

**EC2102**

NATIONAL UNIVERSITY OF SINGAPORE

**EC2102 MACROECONOMIC ANALYSIS I**

(SEMESTER I : AY2005-2006)

Time Allowed : 2 Hours

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**INSTRUCTIONS TO CANDIDATES**

1. This examination paper contains 5 questions and comprises 7 printed pages, including two figures, Figures 1 and 2. This front page counts as page 1.
2. ALL questions are compulsory. The total number of points is 100.
3. This is a CLOSED BOOK examination.
4. Write your answers in the exam booklets provided only.
5. Write your matriculation number, your tutorial group number and/or your tutorial time slot on each exam booklet used. Number all the exam booklets used.
6. On the front page of the first exam booklet, write down how many exam booklets you used, and write down the order in which the questions were answered.

**Question 1 (15 points)**

Consider an economy with an infinitely lived representative firm which is owned by an infinitely lived representative consumer. There are  $h$  units of time each period. The representative firm has a production technology of  $Y_t = z_t F(K_t, N_t)$ ,  $t = 1, 2, \dots$ , where  $z_t$ ,  $K_t$ , and  $N_t$  are period  $t$ 's productivity (*TFP*), capital stock and labour respectively. The representative consumer values both consumption and leisure, and his per period utility function is  $u(C_t, l_t)$ ,  $t = 1, 2, \dots$ , where  $C_t$  and  $l_t$  are consumption and leisure in time period  $t$  respectively. The representative consumer has a discount factor of  $\beta$ , where  $\beta \in (0, 1)$ . The real rate of interest in time period  $t$  is  $r_t$ . Let  $w_t$  be the wage rate per unit of time worked in time period  $t$ . There is no government in this economy.

- (i) Write down the representative consumer's maximization problem in time period  $t$ . (5 points)
- (ii) Write down the representative firm's maximization problem in time period  $t$ . (5 points)
- (iii) When is the economy said to be in a competitive equilibrium? (5 points)

**Question 2 (10 points)**

Consider the monetary intertemporal model that we studied in class where there is a cash-in-advance (*CIA*) constraint.

- (i) List the three properties that money must have? (2 points)
- (ii) Write down the cash-in-advance constraint for time period  $t$ , making sure you have carefully defined all the variables used. Which of the three properties of money listed in part (i) is the defining characteristic of money in this model? (3 points)
- (iii) What is the representative consumer's budget constraint in time period  $t$ ? (3 points)
- (iv) Why is the representative consumer's budget constraint in time period  $t$  different from his cash-in-advance constraint in time period  $t$ ? (2 points)

**Question 3 (25 points)**

In the Lucas-Friedman money-surprise model, when the representative consumer observes a rise in his nominal wage in time period 1 (today),  $W_1$ , he knows that there is a chance that this is due either to a rise in today's productivity ( $TFP$ ),  $z_1$ , or a rise in today's nominal money supply,  $M_1^s$ , by the central bank. That is, the representative consumer puts a non-zero probability on either event having occurred.

Suppose that the representative consumer observes a rise in  $W_1$ . In reality, this rise in  $W_1$  was caused by a rise in  $z_1$ . Explain carefully, using graphs, the resulting effects in time period 1 in the labour, goods, and money markets, supposing that all of these markets were initially in equilibrium before the rise in  $W_1$ . Also explain how consumption and investment in real terms are affected, and why.

**Question 4 (25 points)**

Let us consider the monetary intertemporal model studied in class, where all prices are fully flexible. Suppose that the economy is initially in an equilibrium. The labour, goods and money market equilibria in time period 1 are illustrated in Figure 1, and the government's lifetime budget constraint holds.

Now suppose that the government announces at the beginning of time period 1 that it will increase spending in time period 1 by  $\Delta$ , and that it will decrease its expenditures in time period 2 by  $\Delta(1 + r_1)$ . All announcements made by the government are credible and known to the public.

Explain what happens to the government's lifetime budget constraint. Then explain the impact of this change in government expenditures on the decisions made in time period 1 by the representative consumer and the representative firm. And with the aid of graphs, illustrate the impact of this on equilibria in the labour, goods, and money market in time period 1, and explain how consumption and investment, in real terms, have changed in time period 1.

