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THE ROLE OF FINANCIAL SYSTEMS IN ECONOMIC GROWTH THROUGH SAVINGS AND INVESTMENT ACCUMULATION

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Rudevska V. I., Ukhanova K. O. The Role of Financial Systems in Economic Growth through Savings and Investment Accumulation

The aim of the article is to explore the role of financial systems in fostering economic growth through the accumulation of domestic savings and their transformation into investments, based on a comparative analysis of countries with different economic development models. The significance of the study is driven by the increasing role of financial systems in promoting economic growth amid rising macroeconomic instability, structural shifts, and global shocks. In today's global economy, traditional sources of growth are increasingly depleting their potential, highlighting the importance of mechanisms for the internal accumulation of savings and their efficient conversion into investments as key factors for long-term development. This issue is particularly relevant in the context of unequal economic development among countries and differences in the functioning models of financial systems. A comparative analysis of economies with high savings and investment levels, developed industrial countries, and post-crisis economies allows for the identification of structural constraints and opportunities within financial systems to stimulate economic growth. At the same time, the slowdown in growth rates in countries with high investment activity highlights the need to reconsider the role of financial intermediation and the quality of investments, rather than just their quantity. This article examines the role of financial systems in promoting economic growth through the accumulation of domestic savings and their conversion into investments. The study combines a theoretical framework with a comparative empirical analysis of individual economies at different stages of development: high-saving countries, developed industrial states, and economies recovering from a crisis. Using macroeconomic indicators such as gross domestic savings, gross capital formation, and real GDP growth, the study identifies structural differences in financial accumulation patterns and their impact on long-term growth dynamics. The results indicate that economies with stable and substantial domestic savings have greater capacity to support investment and long-term growth. However, the strength of this relationship diminishes as development advances toward mature stages. In contrast, countries experiencing structural shocks face chronic investment shortfalls due to weakened saving capacity, significantly limiting economic recovery. The study's findings highlight that financial systems promote economic growth not only through the volume of accumulated resources but also through the efficiency of financial intermediation and the quality of institutions. The study concludes that strengthening domestic savings mechanisms and enhancing investment efficiency are crucial for boosting economic resilience and supporting sustainable growth, particularly in post-crisis and transitional economies.

Keywords: *financial system, savings, investments, economic growth, financial intermediation, capital accumulation, post-crisis economy.*

Fig.: *4.* ***Bibl.:*** *22.*

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Рудевська В. І., Уханьова К. О. Роль фінансових систем у забезпеченні економічного зростання через акумуляцію заощаджень та інвестицій

Мета статті – дослідити роль фінансових систем у забезпеченні економічного зростання шляхом акумуляції внутрішніх заощаджень і їх трансформації в інвестиції на основі порівняльного аналізу країн з різними моделями економічного розвитку. Актуальність дослідження зумовлена посиленням ролі фінансових систем у забезпеченні економічного зростання в умовах зростаючої макроекономічної нестабільності, структурних зрушень і глобальних шоків. У сучасній світовій економіці традиційні джерела зростання дедалі більше вичерпують свій потенціал, що підвищує значущість механізмів внутрішньої акумуляції заощаджень і їх ефективного перетворення в інвестиції як ключових чинників довгострокового розвитку. Особливої актуальності проблема набуває у контексті нерівномірності економічного розвитку країн і відмінностей у моделях функціонування фінансових систем. Порівняльний аналіз економік із високими рівнями заощаджень та інвестицій, розвинених індустріальних країн і посткризових економік дозволяє виявити структурні обмеження та можливості фінансових систем у стимулюванні економічного зростання. Водночас уповільнення темпів зростання в країнах з високою інвестиційною активністю свідчить про необхідність переосмислення ролі фінансового посередництва та якості інвестицій, а не лише їх кількісних параметрів. У цій статті розглянуто роль фінансових систем у сприянні економічному зростанню шляхом накопичення внутрішніх заощаджень і їх перетворення на інвестиції. Дослідження поєднує теоретичну базу з порівняльним емпіричним аналізом окремих економік, що перебувають на різних стадіях розвитку: країн з високим рівнем заощаджень, розвинених промислових держав та економік, які відновлюються після кризи. Використовуючи макроекономічні показники, такі як валові внутрішні заощадження, валове накопичення капіталу та реальний приріст ВВП, дослідження визначає структурні відмінності в моделях фінансового на-

