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Technical progress as a factor of economic growth in the classical theory of J. S. Mill

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Abstract.

Introduction. *J. S. Mill is traditionally regarded as a thinker who summarized the achievements of classical political economy, but his approach is much broader, as he integrates economics into the context of social philosophy. J. S. Mill sought to provide a comprehensive interpretation of socio-economic issues, including the distribution of roles between the state and the market, the organization of production, and the impact of technology on labor. His vision of economic growth includes not only capital accumulation, but also the role of institutions, ethics, and technological progress. Of particular importance is the idea of the "antagonistic principle," which reveals the compensatory function of innovation in relation to natural and social constraints. Despite the relevance of these ideas in the context of modern challenges, J. S. Mill's contribution to growth theory is still underestimated.*

Objective. *The modern interpretation of J. S. Mill's theory of economic growth, considering the importance of innovative factors within the classical paradigm of political economy.*

Methods. *To achieve this goal, hermeneutical analysis (to identify the content, hidden meanings and logical structure of J. S. Mill's growth concept), historical, genetic and comparative analytical methods, as well as conceptual and mathematical modeling are used.*

Results. *J. S. Mill's theory of economic growth is reconstructed as an open dynamic system that combines technological progress, institutional factors and social philosophy. The key role of the "antagonistic principle" as a mechanism that allows technical innovations to compensate for natural and social constraints on production is highlighted. A mathematical interpretation of J. S. Mill's approach based on I. Adelman's generalized growth model with regard to institutional and innovative variables is proposed. It is shown that the concept of steady state in his theory does not imply stagnation, but a transition to a qualitatively new type of development.*

Prospects for further research *lie in the mathematical extension of J. S. Mill's growth model by constructing a production function with endogenous technological and institutional variables. In addition, a comparative analysis, in particular, a comparison of J. S. Mill's ideas with modern concepts of sustainable development and the "happiness economy", is a promising direction.*

Keywords: *technical progress; steady state; production function; sustainable development; innovative development.*

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Технічний прогрес як чинник економічного зростання у класичній теорії Дж. С. Мілля

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Анотація.

Вступ. *Дж. С. Мілля традиційно розглядають як мислителя, який підсумував досягнення класичної політичної економії, однак його підхід значно ширший, оскільки він інтегрує економіку в контекст соціальної філософії. Науковець прагнув дати комплексну інтерпретацію соціально-економічних проблем, серед яких – розподіл ролей між державою і ринком, організація виробництва та вплив технологій на працю. Його бачення економічного зростання охоплює не лише нагромадження капіталу, а й роль інституцій, етики та технічного прогресу. Особливої ваги набуває ідея «антагоністичного принципу», яка розкриває компенсаторну функцію інновацій щодо природних і соціальних обмежень. Попри актуальність цих ідей у контексті сучасних викликів, внесок Дж. С. Мілля в теорію зростання досі залишається недооціненим.*

Мета. *Сучасна інтерпретація теорії економічного зростання Дж. С. Мілля з урахуванням значення інноваційних чинників у межах класичної парадигми політичної економії.*

Методи. *Для досягнення поставленої мети застосовано герменевтичний аналіз (для виявлення змісту, прихованих смислів і логічної структури концепції зростання Дж. С. Мілля), історико-генетичний та порівняльно-аналітичний методи, а також концептуальне і математичне моделювання.*

Результати. *Реконструйовано теорію економічного зростання Дж. С. Мілля як відкриту динамічну систему, яка поєднує технологічний прогрес, інституційні чинники та соціальну філософію. Висвітлено головну роль «антагоністичного принципу» як механізму, який дозволяє технічним інноваціям компенсувати природні та соціальні обмеження виробництва. Запропоновано математичну інтерпретацію підходу Дж. С. Мілля на основі узагальненої моделі зростання І. Адельман з урахуванням інституційних та інноваційних змінних. Показано, що концепція стаціонарного стану в його теорії передбачає не стагнацію, а перехід до якісно нового типу розвитку.*

Перспективи подальших досліджень *полягають у математичному розширенні моделі зростання Дж. С. Мілля через побудову виробничої функції з ендогенними технологічними та інституційними змінними. Крім того, перспективним напрямком є порівняльний аналіз, зокрема зіставлення ідей Дж. С. Мілля із сучасними концепціями сталого розвитку й «економіки щастя».*

