

simple equations for production theory

Theodoros Gevezes

the following correspond to a **group**:

N is the number of individuals

W is the time of period that can be considered as the base of our periodic phenomenon, e.g. $W = \text{"a week"}$

h_i are the working hours of the individual i during W , for $i = 1, 2, \dots, N$

M is the number of distinct goods (tangible properties and services)

q_{ij} is the quantity of the good j produced by the individual i in 1 hour

$q_{ij} = f(i, j)$ is a function of the individual *and* the good

h_{ij} are the hours that the individual i produces the good j during W

constraint: $\sum_j h_{ij} = h_i$, for all $i = 1, 2, \dots, N$

Q_{ij} is the total quantity of the good j produced by the individual i during W

$Q_{ij} = q_{ij}h_{ij}$, for all $i = 1, 2, \dots, N, j = 1, 2, \dots, M$

Q_j is the total quantity of the good j produced during W

$Q_j = \sum_i Q_{ij}$, for all $j = 1, 2, \dots, M$

a_j is the percentage of the quantity of the good j produced during W that is *usable* after the effect of several factors (transportation, wastage, transactions, bidding, exchanges, processing, ...). this stage is the link between different groups

$a_j \in [0, 1]$

S_j is the *usable* quantity of the good j for consumption

$S_j = a_j Q_j$, and so $S_j \leq Q_j$, for all $j = 1, 2, \dots, M$

p_{ij} is the percentage of the good j that corresponds to the individual i

constraint: $\sum_i p_{ij} = 1$, for all $j = 1, 2, \dots, M$

S_{ij} is the quantity of the good j that corresponds to the individual i for consumption during W (the individual can enjoy, consume, or waste this quantity)

$$S_{ij} = p_{ij}Q_j, \text{ for all } i = 1, 2, \dots, N, j = 1, 2, \dots, M$$