копичення та їх вплив на динаміку довгострокового зростання. Результати показують, що економіки зі стабільними та значними внутрішніми заощадженнями мають більше можливостей для підтримки інвестицій та довгострокового зростання. Однак сила цього взаємозв'язку зменшується у міру просування розвитку до розвинених стадій. Натомість країни, що зазнають структурних потрясінь, стикаються з постійним дефіцитом інвестицій через ослаблення спроможності до заощадження, що значно обмежує економічне відновлення. Результати дослідження підкреслюють, що фінансові системи сприяють економічному зростанню не тільки завдяки обсягу накопичених ресурсів, а й завдяки ефективності фінансового посередництва та якості інституцій. У дослідженні зроблено висновок, що зміцнення механізмів внутрішнього заощадження та підвищення ефективності інвестицій мають вирішальне значення для посилення економічної стійкості та підтримки сталого зростання, особливо в посткризових і перехідних економіках.

Ключові слова: *фінансова система, заощадження, інвестиції; економічне зростання, фінансове посередництво, накопичення капіталу, післякризова економіка.*

Рис.: *4.* ***Бібл.:*** *22.*

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Economic growth constitutes a fundamental category of macroeconomic theory, representing a long-term process of expanding an economy's production capacity. In contemporary economic literature, economic growth is understood not merely as a quantitative increase in output, but as a complex result of structural, technological, and institutional transformations that determine the trajectory of national development.

In international practice, economic growth is most commonly measured by the dynamics of real gross domestic product (GDP), which reflects changes in the aggregate volume of goods and services produced within an economy, adjusted for inflation [1]. The widespread use of real GDP growth rates is caused by their methodological standardization, international comparability, and applicability in macroeconomic modeling. At the same time, GDP primarily functions as an aggregate quantitative indicator, rather than a comprehensive measure of economic development.

Despite its analytical usefulness, GDP as a measure of economic growth has significant limitations. It does not account for income distribution, non-market production, environmental degradation, or qualitative changes in financial structure. Consequently, positive GDP dynamics may coexist with structural imbalances, declining productivity, or social inequality. This has led to a growing consensus in economic literature that GDP should be regarded as a necessary but insufficient indicator of economic growth.

Accordingly, contemporary theoretical approaches increasingly advocate a multidimensional interpretation of economic growth that complements GDP dynamics with indicators of productivity, innovation, institutional quality, and structural transformation. Such an approach enables a more nuanced understanding of growth processes and provides a stronger theoretical foundation for analyzing long-term economic trajectories.

The neoclassical growth model developed by Robert Solow conceptualizes economic growth as a function of capital accumulation, labor force growth, and exogenous technological progress. In this model, investments driven by savings increase the capital stock and raise output levels, but diminishing returns to capital lead the economy toward a steady-state growth path.

In contrast, endogenous growth theory emphasizes the internal generation of technological progress. Paul Romer argues that investments in education, research and development, and institutional quality create positive spillovers that sustain long-term economic growth without diminishing returns to scale. This approach highlights the strategic importance of innovation-oriented investment.

In contemporary literature, the impact of the economic system on economic growth is usually described through three interrelated channels: institutional, structural, and macroeconomic.

The institutional channel refers to the rules governing property rights, governance quality, and the rule of law, which create incentives for investment, innovation, and entrepreneurship. This approach is the basis of the «institutions rule» in comparative development economics [2].

The structural channel ensures growth through transition to more productive sectors, technological sophistication, industrial modernization, and clustering. This is particularly important for countries with structural economic distortions and post-crisis/post-war recovery [3].

The macroeconomic regime provides stability/instability, as well as fiscal and monetary rules, and the system's ability to respond to shocks. For transition economies, this regime often determines whether factor potential will translate into real growth [4].

It is critically important to note that these three channels are not mutually exclusive. The «economic system» in the modern sense is a complex of institutions, production structures, and rules of macroeconomic coordination, which together determine the trajectory of growth.

