

SYSTEM DYNAMIC MODEL OF NEW KEYNESIAN MODEL

The current stage of economic development is characterized by a dynamic, accelerated change in socio-economic phenomena. In this regard, special attention is paid to the ability of government bodies (state, regional, corporate) to take appropriate effective measures in a timely manner, the justification of which is implemented using simulation modeling as a tool for multivariate forecasting and analysis of systems of high complexity.

The most important problems in the national economy are: unemployment (employment), inflation (prices), economic growth. So the question is: what should be the volume of output to address these issues?

Macroeconomics examines the problems of economic growth and economic cycles, employment, inflation, analyzes the state of the state budget and the balance of payments of the country. Coordination of economic agents and the interconnections of different markets, real and monetary sectors of the economy are investigated within the framework of the theory of general economic equilibrium.

Consider a simulation model of the economic cycle, Keynesian dynamic model, which includes the goods market, which presents two economic agents - a household and a company:

$$Y_t = C_t + I_t + G_t, \quad (1)$$

$$C_t = gY_{t-1} + C_0, \quad (2)$$

$$I_t = b(Y_{t-1} - Y_{t-2}) + I_0, \quad (3)$$

$$G_t = c_1 Y_{t-1} + c_2 Y_{t-2} + u_t, \quad (4)$$

where

C_t – consumption;

I_t – investment;

G_t – government spending;

Y_t – national income;

g – marginal propensity to consume;

b – accelerator of monetary policy;

c_1, c_2 – coefficients that describe the proportion of national income used for public consumption (social policy);

C_0, I_0 – autonomous consumption and investment; u_t – random variable.

Equation (1) is an axiomatic identity in macroeconomics. Equation (2) shows that the consumption of the current period is determined by the income of the previous period. Equation (3) is based on the assumption that entrepreneurs make investments after being convinced that national income growth is steady in the previous period.

If investment increases, then, according to the multiplier principle, aggregate demand and income increase. Increase in income causes fluctuations in derivative investments. Thus, the effect of the multiplier causes the action of the accelerator. The behavior of the economic system depends on b and g . The upper limit is the level of full employment. The lower limiter is the amount of depreciation.

Figure 1 shows the system dynamic model that takes into account the structure of relations (1) – (4):

- 1) Consumption = Consumption Fraction * Output,
- 2) Government Spending = $0.1 + 0.1 * \text{PULSE}(4, \text{TIME STEP})$;
- 3) Investment = Investment Multiplier*(Output – Previous Output),
- 4) New Output is modeling of current national income:

$$\text{New Output} = \text{Investment} + \text{Consumption} + \text{Government Spending};$$
- 5) Output is national income of the previous period:

$$\text{Output} = \text{INTEG} ((\text{New Output} - \text{Output})/\text{TIME STEP}, 1);$$
- 6) Previous Output is national income at time $(t - 2)$:

$$\text{Previous Output} = \text{INTEG} ((\text{Output} - \text{Previous Output})/\text{TIME STEP}, 1).$$

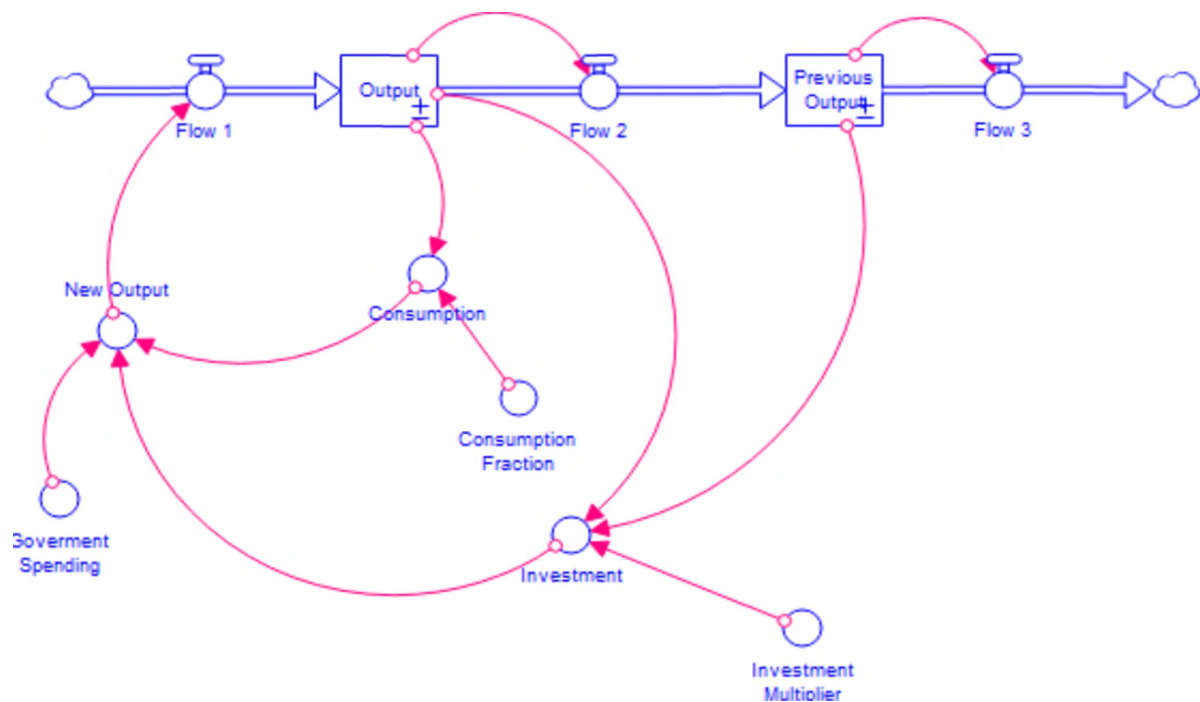


Figure 1. System dynamic model of the economic cycles

Achieving sustainable economic growth is a key element of the economic strategy, a common reference point for the country's economic policies of most states. Indeed, economic growth has always been considered an indicator of the effectiveness of the economic system and remains an important condition for its development. It is associated with the formation of economic and social conditions, in order to ensure changes in the level and quality of life, overcome poverty and reduce economic inequality in the country. This defines the necessity of deeper

research and development of the model being built, that can be used for further research and policy recommendations.

References

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SYSTEM DYNAMIC MODEL OF ENDOGENOUS ECONOMIC GROWTH FOR NORTH AND SOUTH COUNTRIES

The large difference in the levels of economic development between the countries has made many views of the world as being divided between the rich North and the poor South. We built the model of endogenous economic growth for these two kinds of countries. The model is based on the relationships between output, Y , knowledge, A , capital, K , and labor, L .

We assume that the output and capital accumulation in region i ($i = N, S$) is given by

$$\begin{aligned} Y_i(t) &= (K_i(t))^\alpha [A_i(t)(1 - a_{Li}) L_i]^{1-\alpha}, & (1) \\ K_i(t) &= s_i Y_i(t), & (2) \end{aligned}$$

where a_{LN} – fraction of the labor force used in the resources and development sector that is located in North,

a_{LS} – fraction of the labor force engaged in learning Northern technologies,

a_{Li} – endogenous and constant,

$1 - a_{Li}$ – fraction of the labor force used in the goods-production sector,

α – elasticity of capital in goods-production sector, so it is a variable that measures the reaction of output to a change in levels of capital,

$1 - \alpha$ – elasticity of labor in goods-production sector,

s_i – saving rate.

Technologies or knowledge can be produced at first only in North, after that they become to be available to South. So new knowledge in North are given by third equation: