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SAMUELSON HICKS'S DYNAMIC ECONOMIC MODEL

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Abstract: The article analyzes the basic principles of the Samuelson-Hicks dynamic economic model , including the interactions of the multiplier and accelerator, as well as economic cycles and their impact on the modern economy. The relevance of the model for economic systems and politics is shown, and its application to economic growth, stability and economic policy formulation is emphasized. The article discusses the limitations of the Samuelson-Hicks model and the need for its modernization, in particular, taking into account external factors and technological development. Suggestions for the development of a model for effective management of economic policy and sustainable economic growth are also given.
Key words: Paul Samuelson, John Hicks , mathematical model, Samuel - Hicks , economic efficiency.

Introduction

Samuelson model The Hicks model is a mathematical model designed to explain business cycles and dynamic changes. The model was created by Paul Samuelson and John Hicks and is used to analyze economic tactics in the economy and study stability. The purpose of dynamic economic models is to observe and predict changes that will occur in the economy over time . The Samuelson-Hicks model explains exactly this process using a mathematical approach. Paul Samuelson and John Hicks are among the first scientists to apply dynamic analysis in economics. They aim to explain various business cycles in the economy through mathematical modeling. Key Points changes in the economy in models Samuelson and Hicks :

- Investments
- Level consumption
- State expenses
- Market conditions

Its purpose is to explain how these changes affect the economy over time depending on such factors.

In the Samuelson-Hicks model, changes in the main indicators of economic activity are represented **by differential equations** or **differential equations**. Model, **permanent income in the economy** and mathematically explains the relationship between **periodic incomes. With the help of these models, cycles** and **trends** in the economy can be identified. The Samuelson-Hicks model explains how business cycles occur. The main variables here are GDP, interest rates, investment volume and consumption level. The model is used to explain how growth and recession are formed in the economy. For example, an increase in investment can lead to an increase in the level of income and production in the economy.

Stability analysis plays an important role in the Samuelson-Hicks model . The model allows us to study under what conditions the economy is stable or unstable. Dynamic models consider under what conditions the economy can achieve stability or, conversely, under what conditions it can lead to an economic crisis.

Analysis of various inter-period changes in the economy . It is used to explain how economic cycles arise and how they stabilize. This model helps to conduct more accurate economic analysis, which is important for understanding economic changes and market conditions.

Overall, the Samuelson-Hicks model is an effective tool for explaining growth, decline and stability in the economy. Thanks to the mathematical approaches of the model, complex economic processes are expressed in a simpler and more understandable way. This facilitates economic analysis for economists and experts and helps in the process of making economic decisions.

Literature review

Samuelson–Hicks model is a model of dynamic economic analysis developed in the mid-20th century and used to explain business cycles (changes in a market economy). The model was developed by two prominent economists, Paul Samuelson and John Hicks.

History of John Hicks: In the 1930s, as research on economic growth and business cycles developed, John Hicks further explored Keynesian economic ideas and became famous for his IS - LM model. He interpreted the relationship between investment and savings (the IS curve) and the money market (the LM curve) to explain changes in economic policies and economic systems.

Paul Samuelson and the acceleration principle: Paul Samuelson studied the dynamic characteristics of economic processes and focused on the acceleration principle. Based on this principle, he analyzed the relationship between consumption and investment and showed how changes in the level of production affect changes in investment in the economy.

Samuelson-Hicks Model: The Samuelson-Hicks model combines Keynesian analysis and the acceleration principle. In this model, economic processes are analyzed using various variables and explain how various dynamic changes occur in the economic growth processes.

Acceleration and multiplier effects. The model explains how the economy changes over time based on acceleration and multiplier effects. These effects manifest themselves, for example, in how changes in the level of consumption affect the level of investment and production.

Business Cycles: The Samuelson-Hicks model is used to explain economic changes and business cycles (such as booms and busts) through mathematical and graphical analysis. According to this model, various internal and external factors in the economy create economic growth and recession.

Research Methodology

Main factor and the features of this model: The model includes IS - LM and AD - AS analysis . The model analyzes the relationship between income and consumption. This model provides an understanding of the relationship between investment, production and economic policies. This model is very useful for analyzing economic growth, business cycles and explaining the effects of economic policies.

Analysis and discussion of results

Samuelson-Hicks model is used in economics to explain business cycles. This model takes into account the dynamic interactions between aggregate demand and aggregate supply. Samuelson-Hicks Model uses mathematical equations and dynamic concepts to predict changes in economic indicators over time.