For a deeper understanding of the relationship between the economic system and economic growth, we will examine global approaches, highlight their key positions, and conduct a critical analysis of them.

The neoclassical approach emphasizes that the system is essential, but technology is «outside the model.» According to this approach, capital and labor only provide temporary growth: long-term dynamics are determined by technological progress [5].

Theoretical interpretations of economic growth have undergone significant evolution over time. Within the neoclassical paradigm, the Solow growth model explains economic growth through capital accumulation, labor force expansion, and exogenous technological progress. Within this framework, investment-driven capital accumulation plays a crucial role in increasing output levels in both the short and medium terms. At the same time, long-term growth converges to a steady state determined by technological progress. This approach highlights the limits of extensive growth based solely on factor accumulation.

The main criticism of this approach is that the «economic system» in this tradition is often implicitly presented as a neutral background (the market «works»). At the same time, institutions and state capacity are explained outside the basic model.

Some scholars shift technological progress «inside» the economy, arguing that investments in knowledge, human capital, and R&D can support sustainable long-term growth. Such growth is commonly considered endogenous.

Endogenous growth theory provides a broader analytical perspective by emphasizing the internal sources of technological change. For example, according to Romer, sustained economic growth arises from investments in knowledge, education, and research and development, which generate positive externalities and mitigate the effects of diminishing returns [6]. As a result, the quality, structure, and direction of investments become central determinants of long-term growth, shifting analytical focus away from purely quantitative indicators. The criticism of this approach is that models often abstract from political economy – who finances knowledge, how intellectual property protection institutions work, and why countries differ in their ability to create/absorb innovation.

An approach that has gained recognition from the global scientific community and won the Nobel Prize in Economics, known as New Institutionalism (North; Acemoglu, Johnson, and Robinson; Rodrik) [7], is characterized by the notion that "institutions rule." The laureates demonstrated that persistent differences in economic and political institutions are a fundamental cause for differences in long-term economic development and welfare across countries. In particular, they revealed that countries with institutions that ensure the rule of law, protect property rights, and have inclusive political mechanisms exhibit higher economic growth rates and levels of well-being compared to countries with «extractive» institutions that centralize power and exploit their populations [8]. Their research not only established a link between institutions and economic prosperity but also created methodological and theoretical tools for analyzing the causes and consequences of institutional differences. It covers both historical (e.g., colonial influences) and contemporary sources of institutional differences that have long-term implications for economic development.

Their work has become an integral part of the modern understanding of economic systems, as it shifted the focus from traditional growth factors (capital and labor) to institutional determinants, creating an empirical and theoretical basis for explaining why some countries develop faster than others. Another important contribution was that it demonstrated that institutional development is both a cause and a result of economic processes.

Thus, the contemporary contribution of the 2024 Nobel Prize is not only a confirmation of the role of institutions but also a definition of their central place in economic growth theories, which are now at the core of economic system analysis [8]. However, the institutional approach is sometimes "too universal" – in politics, this can result in general prescriptions (such as good governance) without sufficient attention to structural transformation, industrial policy, and specific mechanisms.

Ukrainian economists further develop this conceptual understanding of economic growth. It is treated as a macroeconomic outcome, reflecting changes in the real sector of the economy, as expressed through

the dynamics of real GDP, which serves as a general indicator of economic activity. Notably, the author emphasizes that GDP growth should be interpreted as a resultant measure of economic processes, rather than as an exhaustive characterization of economic development. This approach underscores the analytical distinction between economic growth as a measurable macroeconomic dynamic and broader categories of economic sustainability and development.

Chukhno emphasizes that the transition to a post-industrial economy is a qualitative transformation of the economic system, where knowledge and information technology become key factors of production. This shifts the focus from «simple GDP growth» to the modernization of structure and productivity [9].