Подяки. *Переклад, редагування та покращення читабельності було виконано за допомогою ліцензованого програмного забезпечення ChatGPT 5 (OpenAI). Автор переглянув та схвалив усі редагування, внесені за допомогою штучного інтелекту.*

Ключові слова: *технічний прогрес; стаціонарний стан; виробнича функція; сталий розвиток; інноваційний розвиток.*

Statement of the problem. Historians of economic thought often consider J. S. Mill as a thinker who summarized the achievements of classical political economy. However, his approach to economics was much broader, as he considered economic phenomena in the context of social philosophy. Drawing on the ideas of representatives of different schools, J. S. Mill sought to provide a comprehensive interpretation of complex socio-economic problems. Although assessments of the effectiveness of his attempts remain controversial, the relevance of many of the issues he raised remains relevant even more than 170 years after the publication of his work Principles of Political Economy (1848). These issues include the separation of state and market functions, ensuring human rights and freedoms in the face of a potential majority dictatorship, and the socio-economic consequences of automation and the displacement of human labor by machines.

J. S. Mill's vision of economic growth as a process that is not limited to quantitative accumulation, but includes technological progress, socio-ethical and institutional factors, is particularly relevant in the context of modern challenges. Among them is the prospect of technological unemployment due to digitalization, the development of artificial intelligence, and the rise of social inequality.

Of particular importance is the idea of the "antagonistic principle" formulated by J. S. Mill, which explains how technological progress neutralizes natural and institutional constraints on production.

This approach opens up the possibility of rethinking classical models of development, taking into account the dynamics of knowledge, innovation, and the institutional environment.

Despite the considerable intellectual potential of J.S. Mill's economic views, his contribution to the theory of economic growth is still not sufficiently understood. In many studies, his theory is interpreted either as the final stage of the classical tradition or as a transitional link to the neoclassical paradigm, while its internal logic, dynamic nature and the role of technological change are often overlooked.

Analysis of recent research and publications. In the modern scientific literature, several approaches to the interpretation of J. S. Mill's work can be distinguished. The first approach focuses on the ethical and philosophical foundations of his doctrine, in particular, on the concepts of utilitarianism and individual freedom [1; 2]. For example, [3] analyzes the risks of losing personal autonomy in a technologically controlled society; this aspect is interpreted as a kind of foresight of the modern challenges of the digital age. Although these topics are important for understanding the social dimension of J.S. Mill's views, they are of secondary importance for the purpose of our study.

The second approach focuses on J. S. Mill's economic analysis, in particular, his concepts of distribution, capital accumulation, the role of the state, steady state, and economic growth. For example, [4] examines the role of historical knowledge in understanding the limits of growth and shaping sustainable development policies. The author proposes to rethink the very concept of development - not as endless growth, but as adaptation to social and biophysical limitations. In [5], special attention is paid to the well-known Millian distinction between the immutable laws of production and the laws of distribution (as such, depending on the will of society). It is emphasized that it is thanks to this approach that J. S. Mill had a significant impact on further discussions on social justice and the role of the state in the economy.

The third approach explores the interaction between technological progress, demographic changes, and the institutional structure of society. In [6], the author analyzes the complex relationship between technology, labor, and welfare, which contradicts techno-optimistic notions and considers conflicts between labor and capital in the process of technological change. In [7], the idea of controlled technological development, which should be consistent with the values of freedom, self-realization, and ethical responsibility, is discussed, as opposed to technocratic determinism. It is this third approach, in our opinion, that is the least studied and insufficiently understood, and therefore constitutes the main focus of our study.

The purpose of the article is to provide a modern interpretation of J. S. Mill's theory of economic growth, considering the importance of innovative factors within the classical paradigm of political economy.

Presentation of the main material. J. S. Mill did not formulate a strict, logically complete and formalized theory of economic growth in the modern sense - his approach was more conceptual and theoretical than mathematically formalized. J. S. Mill interpreted economic growth as a component of a broader process of social development, in which technological progress, capital accumulation, institutional structure, resource allocation, and moral and ethical factors play a key role.

