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ECO2142 Macroeconomic Theory I
Final Exam

Note: This exam has 7 problems and 150 points. Let t be the total number of points that you get. Your grade will be $= \frac{t}{150} * 100\%$.

Problem 1: Theoretical knowledge of the $IS - LM$ model (50 points)

Consider a closed economy. Let $C(Y - T, i)$ be the consumption function and $I(Y, i)$ the investment function. Y represents total output and i, the interest rate. Assume that government spending, G, and total taxes, T, are exogenous.

a) Is consumption an increasing or a decreasing function of disposable income and interest rate? Explain. (5 points)

b) Is investment an increasing or a decreasing function of total output and interest rate? Explain. (5 points)

c) Explain how equilibrium output is obtained for a given interest rate. (5 points)

d) Explain how the IS curve is obtained. What does a point of this curve represent? (5 points)

Suppose now that liquidity demand is given by $L(Y, i)$.

e) Is $L(Y, i)$ an increasing or a decreasing function of total output and interest rate? Explain. (5 points)

f) Describe the equilibrium on the financial market. (5 points)

g) Explain how the LM curve is obtained. What does a point of this curve represent? (5 points)

h) Explain how the equilibrium of the $IS - LM$ is obtained. (5 points)

i) What is the impact of a decrease in government spending on total output, Y, and on the interest rate, i. (5 points)

j) What is the impact of a decrease in government spending on private investment, I. (5 points)

Problem 2: Micro-foundation of Unemployment (10 points)
Many microeconomic models have presented rational arguments explaining the presence of unemployment in a market economy.

a) Give the intuition underlying Shapiro and Stiglitz's shirking efficiency wage model. (5 points)

b) Give the intuition underlying Salop's labor turnover efficiency wage model. (5 points)

Problem 3: Nominal Wage Rigidity and the Aggregate Supply (25 points)
Consider an economy in which the production sector can be represented by a representative competitive firm (this implies that the firm is a price taker). The firm's production function is $Y = f(N) = N^{0.5}$. Let P be the price level and ω be the nominal wage. The labor supply in this economy is given by $N^s = \omega/P$

a) Write down the profit function of the firm. (5 points)

b) What is the firm's labor demand for a given nominal wage ω and an expected price level P^e? (5 points)

c) If the expected price level is equal to 1, what is the equilibrium nominal wage? (5 points)

d) Assume now that the nominal wage found in (c) is rigid. What is the firm's labor demand as a function of the price level P? (5 points)

e) What is the aggregate supply AS of this economy? (5 points)

Problem 4: The Macroeconomic Equilibrium (10 points)

a) Explain how the aggregate demand AD is obtained from the $IS - LM$ model. (5 points)

b) Explain how the macroeconomic equilibrium is obtained from the aggregate demand, AD, and the aggregate supply, AS. (5 points)

Problem 5: Macroeconomic Policies (15 points)
Consider an economy that produces initially (at $t = 0$) at its natural level $Y_0 = Y_n$. Assume that $P_t^e = P_{t-1}$.

a) What are the short run and medium run impacts of a reduction in government spending on the level of production, the price level and on private investment? *Assume that public spending has no impact on the production sector or on the labor market.* (5 points)

b) Consider an increase of money supply ΔM^s that has exactly the same short run impact on total production than an increase in government spending ΔG. Compare the short run and medium run impacts of those two policies on total production Y, the price level P, on the interest rate i and on private investment I. (5 points)

c) What are the short run and medium run impacts of a permanent increase in the price of oil on the level of production and the price level? (5 points)

Problem 6 (20 points)
Consider an economy that is described by the following equations:

- Okun's law: $u_t - u_{t-1} = -0.4 \cdot (g_{yt} - 0.03)$
- Phillips curve: $\pi_t - \pi_{t-1} = -(u_t - 0.05)$
- Aggregate demand: $g_{yt} = g_{mt} - \pi_t$.

a) What is the natural rate of unemployment? (5 points)

b) Assume that this economy is at the medium run equilibrium. Assume that the unemployment rate is equal to the natural rate and that the inflation rate is 8%. What is the growth rate of the money supply? (5 points)

c) Assume now that the central bank decides to reduce the inflation rate at 4% in four years ($\pi_t = 7\%$, $\pi_{t+1} = 6\%$, $\pi_{t+2} = 5\%$ and $\pi_{t+3} = 4\%$) and keep it there. What must happen to the unemployment rate and output growth in years t, $t+1$, $t+2$, $t+3$ and $t+4$? (5 points)

d) What money growth rate in years t, $t+1$, $t+2$, $t+3$ and $t+4$ will accomplish this goal? (5 points)

Problem 7 (20 points)
Consider the following open economy. The real exchange rate, $\varepsilon = 1$, the price level, $P = 1$ and the interest rate, i, are constant. The following behavioral equations describe the economy:

- Consumption: $C = 10 + 0.8 \cdot (Y - T)$.
- Investment $I = 10$.
- Government spending: $G = 10$.
- Taxes: $T = 10$.
- Imports: $M = 0.3Y$.
- Exports: $Q = 0.3Y^*$.

Y and Y^* represent respectively national income and foreign national income.

a) Solve for the equilibrium income in the domestic economy, given Y^*. (5 points)

b) Assume that the foreign economy has the same equations as the domestic economy. Solve for the equilibrium income of each country. (5 points)

c) What is the increase in G necessary to achieve $Y = 125$ assuming that G^* remains constant? (5 points)

d) What is the common increase in G and G^* necessary to achieve the same targeted output? (5 points)