However, there are some controversial points in this concept. It does not consider that without developed industrial/innovation policy tools and implementation institutions, the post-industrial trajectory may remain declarative. Other recent Ukrainian studies (particularly on industry and recovery) emphasize that economic growth depends on structural restructuring, transition to higher technological arrangements, support for the entrepreneurial sector, and the economy's ability to recover from shocks. Critical remark: these approaches significantly improve the practical quality of the discussion (what exactly to do), but require a clearer "theory of causality": which reforms/instruments provide the greatest multiplier effect and under what initial conditions [10,11]. A critical point is that these approaches significantly improve the practical quality of the discussion (what exactly to do), but require a clearer "theory of causality": which reforms and/or instruments provide the most significant multiplier effect, and under what initial conditions.

We maintain our position that the concept of economic growth is interrelated with the categories of economic development and economic policy. A review of interpretations of the concept of «economic growth» and attempts to unify approaches to various conceptual foundations in scientific literature has allowed us to define economic growth as a priority goal of the state, which manifests itself in GDP growth and other alternative indicators of economic system development, ensuring an improvement in the quality of life of the population in the process of social reproduction. The differentiation of economic dynamics enables the identification of economic growth as a specific type of economic dynamics characterized by certain distinct features, including the scale of its emergence, the reproduction process, GDP growth, and the driving force behind goods production [12].

This study employs a mixed-method research design that integrates theoretical analysis with comparative empirical assessment to examine the contribution of financial systems to economic growth through the accumulation of savings and investment. The methodological framework is grounded in a systems-based approach, which conceptualizes the financial system as an institutional mechanism facilitating the mobilization of domestic savings and their allocation to productive investment.

The theoretical component is based on analytical and comparative methods, including critical review and synthesis of classical, neoclassical, endogenous growth, and institutional economic theories. This approach allows for the identification of key transmission channels linking savings, investment, and economic growth, as well as the formulation of an integrated analytical framework.

The empirical analysis relies on a cross-country comparative approach. The sample includes economies representing different stages of development and financial system maturity: China, South Korea, Germany, and Ukraine. This selection enables the examination of heterogeneous financial accumulation models and their implications for growth dynamics under diverse institutional and macroeconomic conditions. Quantitative analysis is conducted using descriptive statistical methods and a comparative analysis of macroeconomic indicators, including gross domestic savings (as a percentage of GDP), gross capital formation (as a percentage of GDP), and real GDP growth rates. Data are sourced from internationally recognized databases, primarily the World Bank, the International Monetary Fund, and related statistical platforms, ensuring consistency and cross-country comparability. The study focuses on medium- to long-term trends, with particular attention to recent structural disruptions.

Graphical analysis is employed to visualize key relationships and trends, facilitating the identification of patterns across countries and time periods. The interpretation of empirical results is supported by structural and causal reasoning, enabling the assessment of how variations in financial system capacity and efficiency affect growth outcomes.

The most convincing framework is a combined one, which takes into account that institutions determine the rules of the game (investment incentives, property rights, quality of the state). In contrast, the structure of the economy determines productivity (the flow of resources to highly productive sectors, technological complexity). The macroeconomic regime determines the ability to withstand shocks and invest in

the long term (stability, expectations, fiscal/monetary coordination).

While one-dimensional explanations (capital alone/institutions alone/innovation alone) simplify reality, the economic system influences growth through the interaction of institutions, structures, and political/macroeconomic coordination. The multidimensionality of economic growth as a scientific phenomenon, along with the internal connections between its elements, has enabled the authors to propose a conceptual framework of economic growth factors (Fig. 1).