The basic equation of economic growth as interpreted by J. S. Mill is based on three main factors of production: labor, capital, and land. The increase in production depends on the efficiency of each of these factors, which, in turn, is determined by their productivity. Thus, economic growth is the result of both a quantitative increase in production resources and an increase in their productivity. J. S. Mill proposes a sequential analysis of these elements (the so-called "law of successive effects on growth"), considering their contribution to production growth: first, labor, then capital, and finally land [8, p. 130].

In his concept of economic growth, J. S. Mill clearly defines that land is the main factor to which the law of diminishing returns is directly applicable. In his opinion, it is the "limited quantity and limited

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productiveness of land" [8, p. 151] that constitute the real limit for further production growth. At the same time, J. S. Mill does not extend the law of diminishing returns to labor and capital in the same strict sense as to land. Capital can be accumulated, moved and improved, and labor productivity can increase due to technological progress, increased education, better management and organization of production. He calls this compensating mechanism the "antagonist principle" that counteracts the limitations caused by the nature of the land [8, p. 155].

According to J. S. Mill, it was the mechanical inventions of the last 70-80 years (before the publication of his work in 1848) that caused an accelerated decline in costs and prices for industrial products. At the same time, these changes are not accidental, but long-lasting and potentially unlimited. This approach contrasts with the pessimistic forecasts of his predecessors, in particular, D. Ricardo, who believed that in the long run the economy would inevitably reach a stationary state due to limited resources and the law of diminishing returns, as well as T. Malthus, who pointed out the imbalance between the geometric growth of the population and the arithmetic growth of the means of subsistence. J. S. Mill, on the contrary, argues that technological progress can compensate for these limitations by allowing an increase in production without a proportional increase in costs, and thus postpone the onset of growth limits. This suggests that economic growth should not be viewed as a limited or closed-loop movement, but as a dynamic process that is renewed through human intelligence, scientific knowledge, and technical innovation. Thus, if technical changes are long-lasting and reproducible, cost and price reductions are no longer a temporary phenomenon, but become a long-term trend. This changes the very logic of economic forecasting: the economy is not a system that exhausts itself, but a system that is capable of self-renewal through human progress.

In his analysis of the impact of machinery on factor productivity, J. S. Mill makes an important point: the use of machinery is only one way in which knowledge affects production. He emphasizes that, according to his observations, the most important achievements in agriculture were not so much related to the introduction of new machinery as to the rationalization of processes, such as a more organized approach to soil cultivation and the correct rotation of crops. It is, therefore, primarily about managerial innovations, not just about investing in fixed assets. Such innovations, according to J. S. Mill, save time by accelerating the flow of income in response to labor and capital inputs and also contribute to saving material resources.

In modeling economic growth according to J. S. Mill, we focus on the generalized classical growth model proposed by I. Adelman, which allows us to integrate all the key elements of his concept. It is based on a production function that links the level of economic output at a given time with the amount of resources used - labor, capital, natural resources (land), as well as the factors that determine the productivity of these resources [9, p. 8]. Given that J. S. Mill pays special attention to socio-cultural factors, the institutional environment is explicitly introduced in the model as a factor that affects the distribution of resources among economic agents. This is a recognition that the level of output is not only an economic but also a socio-institutional phenomenon. It is assumed that each firm maximizes output from its available resources, so that at each point the production function reflects the maximum possible output:

$$Y_t=f(L_t,K_t,N_t,A_t,S_t), \quad (1)$$

where Y_t is output, L_t is employment, K_t is capital, N_t is natural resources (land), A_t is the fund of applied technological knowledge, and S_t is the socio-cultural (institutional) environment.

Production factors should be considered not as separate aggregate indicators, but as multicomponent vectors, for example:

$$K_t=(K_{1t},K_{2t},...,K_{jt}), \quad (2)$$

where K_{1t} is the amount of j-th type of capital used at the moment of time t [9, p. 9-11].

Other factors have a similar vector structure. Such disaggregation is necessary because, for example, capital consists of different types of assets, and natural resources also have a complex internal structure. Employees differ in their level of skills, education, and qualifications, and over time, the health and labor efficiency of the same category of labor force also changes. This makes it impossible to reduce the analysis of labor resources to a simple count of the number of people employed.

While estimating the capital stock, labor force, or natural resources is already a difficult methodological task, the variables A_t (technological knowledge) and S_t (socio-cultural/institutional environment) are even less quantifiable. They represent two multidimensional arrays of factors that are crucial for economic progress, but do not have a clearly defined metric scale. I. Adelman emphasizes that these variables can be characterized only in the ordinal sense (by means of ranking) and interprets them as heuristic constructions that have primarily conceptual significance [9, p. 11].

The inclusion of the factor A_t in the production function is due to the need to analyze changes in the productivity of other production factors that are not a consequence of changes in their quantitative volumes. Since A_t is a multidimensional vector, each of its components is an indicator of a certain type of knowledge – scientific, technical or organizational – implemented during the period of time. The mechanism of influence of this factor on the volume of production is realized through the growth of productivity of physical resources: labor, capital and land. Even if the total amount of these resources remains unchanged, their new combination and distribution caused by innovations can ensure higher production efficiency.

Since all the variables of the production function change over time, equation (1) can be used to derive the equation for the growth rate of output over a discrete time interval Δt:

$$\frac{\Delta Y}{\Delta t} = \sum_{j=1}^{p} \frac{\Delta Y}{\Delta L_j} \frac{\Delta L_j}{\Delta t} + \sum_{j=1}^{q} \frac{\Delta Y}{\Delta K_j} \frac{\Delta K_j}{\Delta t} + \sum_{j=1}^{r} \frac{\Delta Y}{\Delta N_j} \frac{\Delta N_j}{\Delta t} + \sum_{j=1}^{v} \frac{\Delta Y}{\Delta A_j} \frac{\Delta A_j}{\Delta t} + \sum_{j=1}^{w} \frac{\Delta Y}{\Delta S_j} \frac{\Delta S_j}{\Delta t}, \quad (3)$$

where $\frac{\Delta Y}{\Delta L_j} \frac{\Delta Y}{\Delta K_j} \frac{\Delta Y}{\Delta N_j} \frac{\Delta Y}{\Delta A_j} \frac{\Delta Y}{\Delta S_j}$ are the marginal physical products of the j-th type of labor, capital, natural resources, technologies and institutions at the moment of time [9, p. 14].

It is important to note that variables of the type $A_t S_t$ are often discrete in nature. This is due to the fact that in reality it is difficult to identify a gradual change in technology or the socio-cultural environment at a particular point in time. For example, a technology is either already implemented or not; a law regulating certain economic relations has either entered into force or is still under development. In this context, the process of developing or preparing changes usually does not have the same impact on the economy as the fact of implementation. Therefore, there is no need to look for the instantaneous rate of change (as in differential equations); instead, it is more appropriate to use difference equations, which allow analyzing the dynamics in discrete (step) time.

Another important note concerns the marginal productivity of technology. In a market economy, it is usually inherent: only those innovations are introduced that ensure at least a minimal increase in productivity or do not reduce it. Instead, the marginal effect of the institutional environment can be either positive, or negative: socio-cultural or political changes can either stimulate economic growth or restrain it.

According to J. S. Mill, the two key factors in reducing the cost of production are the division of labor and the use of machines, and the possibility of their effective use in industry depends largely on the scale of production. Technical inventions do not appear suddenly, but develop gradually – one innovation gives rise to the next, forming a seemingly unlimited sequence of improvements. That

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is why the share of the value of industrial goods that falls on the direct production process tends to decrease steadily with the development of society [8, p. 557].

