ECO419 — Final Exam — Fall 2014

Time Allowed: 85 minutes

Points Available: 50 pts

Questions

1. The World Economy

- Imagine a world economy with M countries. Let $m \in \{1, 2, ..., M\}$ be the corresponding index variable.
- There are two produced goods in this world—good A and good B. Both A and B are tradable goods.
- There are two primary inputs in this world—land (L) and labor (H). These inputs are immobile across countries.
- Use the following notation:

$$\begin{array}{rcl} Y^j(m) & : & \text{total production of good } j \text{ in country } m \\ C^j(m) & : & \text{total consumption of good } j \text{ in country } m \\ E^i(m) & : & \text{total endowment of input } i \text{ in country } m \\ Z^i_j(m) & : & \text{total use of input } i \text{ in the production of good } j \text{ in country } m \end{array}$$

- **Question (a)**— Suppose that the entire endowment of any input is supplied inelastically in any country. Write down all the market clearing conditions in a self-explanatory and compact way **(5 pts)**.

2. A Simple Input-Output Model

- There are $n \in \mathbb{N}_{++}$ produced commodities and the labor force. The labor force—a non-produced good—is homogeneous.
- Each commodity is produced by means of other commodities and the labor force. Specifically, $a_{ij} \geq 0$ units of good i and $L_j \geq 0$ units of the labor force are required to produce a unit of good j.
- Define the $n \times n$ matrix A and the $1 \times n$ vector L as in

$$A = (a_{ij}) \quad \text{and} \quad L = (L_j)$$

- Let p denote the $1 \times n$ vector of commodity prices, and normalize the money wage to unity. The $1 \times n$ vector of the unit costs of production is thus defined as in

$$pA + L$$

- **Question (a)**— Write down the matrix equation solving for p under perfect competition **(5 pts)**.
- **Question (b)**— Write down the matrix equation solving for p under imperfect competition such that there is a unique mark-up $\pi > 0$ over the unit cost for all j **(5 pts)**.

Table 1: Social Accounting Matrix for the Redistribution Problem

	Ken	***Leo***	***Government***	***Industry 1***	***Industry 2***	***Industry 3***
Ken	**0**	**0**	**30**	**0**	**0**	**0**
Leo	**0**	**0**	**0**	**15**	**10**	**20**
Government	**0**	**0**	**0**	**10**	**15**	**5**
Industry 1	**10**	**15**	**0**	**0**	**0**	**0**
Industry 2	**10**	**15**	**0**	**0**	**0**	**0**
Industry 3	**10**	**15**	**0**	**0**	**0**	**0**

Careful: Incomes in rows, expenditures in columns!

3. Redistribution

- Imagine an economy with two individuals (Ken and Leo), three industries (1, 2 and 3), and a government.
- Each industry produces a distinct good. These goods are consumed by Ken and Leo.
- Leo is the lucky(!) guy; he owns all the firms in the economy. Leo's income originate solely from firm ownership.
- Ken does not own any firm, and the only source of income for him is the government's transfer.
- The government collects taxes from industries and redistributes the total tax revenue (*Careful*: Leo gets nothing according to the given SAM.)
- **Question (a)**— Find the average tax rate across industries **(15 pts)**.
- **Question (b)**— Suppose that Ken and Leo have identical preferences represented by the utility function $\boldsymbol{u(x_1, x_2, x_3) \equiv x_1^a x_2^b x_3^c}$ with $\boldsymbol{a, b, c > 0}$. Can you calibrate these parameters? What additional assumptions would be necessary? Explain **(15 pts)**.
- **Question (c)**— Write down a social accounting matrix such that
  - there is no government,
  - Ken and Leo own all the firms with equal ownership shares,
  - they have the same level of income, and
  - they have the same level of consumption (as their utility functions are identical).

  Which allocation is better(!)—the perfectly egalitarian one without government and taxes <u>or</u> the one with some inequality and redistribution? Explain **(5 pts)**.