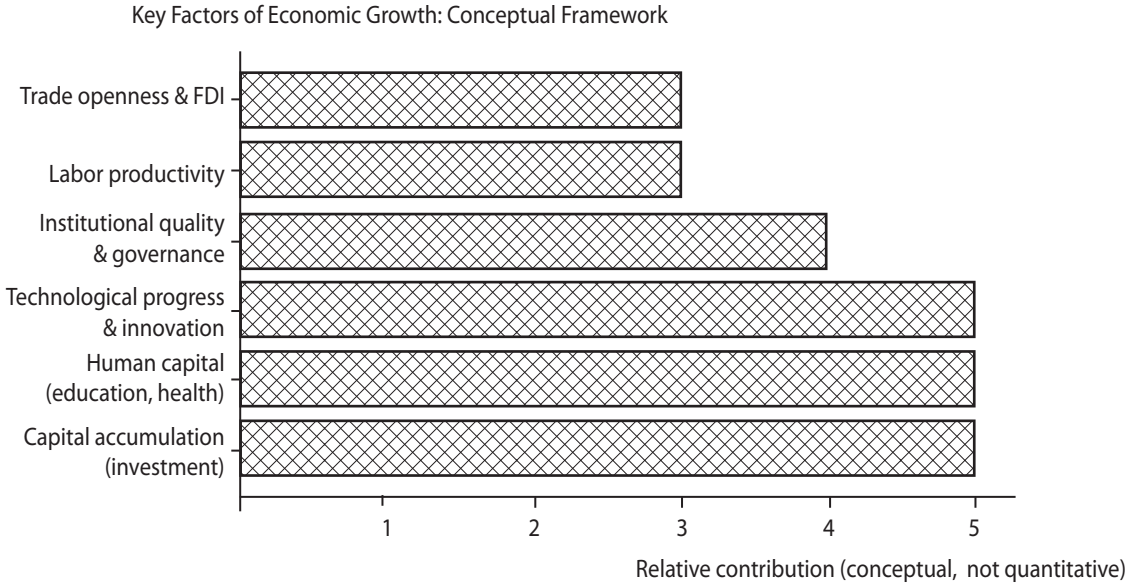

Fig. 1. Key factors of economic growth: a conceptual framework

Source: author's own illustration based on classical and endogenous growth theory and international empirical literature [13; 14; 15].

The proposed framework demonstrates that one of the dominant elements positively influencing economic growth is capital accumulation and investment. Savings represent the portion of income that is not allocated to current consumption. At the macroeconomic level, savings form the primary financial resource for investments and are reflected in the savings–investments identity. Savings can be accumulated in various financial instruments, including deposits, securities, and pension funds. Savings is the portion of income that is not spent on current consumption. It can be stored in various forms, including deposits, securities, and cash. Savings is a source of financing for investments in the macroeconomic equation [16].

Investment refers to expenditures on physical capital, such as machinery, infrastructure, and buildings, as well as on human capital. Investment directly expands productive capacity and facilitates capital accumulation, thereby contributing to economic growth.

A critical distinction must be drawn between savings and investments. Savings are financial decisions, whereas investments constitute real economic activity. Without effective financial intermediation, high savings rates may fail to translate into productive investments.

Having singled out savings and investments, let us consider them as growth models. The Harrod–Domar model establishes a direct relationship between the savings rate, investments, and economic growth. According to this model, higher savings lead to increased investments and accelerated capital accumulation, resulting in faster growth, provided that the capital–output ratio remains stable [17].

The Solow model refines this relationship by introducing diminishing returns to capital. While increased investment raises income levels, long-term growth ultimately depends on technological progress, rather than capital accumulation alone. Endogenous growth models extend this analysis by emphasizing innovation, human capital, and R&D investment as permanent drivers of productivity growth, thereby reinforcing the importance of investment quality over quantity.

The international experience demonstrates diverse growth trajectories shaped by savings behavior, investment patterns, and institutional frameworks. A comparative analysis of selected countries highlights the role of financial systems in channeling resources toward productive uses.

For a practical example, China represents a high-savings, high-investment growth model. With domes-

tic savings exceeding 40% of the country's GDP, it has financed large-scale industrialization and infrastructure development. China is characterized by a persistently high savings and investment ratio, with gross domestic savings amounting to approximately 43.2% of GDP and gross capital formation (fixed) remaining at around 40–41% of GDP. Over the period 2010–2023, real GDP growth was relatively high on average; however, in recent years, a deceleration has been observed, with reported growth of about 5.2% in 2023 and a continued trend towards slower growth in 2024–2025, as indicated by official quarterly statistics. However, recent evidence suggests diminishing marginal returns, rising debt, and challenges to efficiency [18].

