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# ANALYSIS OF THE CHANGE IN THE SAVING RATE ON THE ECONOMIC EVOLUTION

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## Abstract

*In this article I started from the fact that savings, in the form of individual savings, profit or dividends, constitute the main source of investment in personal or national interest. National saving is done through public savings, the difference between what the government receives in revenue and taxes and what it spends. When its expenditures exceed its revenues, the government runs a budget deficit and, as such, is unable to create resources for new investments, which create new jobs, which create new national and multinational businesses, which develop the employment of the unoccupied or unemployed workforce, so that the expenditure on the government is reduced as much as possible. From this point of view, we will find that when expenses are lower than income, that surplus of income is created that can be used for investment and employment. Of course, some economists argue that high tax rates on capital, including capital on corporate income, the federal income tax or estate tax, and many other state taxes on income and property, discourage the economy in question by reducing the rate of return that savers earn. This aspect is real, but it must be combined with the fact that when something like this happens, analyzes must be carried out to show that the change in the saving rate has an effect on the evolution of the economy as long as there is an increase in the labor force salaries and similar bonuses, and for those of the third age, who are at the pension level, to ensure incomes in accordance at least with the price index. In this article I have used a broad methodology, using a series of models starting, first of all, from the Solow model or other models of great economists who have oriented themselves towards this activity. Clarifying examples are also presented in the article so that those who study this material understand the essence of the thinking that the authors of the article had and that this thinking is implemented coherently and precisely within the free market in Romania.*

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**Keywords:** expenditure, income, saving, capital, investment, evolution.

**JEL classification:** E20, E30

### **Introduction**

In this article, Analysis of the change in the saving rate on the economic evolution, I started from the fact that from all the economic calculations and studies it follows that in order to move the economy towards the Golden Rule, a state of equilibrium, political decision-makers should adopt strategies to encourage national saving.

National saving does not mean cutting the rights to income, profit, benefit or salary rights and others, so as to create additional income to the consolidated budget of the state, through which we can make corrections and on the basis of which we can ensure the growth of the national economy. Of course, saving is the basic element and is achieved through better use of the factors of production, the resources available to society at a given time, the resources of national or multinational commercial companies, as well as through the efficient spending of the other amounts that remain available at the level of natural and legal persons.

Obviously, allocating investments in the economy is not always an easy task. The Solow model starts from the simplifying hypothesis that there is not a single type of capital in the world, there are several types in private business functions and the traditionality of capital.

The government invests in various forms of public capital called infrastructure, such as roads, bridges, sewage systems. The knowledge and skills that workers acquire through education and training are essential to understand their role and the investment to be able to achieve capital growth and on this basis the number of national and multinational commercial companies that also lead to capital growth human to increase both his capacity and training, in order to be able to produce more goods and services of quality and at the most affordable costs.

Research on economic growth emphasizes the fact that this human capital is as important as physical capital, because it, only in conjunction with material, financial resources, can lead to economic growth.

One way to model this fact is to give the capital variable a broader definition that includes both human and physical capital.

The economic-political drivers of economic growth must face the question of what types of capital they need. In other words, likewise, what kind of capital do the largest companies produce in order to be able to produce guaranteed marginal products.

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Other economists have suggested that the government should actively encourage certain forms of capital. It is not necessary because, every time, the capital increase must be done in close accordance with the field of activity and the possibilities that exist.

The microeconomics of research and development requires, in turn, the development of endogenous growth models in two sectors that ensure economic growth. It is primarily about technological progress, research, development, innovation and inventions as well as improving the quality of the workforce.

Some models of endogenous growth try to incorporate these facts about research and development. And these models must be included in a model which, through the calculated parameters, leads to the efficient and effective use of production factors (capital, human factor and material and financial resources).

#### **Literature review**

Anghelache, C. and Anghel, M.G (2016) gave space and importance to the presentation of the essential aspects related to economic growth, the emphasis being on the system of statistical indicators usable in this direction. Anghelache, C. and others (2022) highlight the negative influence that the pandemic crisis had on economic growth and implicitly on the standard of living of the population. Anghelache C., Burea D. (2018) published a study on the stage of industry development in Romania. Dobrodolac (2011) presented a series of econometric models applied in the real economy. Dormbusch, R. Fischer, S. and Startz, S. (2007) make consistent references regarding the factors that determine economic growth, the way of analysis and interpretation, as well as the system of usable statistical-economic indicators. Jarow and Yildirim (2003) analyzed the evolution of security prices under certain conditions. Laborda, R., Olmo, J. (2021) were concerned with the influence of the volatility of economic sectors in the analysis of economic evolution under the impact of crises.