Samuelson-Hicks model examines the relationship between investment, savings, and other economic factors. The model explains that business cycles arise from changes in the balance between aggregate demand and aggregate supply.

Time-dependent changes in the model are represented by mathematical equations. Main the goal is mathematical analyze phases growth and decline economy.

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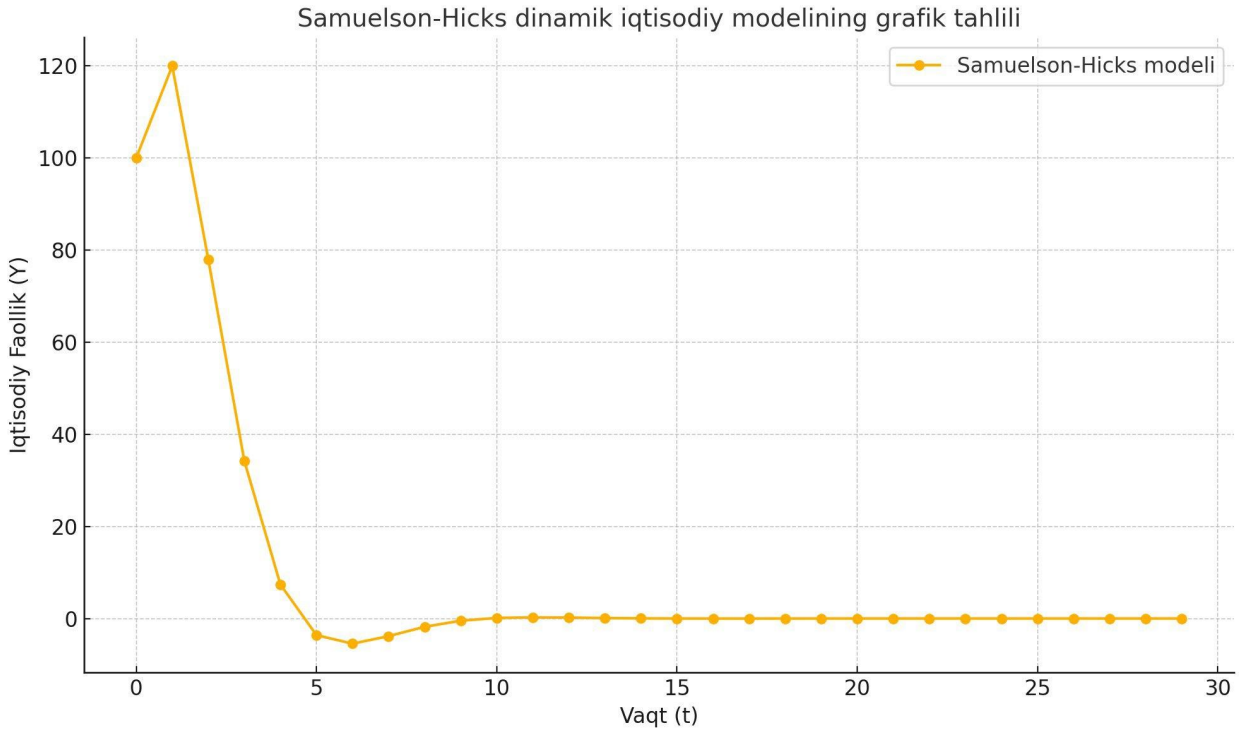

Basic elements of the diagram:
1. Initial values: the graph starts with the $Y_0 = 100$ and $Y_1 = 120$, which represent the initial levels of economic activity.
2. Fluctuations. The chart reflects economic cycles. Upswings indicate economic growth, and downswings indicate economic stagnation.
3. Damping: the amplitudes of oscillations decrease over time, indicating stabilization of the economy.
Although the level of economic activity in the graph initially has high fluctuations, the amplitude of the fluctuations decreases over time. This indicates that economic activity is approaching a state of stable equilibrium.
Steady state approach: Over time, the economy reaches a steady state. This means that a decay process occurs, meaning that economic cycles gradually lose their effect.
Period of oscillations: On the chart, each period of economic oscillations (growth and decline phases) includes, on average, 5-7 units of time.
This chart shows how economic activity stabilizes over time. The chart is a useful tool for explaining the causes of business cycles and their approach to equilibrium over time.
The model can be used to explain economic changes in the real economy, to analyze periods of recession and growth.
Elements used in the graphic:

- Parameters consumption and investment :

a=0.6, c=0.3. These values show the interaction between the volume of consumption and investment.