South Korea exemplifies a balanced development model that combines high savings with targeted industrial policies, human capital investment, and innovation. This strategy facilitated a successful transition to a high-tech economy, characterized by sustained productivity growth. In 2023, South Korea's economy exhibited a balanced relationship between savings and investments, with gross domestic savings accounting for approximately 32.2% of GDP and gross capital formation reaching about 32.1% of GDP. Real GDP growth in 2023 remained moderate, at around 2–3%, reflecting variable short-term dynamics, while the country's long-term economic performance continues to be shaped mainly by the structural and industrial policies implemented during the 1960s–1990s [19].

Germany, as an advanced economy characterized by moderate investments and strong domestic consumption, recorded relatively lower savings and investment ratios in 2023, with gross domestic savings amounting to approximately 27–28% of GDP and gross capital formation at around 21.5–21.7% of GDP. Over 2023–2024, economic growth remained weak, with a contraction of about –0.3% in 2023 and only a slight and uneven recovery projected for 2024–2025, according to government forecasts [20].

Ukraine faces a substantial investment gap due to war-related destruction and economic disruption. Domestic savings are insufficient to meet reconstruction needs estimated at over USD 500 billion, necessitating external financing, institutional reform, and transparent investment governance. Ukraine faces a pronounced investment gap and substantial reconstruction needs, as gross domestic savings have been highly unstable and even negative during 2022–2024 due to the war (with Trading Economics reporting around 0.29% of GDP in 2024 and World Bank estimates showing intense methodological volatility related to transfers and external flows), while gross capital formation remains limited at approximately 18–19% of GDP, clearly insufficient for financial recovery. At the same time, reconstruction needs are estimated at about USD 524 billion over the next decade, which is roughly 2.8 times bigger than Ukraine's nominal GDP in 2024 (around USD 190–195 billion) [21, 22].

Savings are a necessary but not sufficient condition for economic growth. Sustainable growth requires effective financial intermediation, institutional quality, and strategic investment allocation. Empirical evidence confirms that the quality and innovation content of investments are decisive for long-term economic development.

For further analysis of the financial system's contribution to economic growth through the accumulation of savings and investments, we aggregate the results of the countries studied for a clear presentation of the findings.

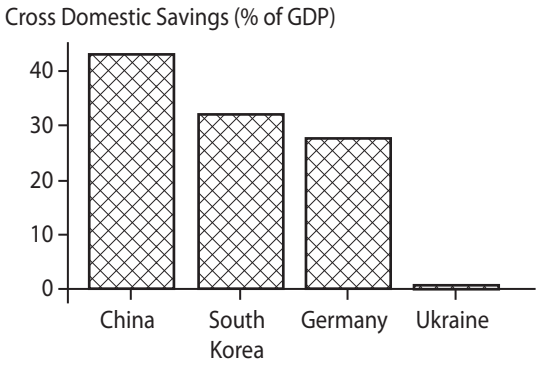

Fig. 2. Gross domestic savings as a percentage of GDP in selected countries, 2023

Source: author's own illustration based on data [18–21].

Figure 2 demonstrates substantial heterogeneity in gross domestic savings as a share of GDP across the selected economies. China consistently exhibits exceptionally high savings ratios, reflecting a development model heavily reliant on domestic resource mobilization and precautionary saving. In contrast, advanced European economies, such as Germany, display more moderate savings rates, consistent with consumption-driven growth patterns and mature financial systems. Ukraine represents an extreme case, where gross domestic savings have been highly volatile and, in recent years, even negative, underscoring the severe macroeconomic distortions caused by war-related shocks, fiscal pressures, and significant external transfers.

Figure 3 reveals corresponding differences in gross capital formation. Economies with high savings capacity—most notably China—maintain elevated and relatively stable investment ratios, enabling sustained capital accumulation. South Korea illustrates a balanced model in which savings and investment move closely together, reflecting long-term industrial and innovation-oriented policies. Germany,