#### **Data, Results and Discussion**

The calculations show that to move an economy toward the Golden Rule, the steady state, policymakers should adopt policies to encourage national saving. But how can we do this? A matter of simple accounting, it shows that higher national savings means higher public savings, higher private saving, or a combination of the two. Much of the debate on growth policies focuses on these options.

The most direct way the government affects national saving is through public savings, the difference between what the government

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receives in tax revenue and what it spends. When its expenditures exceed its revenues, the government runs a budget deficit, which represents negative public savings. A budget deficit raises interest rates and discourages investment. The reduction of the capital stock is part of the national debt burden on future generations. Conversely, if it spends less than it earns, then the Government has a budget surplus, which it can use for pensions and stimulating investment.

Government affects national saving by influencing private saving, saving by households and firms. In particular, how much people decide to save depends on the incentives they receive, and these incentives are modified by a variety of public policies. Many economists argue that high tax rates on capital, including corporate income tax, federal income tax, estate tax, and many state income and property taxes discourage private saving by reducing the rate of return that savers earn. On the other hand, tax-free retirement accounts like IRAs are designed to encourage private saving by giving preferential treatment to income saved in these accounts. Some economists have proposed increasing incentives to save by replacing the current income tax system with a consumption tax system.

Many disagreements about public policy are rooted in differing views about how responsive private saving is to incentives. For example, suppose the Government increased the amount people can put into tax-free retirement accounts. Would people respond to this incentive by saving more, or instead would people just transfer savings already made into taxable savings into tax-advantaged accounts, reducing tax revenue and thus public saving without any incentive for private saving? The desirability of the policy depends on the answers to these questions. Unfortunately, despite much research on this issue, no consensus has emerged.

The Solow model makes the simplifying assumption that there is only one type of capital. In the world, of course, there are many types. Private businesses invest in traditional types of capital. The government invests in various forms of public capital, called infrastructure, such as roads, bridges, and sewer systems.

Although the capital variable in the Solow model is usually interpreted as including only physical capital, in many situations human capital is analogous to physical capital. As with physical capital, human capital increases the ability to produce goods and services. Raising the level of human capital requires investment. Research on economic growth has emphasized that human capital is as important as physical capital in explaining international differences in living standards. One way to model this fact is to give the capital variable a broader definition that includes both human and physical capital.

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Policymakers for economic growth must grapple with the question of the types of capital the economy needs. In other words, what kind of capital produces the highest marginal products? To a large extent, policy makers can rely on the market to allocate the savings pool to alternative types of investment. Those industries with the highest marginal products of capital will naturally be most willing to borrow at market interest rates to finance new investment. Many economists argue that the government should only create a level playing field for different types of capital. For example, ensuring that the tax system treats all forms of capital equally. The government can then rely on the market to allocate capital efficiently.

Other economists have suggested that the government should actively encourage certain forms of capital. Suppose, for example, that technological progress occurs as a by-product of certain economic activities. This would happen if new and improved production processes are devised during the capital building process and if these ideas become part of the knowledge base of the society. Such a by-product is called a technological externality. In the presence of such externalities, the return to capital exceeds the private profits and benefits of capital augmented by larger accumulations than the Solow model suggests.

In addition, some types of capital accumulation may generate greater externalities than others. If, for example, installing robots produces greater technological externalities than building a new factory, then perhaps the government should use tax laws to encourage investment in robots. The success of such industrial policy, as it is sometimes called, requires that the government be able to accurately measure the externalities of various economic activities so that it can provide the right incentive to each activity. Most economists are sceptical of industrial policies for two reasons. First, measuring externalities from different sectors is practically impossible. If the policy is based on poor measurements, its effects can be almost random and therefore worse than no policy at all. Second, the political process is far from perfect. Once the Government gets into the business of rewarding certain industries with subsidies and tax breaks, the rewards are as likely to be based on political influence as the magnitude of the externalities.

One type of capital that necessarily involves the government is public capital. Local, state governments always decide if and when they should borrow to finance new roads, bridges and transit systems. This policy was motivated partly by the desire to increase aggregate demand in the short term and partly to provide public capital and enhance economic growth in the long term. Among economists, this policy has had both defenders and critics. However, all agree that measuring the marginal product of public capital is

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difficult. Private equity generates an easily measurable rate of return for the firm holding the equity, while the benefits of public equity are more diffuse. Moreover, while private equity investments are made by investors who spend their own money, the allocation of resources for public equity involves political process and financing.

Economists who study international differences in living standards attribute some of these differences to physical inputs and human capital and some to the productivity with which these inputs are used.

One reason nation can have different levels of output is that they have different institutions that guide the allocation of scarce resources. Creating the right institutions is important to ensure that resources are put to their best use.

Perhaps the clearest example of the importance of institutions is the comparison between North and South Korea. For many centuries these two nations were combined with a common government, heritage, culture and economy. After World War II, an agreement between the United States and the Soviet Union divided Korea in two. Above the thirty-eighth parallel, North Korea established institutions on the Soviet model, authoritarian communism. Under the thirty-eighth parallel, South Korea established institutions based on the American model of democratic capitalism. Today, the gap in economic development could not be stronger. North Korea's GDP is less than one-tenth of South Korea's GDP. South Korea is well lit, the widespread use of electricity is a sign of advanced economic development. North Korea, on the other hand, is shrouded in darkness.

Among democratic capitalist nations, there are some important but more subtle institutional differences. An example is the legal tradition of a nation. Some countries, such as the United States, Australia, India and Singapore, are former colonies of the United Kingdom and therefore share the English system as their law. Other nations, such as Italy, Spain, and most of Latin America, have legal traditions that evolved from the Napoleonic, French Code. Some studies have concluded that legal protections for shareholders and creditors are stronger in English-style legal systems than in French-style ones. As a result, countries that are part of the English legal system have better developed capital markets. Nations with better developed capital markets, in turn, experience faster growth because it is easier for small companies and start-ups to finance investment projects, leading to a more efficient allocation of capital.

Another important institutional difference between countries is the quality of government and the honesty of government officials. Ideally, governments should lend a helping hand to the system by protecting property rights, enforcing contracts, promoting competition, prosecuting fraud, and

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so on. Yet governments sometimes stray from this ideal and act more like a grabbing hand by using the authority of the state to enrich a few powerful individuals at the expense of the wider community. Empirical studies have shown that the extent of corruption in a nation is indeed a significant determinant of economic growth.

Encouraging technological progress according to the Solow Model shows that a sustained increase in income per worker through technological progress must be taken into account. The Solow model takes technological progress as exogenous and does not explain it. Unfortunately, the determinants of technological progress are not well understood.

Despite this limited understanding, many public policies are designed to stimulate technological progress. Most of these policies encourage the private sector to allocate resources to technological innovation. For example, the system patent grants a temporary monopoly to inventors of new products, and the tax code provides tax breaks for firms that engage in research and development, and government agencies such as the National Science Foundation directly subsidize university research. In addition, proponents of industrial policy argue that the government should take a more active role in promoting specific industries, which are key to rapid technological progress.

In recent years, the encouragement of technological progress has taken on an international dimension. Many of the companies that engage in research to advance the technology are located in the United States and other developed nations. Developing nations like China have an incentive to wire loose. That is, Chinese companies often use ideas developed abroad without compensating patent holders. The United States has strongly opposed the practice, and China has vowed to step up its enforcement. If intellectual property rights were better enforced around the world, firms would be more motivated to engage in research, and this would promote technological progress worldwide.

To fully understand the process of economic growth, we need to go beyond the Solow model and develop models that explain technological progress.

Models that do this often go under the label of endogenous growth theory because they reject the Solow model's assumption of exogenous technological change.

Although the field of endogenous growth theory is vast and sometimes complex, here is a brief interpretation of this modern research. To illustrate the idea behind endogenous growth theory, let's start with a particularly simple production function:



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$$Y = AK,$$

where: Y is production,

K is the capital stock

A is a constant that measures the amount of output produced for each unit of capital.

Notice that this production function does not exhibit the property of diminishing returns to capital. An additional unit of capital produces additional units of output, regardless of how much capital there is. This absence of diminishing returns to capital is the key difference between this endogenous growth model and the Solow model.

Now let's see what this production function says about economic growth. We assume that part of the income is saved and invested. So we will describe capital accumulation with the following equation:

$$\Delta K = sY - \delta K$$

This equation shows that the change in capital stock ( $\Delta K$ ) is equal to investment ( $sY$ ) minus depreciation ( $\delta K$ ). Combining this equation with the production function  $Y = AK$  we get:

$$\Delta Y/Y = sA - \delta.$$

This equation shows what determines the growth rate of output  $\Delta Y/Y$ . As long as  $sA > \delta$ , the economy's income increases forever, even without the assumption of exogenous technological progress. Thus, a simple change in the production function can change the economic growth forecast. In the Solow model, temporary saving leads to growth, but falling returns to capital eventually force the economy closer to a steady state, where growth depends only on exogenous technological progress. By contrast, in this endogenous growth model, saving and investment can lead to persistent growth.

Is it reasonable to abandon the assumption of diminishing returns to capital? The answer depends on how we interpret the variable K in the production function  $Y = AK$ . If we take the traditional view that K includes only the economy's stock of equipment, then it is natural to assume downward trends. Giving 10 computers to a worker does not make that worker 10 times more productive than when we have only one computer.

Proponents of endogenous growth theory, however, argue that the assumption of constant (rather than diminishing) returns to capital is more acceptable if K is interpreted more broadly. Perhaps the best case can be made for the endogenous growth model. Clearly, knowledge is a key element in the evolution of the economy, both the production of goods and services and



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their production provide new knowledge. Compared to other forms of capital, however, it is less natural to assume that knowledge exhibits the property of diminishing returns. Indeed, the increasing pace of scientific and technological innovation has led some economists to argue that there are increasing returns if there is knowledge. If we accept the view that knowledge is a type of capital, then this endogenous growth model with its constant return on capital assumption becomes a more plausible description of long-run economic growth.

Although the  $Y = AK$  model is the simplest example of endogenous growth, the theory has gone beyond that. Some research has attempted to develop models with more than one manufacturing sector to provide a better description of the forces governing technological progress. Thus, the economy has two sectors, which we can call manufacturing firms and research universities. Firms produce goods and services, which are used for consumption and investment in physical capital. Universities produce a factor of production called knowledge, which is then used in both sectors. The economy is described by the production function for firms, the production function for universities, and the capital accumulation equation.

The two-sector endogenous growth model brings us closer to understanding technological progress. If one thinks about the research and development process for even a moment, three facts become apparent. First, although knowledge is largely a public good (that is, a good freely available to everyone), much research is done in firms that are driven by the profit motive. Second, research is profitable because innovations give firms temporary monopolies, either because of the patent system or because there is an advantage to being the first firm to market with a new product. Third, when one firm innovates, other firms build on that innovation to produce the next generation of innovations. These (essentially microeconomic) facts are not easy to connect with (essentially macroeconomic) growth models.

An interesting question, from the perspective of society as a whole, concerns private firms that maximize profit and tend to engage in too little or too much research. In other words, is the social return of research (which is what society cares about) greater or less than the private profit (which motivates individual firms)? It follows that, in theory, there are effects both ways. On the one hand, when one firm creates a new technology, it makes another firm better off by giving them a knowledge base to build on in future research. On the other hand, when a firm invests in research, it can also make other firms worse off if it does nothing more than become the first to discover a technology that another firm would have invented first. This doubling of research effort has been called the toe-treading effect.

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Although theory alone is ambiguous, whether the research effort is greater or less than empirical work in this area is usually less so. Many studies have suggested that the social return on research is high, often over 40 percent per year. This is an impressive rate of return, especially compared to the return on physical capital, which has been estimated at around 8% per year.

### Conclusions

From the study of this article and from the interpretation of the authors' own assessments, those who are interested can reach some theoretical and practical conclusions. First of all, it is about the need to base all economic analyses, macro and microeconomic, on the basis of consistent models, which are based on real factors of production, so as to obtain the intended results.

Another conclusion is that between the three factors of production mentioned above, there must be a close correlation and proportion, because it is easy to demonstrate that when a certain factor is in excess and the others are not in sufficient measure, the one in excess is consumed in vain, without any effect.

At the same time, it follows from this that the investment models in the economy are very sensitive models, which must be analyzed with great patience in order to highlight the financial and material investment resources.

And, last but not least, no economic development strategy, macro or microeconomic, can achieve its goal only when it is carried out on account of a well-structured, well-grounded model, based on production factors as such.

### References

1. Anghelache C., Anghel M.G. (2016). *Bazele statisticii economice. Concepte teoretice și studii de caz*, Editura Economică, București.
2. Anghelache, C., Anghel, M.G., Iacob, Ș.V., Panait, M., Rădulescu, I.G., Brezoi, A.G., Miron, A., *The Effects of Health Crisis on Economic Growth, Health and Movement of Population*. Sustainability, 14, 4613, 2022
3. Anghelache, C., Burea, D. (2018). *Analysis of the industry evolution in Romania*. Romanian Statistical Review, Supplement, 10, 117-124
4. Dobrodolac, T., 2011, *Forecasting by econometric models as support to management, Perspectives of Innovations*, Economics & Business, 7 (1), 72-76.
5. Dornbusch R., Fischer S. and Startz R. (2007). *Macroeconomie - traducere*, Editura Economică, București
6. Jarrow, R., Yildirim, Y., 2003, Pricing treasury inflation protected securities and related derivations using an HJM model. *Journal of Financial and Quantitative Analysis*, 38(2), 337-358.
7. Laborda, R., Olmo, J., *Volatility spillover between economic sectors in financial crisis prediction: Evidence spanning the great financial crisis and Covid-19 pandemic*. Research in International Business and Finance, 57, 1-13, 2021.