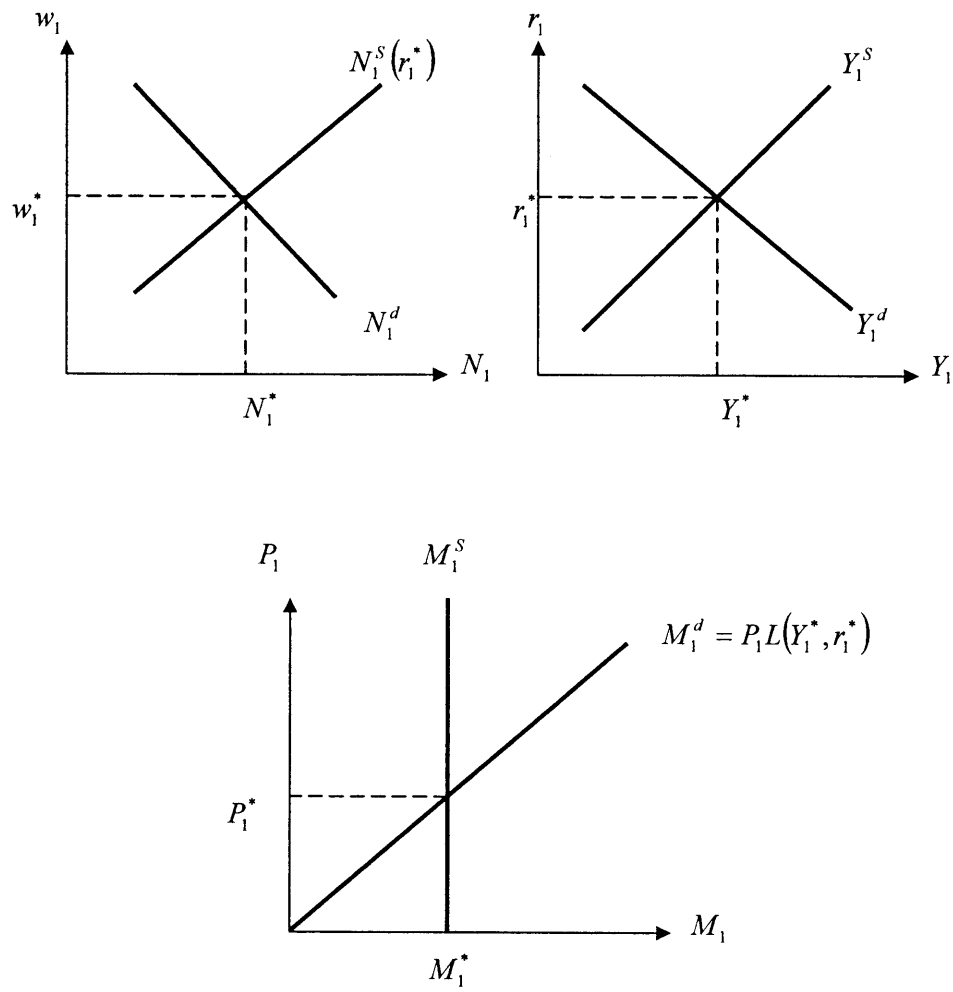
**Question 5 (25 points)**

In the Keynesian sticky (nominal) wage model, suppose that the economy in time period 1 is initially as described in Figure 2: the real output is  $\hat{Y}_1$ , the real rate of interest is  $\hat{r}_1$ , the price level is  $\hat{P}_1$ , and the fixed nominal wage in time period 1,  $\bar{W}_1$ , is such that the implied real wage in time period 1,  $\hat{w}_1$ , where  $\hat{w}_1 = \bar{W}_1/\hat{P}_1$ , is above the market clearing real wage in the labour market.

Suppose that the government spends  $G_t$  and taxes  $T_t$  in real terms in time period  $t$ . Further, let us assume that the government always spends  $G$  every period ( $G_t = G$  for all  $t$ ). The government is also the central bank, and issues money  $M_t$  in time period  $t$ . The government's decisions are such that its lifetime budget constraint holds.