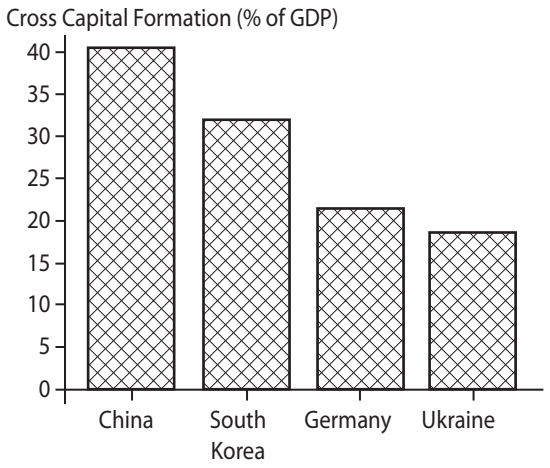

Fig. 3. Gross capital formation (investment) as a percentage of GDP in selected countries, 2023

Source: author's own illustration based on data [18–21].

despite its strong institutional framework, shows comparatively lower investment ratios, suggesting structural constraints on capital expansion. Ukraine again stands out, with investment levels remaining well below those required for recovery and modernization, highlighting a persistent investment gap.

Figure 4 illustrates the connection between these financial structures and the fundamental dynamics of GDP growth. High-investment economies have achieved strong long-term growth, although recent years have shown a clear deceleration, particularly in China. South Korea's growth appears moderate but stable, reflecting the maturity of its economic model. Germany experienced stagnation or contraction, indicating limited growth momentum despite macroeconomic stability. Ukraine's growth trajectory remains highly constrained, underscoring

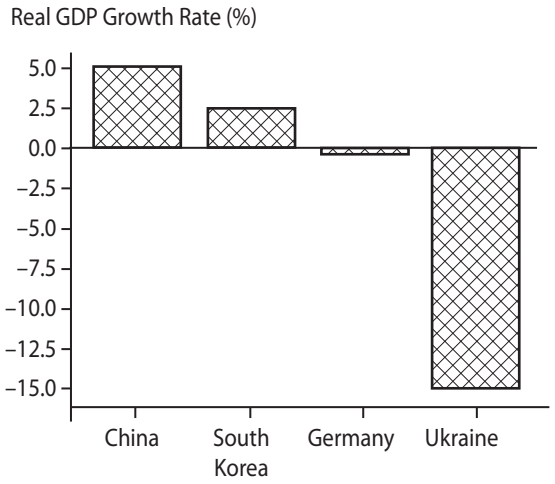

Fig. 4. Real GDP growth rates in selected economies, 2023

Source: author's own illustration based on data [18–21].

that insufficient domestic savings and investment capacity significantly limit the potential for post-crisis recovery.

Overall, the figures collectively demonstrate that sustainable economic growth is closely tied to the ability of financial systems to mobilize domestic savings and channel them into productive investments. Countries with structurally weak savings and investment mechanisms face persistent growth constraints, while those with balanced and stable financial accumulation frameworks demonstrate greater resilience and long-term growth potential.

CONCLUSIONS

The conducted study confirms that financial systems play a fundamental role in shaping long-term economic growth through their capacity to accumulate domestic savings and transform them into productive investment. The comparative analysis presented in the article demonstrates that economies characterized by high and stable savings ratios are better positioned to sustain capital accumulation and maintain growth over extended periods. This relationship is clearly illustrated by the cases of China and South Korea, where consistently high levels of gross domestic savings are closely associated with elevated investment rates and long-term growth performance. At the same time, the results indicate that the savings–investment–growth nexus is not mechanical, as recent growth deceleration in high-saving economies suggests diminishing marginal returns to capital and the growing importance of structural and institutional factors.

The findings further reveal that the efficiency of financial intermediation significantly conditions the impact of savings on economic growth. In advanced economies such as Germany, moderate savings and relatively low investment ratios coexist with high institutional quality and financial stability, resulting in limited but resilient growth dynamics. This confirms that at advanced stages of development, financial systems increasingly support consumption smoothing, risk management, and capital preservation rather than rapid investment expansion. Consequently, the growth model in mature economies becomes less dependent on investment intensity and more reliant on productivity gains and technological progress.

A significant contribution of the study lies in its analysis of economies experiencing structural shocks. The case of Ukraine illustrates how war-related disruptions undermine the financial system's capacity to mobilize domestic savings, resulting in negative or highly volatile savings rates and an acute investment gap. The empirical evidence presented in the article suggests that existing levels of gross capital formation

remain significantly below the scale required to meet reconstruction needs, thereby constraining growth prospects. This confirms that without a functioning mechanism for domestic savings accumulation and effective financial intermediation, economic recovery becomes heavily dependent on external financing sources, thereby increasing vulnerability and long-term risks.