In J. S. Mill's conceptual system, all production factors endogenously interact with each other, forming a complex interdependence. For example, the skills and health status of the labor force L_t depend on the applied technical knowledge accumulated in society A_t. At the same time, the capacity for technological innovation is determined by the quality of the socio-cultural environment, the level of human capital development, and the political will to support science and university education and build relevant institutions. Given this interdependence, as well as the need to consider the temporal dynamics in modeling economic development, in I. Adelman's model, the variable directly affects the behavior of the entire system and its individual elements [9, p. 16]. Thus, the system consists of six equations (1) and (3) - (7) – with the corresponding number of unknown variables that describe the dynamics of each component of the vectors L, K, N, A, S:

$$\Delta L_j/\Delta t=l(Y,L,K,N,A,S,t),j=1,...,p \quad (3)$$

$$\Delta K_j/\Delta t=k(Y,L,K,N,A,S,t),j=1,...,q \quad (4)$$

$$\Delta N_j/\Delta t=n(Y,L,K,N,A,S,t),j=1,...,r \quad (5)$$

$$\Delta A_j/\Delta t=a(Y,L,K,N,A,S,t),j=1,...,v \quad (6)$$

$$\Delta S_j/\Delta t=s(Y,L,K,N,A,S,t),j=1,...,w \quad (7)$$

Consider, for example, equation (6), which describes the dynamics of technological development. In this case: the socio-cultural environment (S) influences entrepreneurial innovation activity – the level of risk tolerance, the existence of a culture of innovation, freedom of speech, protection of intellectual property stimulate entrepreneurs to introduce new technologies; depletion of natural resources (N) stimulates the search for new technological solutions – in the modern economy, these are renewable energy sources, energy-saving technologies or new methods of mining; the structure of the labor/capital ratio shapes the dominant type of future technological change – for example, labor shortages stimulate automation, while a shortage of capital stimulates the development of less capital-intensive technologies; the level of accumulated innovation and education (A) determines society's ability to generate new solutions; government policy in the field of R&D (through S) also determines the pace of technological progress – for example, government funding of basic science often precedes breakthrough technologies.

In turn, technological changes become input variables in the equation of dynamics of other factors. In particular: A affects the structure of employment L – automation can change the demand for labor, displacing low-skilled labor; new technologies expand the possibilities of extraction or rational use of natural resources N; the technological level of the economy affects the functioning of the political system S – digital technologies can both strengthen democratic mechanisms (e-government) and create risks of authoritarian control (mass surveillance).

J. S. Mill proposed a dynamic model of economic growth, actually applying a partial (batch) analysis to the production function. The starting point of his reasoning is the assertion that industrial progress is reduced primarily to three key factors: capital growth, population growth, and production improvements. After that, J. S. Mill consecutively considers the impact of each of these elements separately and then in different combinations, which allows him to identify five basic scenarios of economic development. Each of the scenarios has its own implications for the distribution of national income, in particular for the level of rents, profits, and wages. The results are summarized in Table 1.

Table 1

Dynamic scenarios of economic development according to J. S. Mill.

№ s/n	Scenario		Cost of goods	Real wages and salaries	Profits	Rent
1.	Population grows, capital and technology remain constant		↑	↓↓	↑	↑↑
2.	Capital is growing, population and technology are unchanged		↑	↑	↓↓	↑
3.	Capital and population are growing, technology is unchanged		↑	↕	↓	↑
4.	Technology improves, capital and population remain constant	Short-term effect - higher living standards	↓	↑	↕	↓
		Long-term effect - population growth	↓	↕	↑	↓
5.	All factors of production (capital, population, technology) are growing	Innovations outpace population and capital growth	↓	↕	↑	↓
		Population is growing faster than technology	↑	↑	↓	↑

** Source: developed by the author on the basis of [8; 12].*

*** Symbols: ↑ - increase, ↑↑ - significant increase, ↓ - decrease, ↓↓ - significant decrease, ↕ - change depending on the ratio of factors.*

The fifth scenario, in which all factors of production change simultaneously, is the closest to reality and allows us to analyze the driving forces of economic progress, revealing two distinct and contradictory trends that act in opposite directions. If in a given period technological improvements (innovations) develop faster than population and capital growth, then rents and cash wages tend to decline, while profits rise. On the contrary, if the population grows faster than technological upgrades, workers are forced to accept a decrease in the quantity or quality of food consumed; if this does not happen, rent and wages will gradually increase, while profits will decrease [8, p. 569].

