output.

   (c) Under the neoclassical theory of income distribution, what is the share of total income going to labor? Carefully explain your result.

   (d) Suppose there is a sudden increase in the population, as there was, for example, in Portugal when it gave up its colonies. What happens to the real wage rate? What happens to the real rent on capital?

2. (10) Some have proposed that we ought to have a balanced budget ammendment. Explain the pros and cons of this proposition. In discussing the cons (i.e., arguments *against* the proposition), give detailed examples.

3. (20) Following is the neoclassical (or, Solow) growth model:

$$
\begin{aligned}
Y &= K^{\alpha} L^{1-\alpha}, \ 0 < \alpha < 1, \\
\text{Household Saving} &= s \times \text{Income} \\
\Delta k &= i - \delta k,
\end{aligned}
$$

   where $0 < \delta < 1$ is the depreciation rate on capital, $0 < s < 1$ is the saving rate, i is per capita investment, and k is the per capita stock of capital. Also, K and L denotes the actual stocks of capital and people. The economy starts in a long-run equilibrium, with no population growth and no technology growth.

   (a) Suppose the saving rate increases. Explain carefully, what happens to capital and output per person and to growth over time. Where is the new long-run equilibrium?

(b) Suppose there is a jump in the population, say because of a huge wave of immigration. Suppose the new immigrants have the same saving rate as the people who were there initially. Explain carefully what happens to the amount of capital and output per person, and to the growth rate over time. Why is it important to make an assumption about the saving rate of the immigrants?

4. (25) Consider the AD-AS model:

$$
\begin{aligned}
C^d &= c_0 + c_1(Y - T),\ 0 < c_1 < 1. \\
I^d &= \overline{I} - bi \\
M^d &= PYL(i) \\
L(i) &= \overline{L} - c_2 i \\
G^d &= \overline{G} \\
T &= \overline{T} \\
M^s &= \overline{M} \\
\text{Pricing} \quad &: \quad P = (1 + \mu)W \\
\text{Wage setting} \quad &: \quad W = P^e F(u, z),
\end{aligned}
$$

where $\overline{T}$, $\overline{G}$, $\overline{L}$, $\overline{M}$, $\overline{I}$, c_0, c_1, z, μ are exogenous variables, determined outside the AS-AD model. The remaining parts of the question present several different time patterns for the endogenous variables. One of the exogenous variables is reponsible. Provide a well-reasoned guess about which exogenous variable it is. If there is a case in which more than one of the exogenous variables might have been responsible, say so. In this case, indicate what additional information you would need to identify which exogenous variable is the culprit.

(a) The price level rises and output falls. The interest rate rises.

(b) The following variables all increase: P, I, i, Y, C.

(c) The following variables all increase: P, i, Y, C, but I falls.

(d) The following variables increase: P, Y, C, I, but i falls.

5. (20) Some have argued that the government should undertake policies that would make the society's saving rate equal to the 'Golden Rule'

saving rate: the one which results in the highest long run equilibrium level of consumption.

(a) What sort of things could the government do to influence the saving rate?

(b) Suppose the economy is in a long run equilibrium with a saving rate that is lower than the Golden Rule saving rate. It is proposed that the society's saving rate should be moved upt to the Golden Rule rate. Explain carefuly the case for and the case against this proposal.