Overall, the research results underscore that financial systems contribute to economic growth not only through the volume of accumulated resources but also through their ability to adapt to structural changes, allocate capital efficiently, and maintain macroeconomic stability in the face of uncertainty. The cross-country comparison reveals that balanced and institutionally developed financial systems enhance economic resilience, whereas structurally weak systems exacerbate the negative effects of shocks and hinder recovery processes.

Building on these conclusions, further research should extend the analysis beyond quantitative indicators of savings and investment to examine their qualitative composition and productivity effects. Particular attention should be paid to the role of financial institutions and regulatory frameworks in shaping the effectiveness of financial intermediation, especially in transition and post-crisis economies. In addition, future studies should explore the interaction between domestic savings and external financing, identifying conditions under which foreign capital complements rather than substitutes internal accumulation. Finally, given the growing frequency of economic and geopolitical shocks, an important direction for further research is the analysis of financial systems' capacity to sustain savings and investment under prolonged uncertainty, with a special focus on post-war reconstruction and long-term development strategies. ■

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ЕКОНОМІЧНІ ФАКТОРИ АДАПТИВНОСТІ ШТУЧНОГО ІНТЕЛЕКТУ В УМОВАХ ВОЛАТИЛЬНОСТІ КРИПТОВАЛЮТНОГО РИНКУ

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Шухманн В. А. Економічні фактори адаптивності штучного інтелекту в умовах волатильності криптовалютного ринку

У статті досліджено економічні фактори адаптивності систем штучного інтелекту (ШІ) в умовах волатильності криптовалютного ринку й обґрунтовано доцільність їх розгляду як складової економічної результативності та технічної якості моделей. Показано, що нестабільність криптовалютного ринку, режимні злами волатильності та ліквідності, інформаційна розбіжність і мікроструктурні обмеження виконання угод формують середовище, у якому ефект від адаптації визначається балансом між очікуваним приростом результативності та сукупними витратами. Методологічна основа роботи поєднує концептуальний аналіз і синтез сучасних підходів фінансової економетрики, машинного навчання та навчання з підкріпленням. Здійснено порівняльний аналіз дослідницьких постановок щодо нестаціонарності та дрейфу даних, а також узгодження системи критеріїв оцінювання, орієнтованих на економічний результат. Особливу увагу приділено ролі транзакційних витрат (комісій, спредів, прослизання), інформаційних витрат (збирання, очищення й оновлення даних), вартості обчислювальних ресурсів, ризикових лімітів і інституційних обмежень у визначенні допустимої інтенсивності оновлення моделей і правил ухвалення рішень. Запропоновано методологічну рамку класифікації детермінант адаптивності за групами режимно-ринкових умов, витратних параметрів і ресурсно-організаційних обмежень, а також двоконтурну логіку адаптації, що поєднує моніторинг змін ринкових режимів і дрейфу даних із економічно вмотивованим рішенням про оновлення моделі, набору ознак і правил. Наукова новизна полягає у формуванні критеріїв оцінювання адаптації, які пов'язують технічні рішення з чистим ефектом після витрат, ризик-метриками та стабільністю в різних ринкових режимах. Практичні висновки можуть бути використані для проєктування адаптивних ШІ-систем у криптоаналітиці, алгоритмічній торгівлі та ризик-менеджменті, а також для стандартизації порівняння альтернативних стратегій адаптації з урахуванням реальних витрат виконання угод і ризикових обмежень. Перспективи подальших досліджень пов'язані з емпіричною валідацією рамки на різних торговельних майданчиках і часових горизонтах та з формалізацією порогів, за яких адаптація забезпечує додану вартість після витрат.

Ключові слова: *цифрова економіка, економічні фактори, штучний інтелект, криптовалюта, міжнародний ринок, економічна ефективність, цифрові інструменти.*

Рис.: *1.* ***Табл.:*** *2.* ***Бібл.:*** *16.*

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