Now suppose that the government announces that it will increase its spending in time period 1 by  $\Delta$ , so that the new level of government expenditures in time period 1 is now  $\hat{G}_1$ , where  $\hat{G}_1 = G + \Delta$ . The government announces that it intends to keep all its expenditures in all other time periods fixed at  $G$ , that today's tax rate is unchanged, and that it does not intend to change money supply, either now or in the future. The purpose of this increase in government expenditures today is to restore equilibrium in the labour market. All announcements made by the government are credible and known to the public.

Explain the impact of this change in government expenditures in time period 1 with the aid of graphs.

**Figure 1**

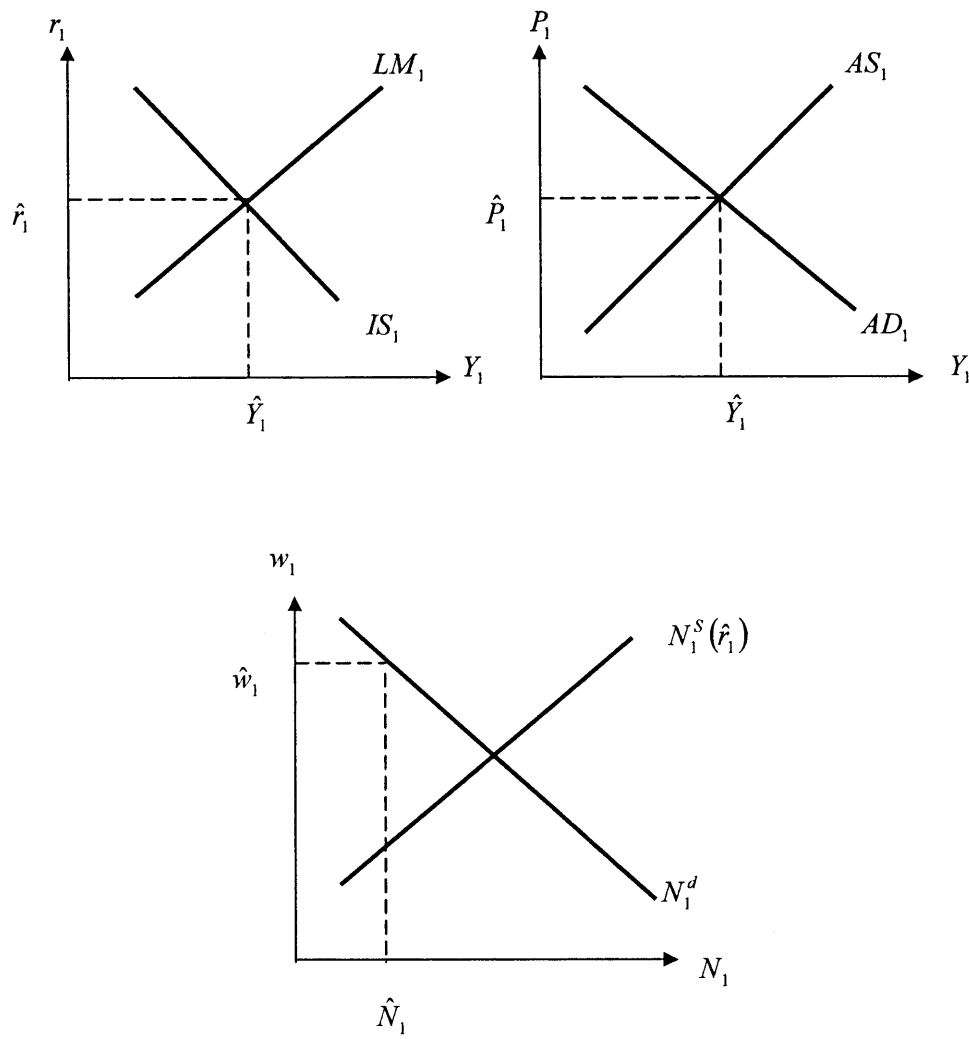


Figure 2

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