economic development and low poverty rates, higher unemployment rates may be observed. In some countries, which are characterized by relatively low unemployment and low social assistance effectiveness, citizens are forced to exist under conditions of vulnerable employment. At the same time in countries with well-developed social security networks, workers can afford to wait for a job offer with a respect to their qualifications or desirable positions.

This research has thrown up many questions in need of further investigation. It would be also interesting to assess the effects of the shadow economy on the Ukrainian labor market in further researches.

References

1. Weiner, Stuart E. (1993) "New Estimates of the Natural Rate of Unemployment" Economic Review – Federal Reserve Bank of Kansas City, fourth quarter, pp 53-69.
2. Official site of the International Labor Organization [Electronic source] – Access mode: https://www.ilo.org/global/lang--en/index.htm
3. Official site of the State Statistics Service of Ukraine [Electronic source] – Access mode: http://www.ukrstat.gov.ua/
4. Faryna O., Dadashova P. (2015) "Conceptual approaches to the construction of the macromodel of the economy of Ukraine by system dynamics methods" – NaUKMA, 64 P.
5. Лук'яненко, І., Віт, Д. (2017). Системний аналіз формування державної політики в умовах макроекономічної дестабілізації.
6. Прімєрова, О., Дадашова, П. (2015). Вивчення економіки методами системної динаміки в Національному університеті" Києво-Могилянська академія".
7. Abakumova, J., Primierova, O. (2018). Globalization, growth and inequality: testing causality and asymmetries. Ekonomicko-manazerske spektrum, 12(2), 83-95.

Natalia Dubrovna
4th-year students, LNU

**SYSTEM DYNAMIC MODEL OF NATIONAL INCOME
AND GOVERNMENT SPENDING**

Let's consider the macroeconomic model of the commodity market, which was constructed using the methods of system dynamics. The constructed dynamic model (Figure 1) describes the relationship between government spending, expenditure, income and consumption.

Variable models are described by the following equations:

Consumption = exogenous consumption +

+ propensity to consume*SMTH1(disposable income; time to adj consumption); (1)

Investment = exogenous investment +

+ interest effect on investment*SMTH1(interest rate 1; time to adj investment); (2)

Disposable income = real income - government spending; (3)

Real income = SMTH1 (real expenditures; time to adj income; 2000); (4)
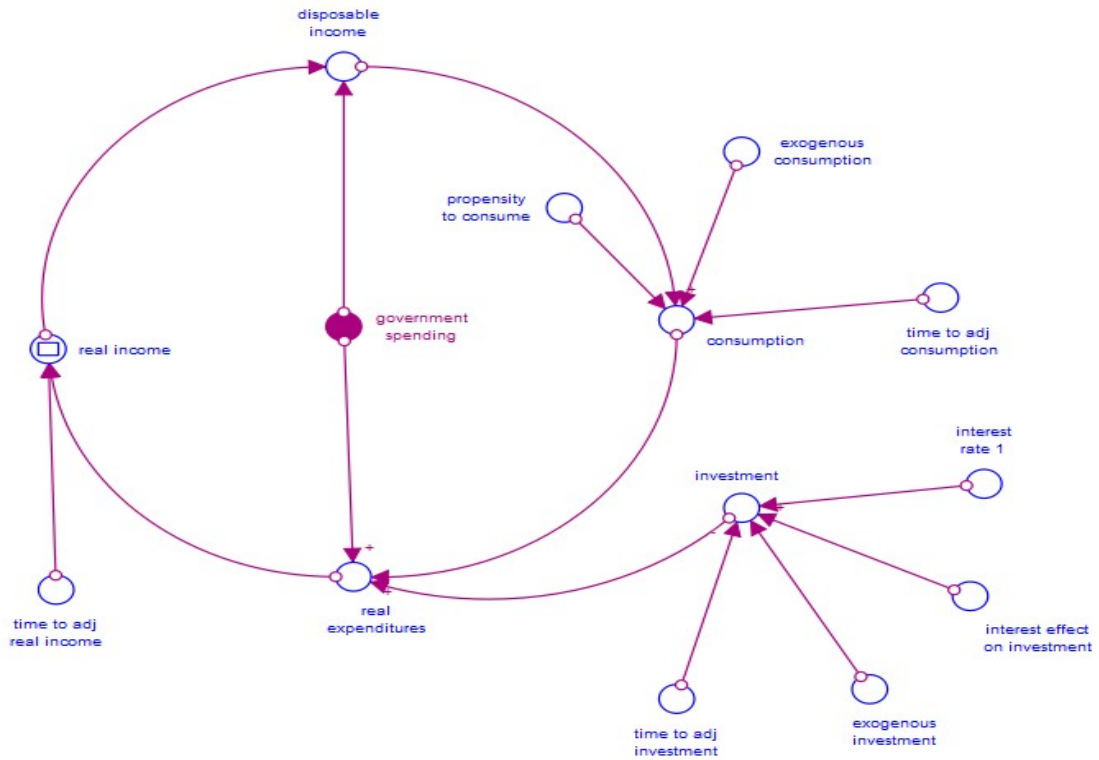Real expenditures = consumption + investment + government spending. (5)