- Initial meanings :

$Y_0 = 100$ and $Y_1 = 120$

- Temporary frames :

Diagram includes 30 units time .
during business cycles and is widely used in practical analysis.

1. Mathematical model Samuel Hicks

Samuelson-Hicks model is expressed as a differential equation or difference equation:

$$Y_t = C(Y_{t-1}) + I(Y_{t-1}) + G$$

Here :

Y_t — gross output (GDP) at time t .

$C(Y_{t-1})$ — consumption at time t -1, depends on production.

$I(Y_{t-1})$ — investments at time t -1, depend on production and economic conditions.

G - government spending or external factors.

Differential equation

Differential equations are also used to provide the mathematical basis for the model:

$$d^2Y/dt^2 + a*(dY/dt) + bY = G$$

This equation shows the dependence of economic changes on time, where:

d^2Y/dt^2 — The second derivative of GDP over time measures the rate of growth and contraction.

dY / dt - The first derivative of GDP per watt shows the growth rate.

a and **b** - table of measurements of economic changes.

G – the influence of the state on economic activity.

2. Example :

For example, the consumption function in a trading economy is C_t =0.8. and the investment function is I_t=100 – 0.5. Initial income is Y_0 = 200. Y_3 is under consideration.

Solution .

1. First year (t=1)

$C_1 = 0.8 * Y_0 = 0.8 * 200 = 160$

$I_1 = 100 – 0.5 * Y_0 = 100 – 0.5 * 160 = 0$

$Y_1 = C_1 + I_1 = 160 + 0 = 160$

2. In the next year (t=2)

$C_2 = 0.8 * Y_1 = 0.8 * 160 = 128$

$I_2 = 100 – 0.5 * Y_1 = 100 – 0.5 * 160 = 20$

$Y_2 = C_2 + I_2 = 128 + 20 = 148$

3. Third year (t=3)

$C_3 = 0.8 * Y_2 = 0.8 * 148 = 118.4$

$I_3 = 100 – 0.5 * Y_2 = 100 – 0.5 * 148 = 26$

$Y_3 = C_3 + I_3 = 118.4 + 26 = 144.4$

Y_3 = 144.4 means that this economy will experience a recession or economic slowdown in the next three years.

3. Analysis results :

This example is designed to analyze changes in an economic system using the Samuelson-Hicks dynamic economic model. The model has two main components: consumption (C_t) and investments (I_t), which determine economic growth.

This result shows that even if the share of consumption in the economic system remained the same, total income decreased by 144.4 as investment decreased. This result indicates that economic growth changed due to the decrease in resources and investment in the economic system or due to other external factors.

This research shows how the Samuelson-Hicks model can be used to analyze time changes and how it illuminates both permanent and temporary changes in economic growth.

Conclusions and suggestions

This is an important tool for analyzing such problems as unemployment and inflation in the economy. This model allows us to analyze the emergence and development of economic cycles, showing the interaction of various factors in the economy.

According to the model, economic cycles arise not from external influences, but from specific features of the economy. In addition, the interaction of consumption and investment can accelerate or slow down economic growth. The model shows that economic cycles can be stabilized through state macroeconomic policy.

Among other things, the model has important implications in economics. The model helps government agencies develop economic policy. For example, when inflation is high, the central bank can cool the economy by reducing the money supply.

At the same time, the Model is used to make economic forecasts. It can predict future economic growth rates, inflation rates, and unemployment rates, and is an important tool for economists and students to understand the basics of economics.

It is important in analyzing the dynamics of economic growth and business cycles. This model analyzes the relationship between the multiplier and accelerator principles to show how economic systems achieve stability over time or experience cyclical fluctuations. The model is based on the following: the relationship between investment and consumer costs in the economy determines the duration and amplitude of economic cycles. This theory is used not only theoretically, but also in practical economics, for example, in formulating economic policy.

However, the model also has limitations, including the fact that it is based only on closed economic systems and does not take into account external factors. In modern economic conditions, this model of limitations requires improvement.

This should be expanded to include open economy conditions such as foreign trade and capital flows. This broadens its applicability to the contemporary global economy. At the same time, contemporary economic growth dynamics can be better analyzed by including technological development and innovation in the model.

If these proposals are implemented, it will be possible to determine the impact of foreign trade and capital flows on economic cycles. The model can be used in the analysis of global economic dynamics.

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