J. S. Mill continued the classical discussion initiated by D. Ricardo on the replacement of human labor by machines. In his writings, he argued for the expediency of using technology to reduce the social need for labor, emphasizing that technological progress should serve to facilitate labor activity, not to increase exploitation. He viewed technology as a potential tool for freeing people from excessive employment, which could provide more free time for self-development, creativity, education, etc. At the same time, despite this optimistic perspective, J. S. Mill noted that the actual direction of technology development often turns out to be unfavorable for employees. Technologies that were supposed to reduce the length of the working day and improve working conditions, in practice, led to the opposite effect: people were forced to work longer and in more difficult conditions [6, p. 1-2].

J. S. Mill noted that one of the possible consequences of technological progress is the transformation of part of the working capital into permanent capital. In a country where the process of capital accumulation is slow, the introduction of machinery, the growth of land fertility and similar processes can have negative consequences: the capital used in this way is actually withdrawn from the wage fund. In contrast, in a country with a high level of annual capital accumulation and a low rate of return, such consequences should not be expected. In any wealthy country, the conversion of working capital into permanent capital – in the form of railroads, factories, machinery, etc. – does not reduce gross output or employment. Moreover, it not only does not reduce the amount of working capital, but is a necessary condition for its growth. It is thanks to this transformation that the country can effectively use the constantly growing capital without reducing profitability to a level that makes further accumulation impossible [8, p. 591-592]. Thus, according to J. S. Mill, improvements in production do not lead to a reduction in gross product or labor demand in the national economy.

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On the contrary, it is crucial for their growth and is a prerequisite for any significant and long-term economic development.

As for technological innovations in agriculture, according to J. S. Mill, they spread slowly and do not happen overnight; discoveries and inventions tend to be sporadic rather than continuous – in contrast to the gradual and steady growth of capital and population. Therefore, it is extremely rare for improvements to outpace demographic processes. Thus, as innovations make it possible to cultivate increasingly poorer quality land under the constant pressure of capital and population growth, rents eventually rise to much higher levels than they would otherwise have reached. In real life, J. S. Mill notes, technological advances never outpace population and capital growth. If improvement temporarily increases, it usually leads to a short-term improvement in the situation of workers and an increase in profits. However, as soon as this is followed by a new wave of population growth, all the benefits of innovation eventually pass to landowners in the form of increased rents [8, p. 570-571]. In practice, J. S. Mill argues that technical progress rarely leads to the withdrawal of land from cultivation, but instead allows the use of increasingly poorer natural quality land to meet growing demand. Thus, improvements contribute to pushing back the limits of economic growth, creating conditions for further capital expansion and population growth.

Outlining the general theory of economic development of society, J. S. Mill does not limit himself to analyzing the laws of its dynamics, but raises fundamental questions about the purpose of this development: what end point is society heading for and what conditions will it face if progress is stopped. Continuing the tradition of the classical school, he emphasizes that the growth of wealth is not an endless process: at the end of the stage defined as progressive development, a stationary state comes. Each step forward, according to J. S. Mill, is at the same time an approach to this limit. If the steady state has not yet been reached, it is because technological progress and the introduction of innovations constantly postpone it for the future.

Within the classical paradigm, steady state was generally viewed as an undesirable end to economic evolution, allegedly accompanied by a deterioration in the welfare of the vast majority of the population. However, J. S. Mill strongly disagreed with this interpretation, arguing that he could not share the aversion to the steady state of capital and wealth that was so openly expressed by the political economists of the old school, and tended to believe that the steady state would be a significant improvement over the current situation [10, p. 531].

According to J. S. Mill, steady state is not a sign of decline, but rather a natural stage in the process of growth. Moreover, production growth is really important only for backward countries, while for economies that have reached a high level of development, an improvement of the distribution system becomes an urgent need. J. S. Mill believed that one of the key means of such improvement is a strict limitation of population growth. Steady state does not mean that human development stops. On the contrary, when the desire for enrichment ceases to be dominant, there are greater opportunities for spiritual, moral, and social progress. Such progress, according to J. S. Mill, becomes much more likely when human consciousness is freed from the constant focus on the struggle for material existence. Summarizing, J. S. Mill emphasized that scientific discoveries and technological improvements can truly improve life only when, along with the functioning of just institutions, there is a conscious regulation of fertility based on “prudent foresight” [10, p. 532-533]. In other words, according to J. S. Mill, the way to increase welfare is to combine technological progress with institutional control over population dynamics.

