

METU Department of Economics

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ECON 204 Macroeconomic Theory II - Section 1 (Voyvoda)  
Spring 2023-24

**MIDTERM 2 (16<sup>th</sup> May 2024, 17:30)**

(120 min)

SHOW ALL CALCULATIONS CLEARLY. MARKS WILL BE DEDUCTED OTHERWISE

**Q1. (12p)** Think of the problem of a **representative household** in a 1-period static model. Now, give an example of (a) a positive, pure income effect for a representative consumer. (b) Give an example that represents a combination of income and substitution effects for a representative consumer. **Explain both (a) and (b) briefly.**

**Q2. (10p)** Think of the problem of a **representative firm** in a 1-period static model. Suppose that there is a **proportional tax (with a tax rate  $t$ ) on the firm's total profits**.

a. How will the firm's total (net) profits function to maximize change? Write down the firm's profit function **and explain**.

b. Determine the effects on the firm's labor demand ( $N^d$ ) decision. **Derive the optimal condition** for the firm and **explain**.

**Q3.** (8p) We have learnt during the lectures that the first welfare theorem fails to hold if,

- a. there are externalities,
- b. if there are public goods,
- c. if there are proportional taxes,

Choose **one of the conditions above** and explain **WHY the** first welfare theorem fails to hold if the condition is observed.

**Q4. TRUE/FALSE/UNCERTAIN? Explain** (each 6 p).

- a. Think of the problem of a representative household in a 1-period static model. Suppose that there is a (proportional) tax on wage income. Consumer optimization under a tax on wage income would imply

$$MP_N > MRS_{l,c}$$

- b. “In the simplified one period model with a distorting tax on wage income, an equilibrium with a lower tax rate **always implies** higher welfare than a high-tax-rate equilibrium.”

- c. Think of the problem of a representative firm in a 1-period static model. Suppose the firm is operating under a Neo-classical production technology. “As the quantity of capital increases, the marginal product of labor increases”.

- d. Think of the problem of a representative firm in a 1-period static model. Suppose the firm is operating under a Neo-classical production technology. “Labor demand is decreasing in the wage because the substitution effect is larger than the income effect.”

- e. In the one-period model, to determine the income effect, we need to first determine the substitution effect, which is a movement along an indifference curve in response to a change in the slope of the production possibilities frontier.

**Q5. (40p)** Consider a 1-period static model of competitive equilibrium. There are many households that are identical with preferences of the form:

$$U(C, l)$$

where  $c$  is the consumption,  $l$  is leisure.

The households have a limited amount of time at their disposal,  $h$ , and have the choice to use it doing leisurely activities that give them utility (going out, reading a book etc.) or work (let the labor supply of household be  $N^s$ ) and get paid the market wage  $w$ . Each household also own an equal share of the firms in this economy and get profit income from them. There is also a government that uses lump-sum taxation to extract  $T$  from the households, to finance its expenditures  $G$ .

Production of the consumption good in this economy is done by a large number of identical firms that have the following technology, where  $K$  is the fixed capital stock of the economy and  $N^d$  is the labor demand by the firm and  $z$  is the exogenous TFP level.

$$Y = z F(K, N^d)$$

- a. (4p) What are the exogenous variables in this model? What are the endogenous variables? What are the parameters of the model? **Explain each.**
- b. (4p) Write down the utility maximization problem of the representative household. What are the choice variables for the household? **Explain.**
- c. (4p) Write down the profit maximization problem of the representative firm, what does the firm choose? **Explain.**
- d. (12p) Define the **competitive equilibrium of this economy**; be precise.
- e. (6p) On a relevant graph, show the components of competitive equilibrium. **Explain.**
- f. (10p) Suppose now that the representative consumer's preferences change, in that his or her marginal rate of substitution of leisure for consumption increases **for all levels of consumption / leisure**.

What effects does this have on the equilibrium real wage, hours worked, output, and consumption? Show the new competitive equilibrium on your graph and explain.