

Computer problems 07

Task 1. Microland is home to 1000 workers with Stone's welfare function, the propensity to work is distributed uniformly on the interval [0.2; 0.8]. The following laws apply in the country: workers have no additional income except their salary, everyone pays a tax of 10% of their total income, no one can work more than 14 hours a day, the subsistence minimum in the country is 120 units. Estimate the labour supply function in Microland using a simulation model.

Task 2. Create a simulation model that reflects the behaviour of personal income taxpayers in Ukraine. The model should take into account the following factors:

1. Personal income tax rate (including military levy) - the current personal income tax rate in Ukraine.

2. Social Security tax rate - a percentage of the Social Security tax rate

3. Administrative pressure - the probability that the payer will be held liable for evading personal income tax.

4. Personal income taxpayers - simulation agents who represent individuals with different income levels. Each agent decides on paying or evading personal income tax based on the tax rate and administrative pressure. Payers include individuals, sole proprietors, company owners, and persons working under civil law contracts.

Task 3. In the labour market, a firm hires workers to perform a certain amount of work each month. There are two types of workers: high-productivity (high-productivity) and low-productivity (low-productivity). The firm cannot determine the type of worker before hiring (asymmetric information), but it knows the total share of high-productivity workers in the market. Workers decide whether to accept a job offer based on the offered salary, and the firm tries to maximize its profit. Model the labour market for 120 months and investigate how asymmetry affects equilibrium.

High-productivity workers (HP) create value for the firm of 100 conditional units per month, their minimum wage is 70 units. Low-productivity workers (LP) create value for the firm of 50 conditional units per month, the minimum wage is 30 units. Initially, the HP share in the market is 60% ($a_1=0.6$). A firm offers a single wage W_t to all workers in the month (t), based on expected productivity:

$W_t = a_t \cdot 100 + (1 - a_t) \cdot 50$. If a certain type of worker does not accept the offer, their share in the labour market changes in the following month according to a certain lag function. Unemployed workers can either leave the labour market or gradually return to it.

Analyze how the initial share of VP affects the equilibrium over 120 periods.