What can protect society from an “overpopulated state” with its consequences in the form of low wages, poverty and degradation? J. S. Mill’s answer is a level of education sufficient to form moral self-discipline in family planning. His main argument is that real progress means not only economic growth or an increase in real per capita income above the level of survival. It is also about universal

education, legal and social equality for women, and the recognition of the full value of the working class as dignified citizens capable of determining their own destiny. In general, J. S. Mill recognized the possibility of population growth under conditions of continuous improvement of production and capital accumulation, but expressed doubt about the feasibility of such a process, noting: *"But even if innocuous, I confess I see very little reason for desiring it"* [8, p. 594].

J. S. Mill, on the other hand, saw progress not in the quantitative growth of the population, but in its qualitative improvement – in a happier, more educated, morally mature society. He hoped that people would voluntarily choose a steady state of the economy before external circumstances forced them to do so. And this is where one of J. S. Mill's key ideas manifests itself – a clear distinction between economic growth and development. He explicitly emphasized that "*a stationary condition of capital and population implies no stationary state of human improvement"* [8, p. 595].

True development, in J. S. Mill's understanding, is possible without economic growth, because it encompasses not only material aspects but also intellectual, moral, and social improvement. It is the path to cultural upliftment and mastery of the "art of living" when people direct their thoughts not only to prosperity but also to finding sources of spiritual growth in the inner world and solitude. His concept of "steady state" contains the key elements of smart growth – the development of knowledge and environmental protection as determining factors of long-term evolution [11, p. 2164].

It is obvious that in the nineteenth century, J. S. Mill intuitively formulated the ideas that now form the basis of the modern doctrine of welfare economics or "happiness economics". His emphasis on moral and intellectual development, culture, and individual freedom resonates with modern approaches in which the well-being of the population is determined not only by the level of income, but also by the quality of life, social ties, education, the state of the environment, and the subjective sense of happiness and satisfaction. Within the framework of such approaches, GDP per capita is no longer considered the only indicator of success [12, p. 218] – instead, alternative development models are being sought, focused on human happiness, education, spirituality, and harmony with nature. The concept of "economy for the sake of man" rather than "man for the sake of economy" is being promoted.

Conclusions and Prospects for Further Research. Based on the results of the study, the following main conclusions are formulated. J. S. Mill is one of the most prominent representatives of classical political economy, who not only summarized its theoretical foundations but also significantly expanded them by integrating economic analysis into the broader context of social philosophy. His approach combines economic, moral, and institutional aspects. J. S. Mill did not consider economic growth as a goal in itself, but interpreted it as an integral part of social development, in which not only labor, capital and natural resources play a leading role, but also technological progress and institutions formed by society.

The theoretical novelty of J. S. Mill's approach is the concept of the so-called "antagonistic principle" – a compensatory mechanism that counteracts the limitations caused by the law of diminishing returns through the potential of technical and social progress. Thanks to this approach, economic growth appears as an open, dynamic system capable of overcoming stagnation tendencies, and the limits of approaching the steady state are constantly postponed.

In contrast to the pessimistic interpretations of his predecessors, J. S. Mill's steady state is not a sign of decline. On the contrary, this concept already contains elements of the modern idea of sustainable development and the "happiness economy". J. S. Mill distinguished between economic growth and human development, and emphasized the importance of moral self-discipline, temperance, and education as prerequisites for genuine social progress. Despite the fact that J. S. Mill did not have a formalized mathematical model of economic growth, his work became the theoretical

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basis for more modern analytical approaches, in particular, for the generalized classical model of I. Adelman.

In modern conditions, J. S. Mill's dynamic scenarios of economic development are of practical value, in which batch analysis is applied to study the impact of changes in each of the production factors on the distribution of national income. In particular, the calculation of the ratio of the rate of technical progress to the rate of population or capital growth provides information on the nature and dynamics of wages, rents and profits, which allows to make forecasts of changes in certain indicators of the economic situation. The problem is that calculating the pace of modern technological progress is far from a trivial task, as there is simply no single approach to assessing the contribution of digitalization or artificial intelligence to the aggregate product.

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