Figure 1. **System dynamic model of national income**

The equation (5) describes the variable Real expenditures E = C + I + G. The constructed model makes it possible to investigate the impact of fiscal policy instruments, in particular Government spending (G) on real Expenditures (E) and Income (I). Change Government spending (G) as follows:

Run 1 government spending = 320; Run 2 government spending = 400
Run 3 government spending = 450; Run 4 government spending = 500
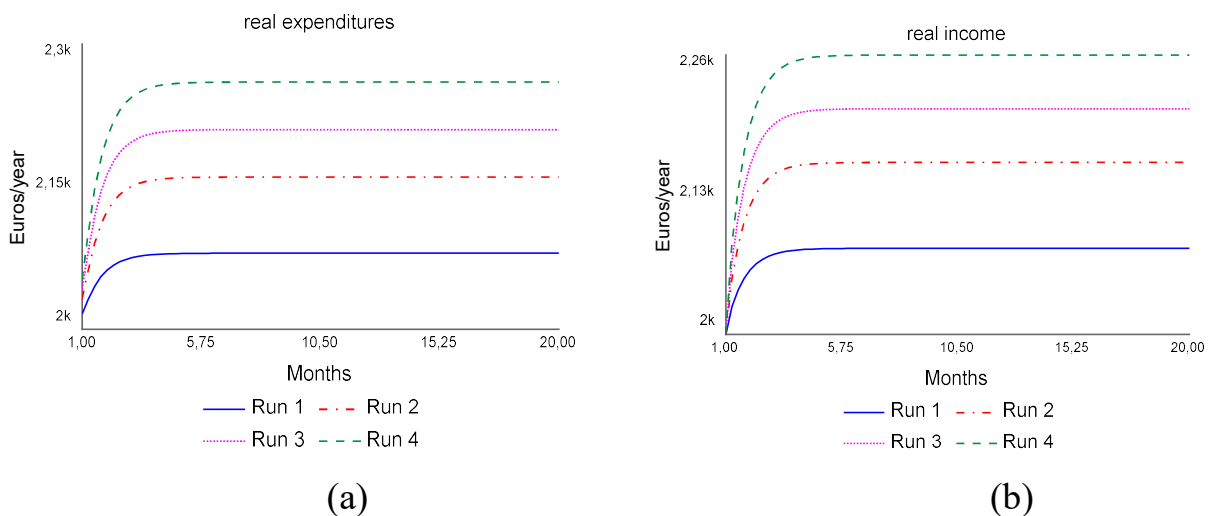

(a)   (b)

Figure 2. **Dynamics (a) of expenditures and (b) national income at different levels of government spending**

Government spending is shifting the expenditure line upwards, which in turn increases the equilibrium income (income). Decreasing the investment costs reduces the planned real expenditures (E) in the economy and shifts the graph of planned expenditures downwards, which in turn reduces the balance of income levels (Y), that is, the national income will increase due to government spending growth. We can easily see it by constructing a comparative graph for income (income). Note that the the increase in income ΔI exceeds the increase in government spending ΔG. Fiscal policy leads to a multiplicative increase in income. That is, G increase by ΔG then I increase by ΔI, where:

$$\Delta I = \Delta G , \qquad\qquad 0 < MPC < 1 ;$$

MPC - Marginal Propensity to Consumption. The multiplier shows how much the income grows if the government spending is increased by one monetary unit .

References

1. Romer, D. (2012). Advanced macroeconomics. University of California, Berkeley.
2. Sterman, J. D. (2000). Business Dynamics: Systems Thinking and Modeling for a Complex World. New York, Irwin. McGraw- Hill. 982 p.
3. Shone, Ronald (2003). An Introduction to Economic Dynamics, Cambridge, New-York, 224 p.
4. Лук'яненко, І., Віт, Д. (2017). Системний аналіз формування державної політики в умовах макроекономічної дестабілізації.

Oleksandr Hnatiuk
4th-year students, LNU

IMPACT OF TAX RATE ON THE GDP LEVEL IN TWO COUNTRIES: SYSTEM DYNAMICS MODEL

The research considers a Keynesian model that take into account relationship between aggregate demand, import and export of two countries. Aggregate demand is determined by the following formula:

$$AD(t) = C(t) + I' + G' + NX(t),$$

where I' and G' is a investment and government spending respectively, C(t) – consumption, NX(t) – net export,

$$C(t) = C' + b*Yd(t),$$

where C' is a consumption, b is a marginal propensity to consume and Yd(t) is a disposable income.

$$NX(t) = X' – m*Y(t) – M',$$

where M' is a import, X' is an export that are exogenous. Y(t) is a national income and m is a marginal propensity to import.

To study the dynamics of the described model we use the system dynamics, and this model is depicted in Figure 1.