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SUSTAINABLE FINANCE AS A FACTOR OF ENSURING STATE ECONOMIC RESILIENCE

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ABSTRACT

Modern financial and economic transformations have intensified the need to ensure economic resilience, which is the ability of economic systems to adapt to exogenous and endogenous factors. In this context, examining the role of sustainable finance in strengthening the economic resilience of the state has become particularly relevant. The purpose of this study is to theoretically substantiate and empirically assess the role of sustainable finance as a macroeconomic factor in ensuring economic resilience under conditions of contemporary structural transformations. The study demonstrates that the impact of sustainable finance is implemented through sustainable finance instruments, which form a transmission mechanism operating along three interrelated vectors: financial-investment, debt-fiscal, and innovation-technological vectors. The proposed conceptual approach explains how sustainable finance contributes to strengthening macroeconomic stability, reducing economic vulnerability, and enhancing the adaptability of national economies to external and internal challenges. The empirical analysis revealed a statistically significant relationship between sustainable finance instruments and the innovation-technological component of economic resilience. The estimated regression model confirmed a statistically significant positive effect of green bond issuance on the Eco-innovation Index. The obtained results indicate that the development of the green financial instruments market contributes to strengthening the innovation-technological component of economic resilience. The study substantiates the integrated relationship between sustainable finance and economic resilience and identifies the main channels through which sustainable finance influences macroeconomic stability. The practical significance of the obtained results lies in their potential application to the formulation of state financial and economic policy aimed at developing sustainable finance instruments, promoting eco-innovation, and enhancing the economic resilience of the state under conditions of contemporary structural transformations.

Keywords: economic resilience, sustainable finance, sustainable financing, macroeconomic stability, green finance, ESG investment, eco-innovation, public financial policy, sustainable development

JEL Classification: E27, O13, Q32

INTRODUCTION

The paradigm of socio-economic development is based on the synergistic interaction of economic, social, and environmental components. The intensification of financial and economic transformations and increasing economic volatility have heightened the importance of ensuring economic resilience. Economic resilience is generally understood as the ability of a national economy to adapt to exogenous and endogenous factors, maintain macroeconomic stability, and ensure long-term sustainable development. Under these conditions, examining the role of sustainable finance in implementing the concept of sustainable development and strengthening the adaptive capacity of economic systems is of particular importance.

Sustainable finance represents a system of financial relations that integrates environmental, social, and governance (ESG) principles into financial and investment decision-making processes. As a macroeconomic factor, sustainable finance contributes to the mobilization and efficient allocation of financial resources toward projects that promote economic growth, social responsibility, and environmental sustainability. Its practical

implementation is carried out through sustainable finance instruments. The principal instruments include green bonds, sustainability bonds, green lending, ESG-oriented investments, sustainable banking mechanisms, and other financial instruments aimed at supporting long-term sustainable development.

Contemporary scientific research devotes considerable attention to ESG reporting, the development of green assets, and the role of sustainable investment in achieving the Sustainable Development Goals. At the same time, the role of sustainable finance as a macroeconomic factor in ensuring the economic resilience of the state remains insufficiently explored. In particular, the transmission mechanism through which sustainable finance influences economic resilience under conditions of financial and economic instability requires further theoretical and empirical investigation. Accordingly, the relevance of this study is determined by the need to theoretically substantiate and empirically assess the role of sustainable finance as a macroeconomic factor in ensuring the economic resilience of the state under conditions of contemporary structural transformations. Particular attention is devoted to identifying the transmission mechanism through which sustainable finance instruments influence the financial-investment, debt-fiscal, and innovation-technological vectors of economic resilience. The obtained results provide a theoretical and empirical basis for improving state financial and economic policy aimed at enhancing the adaptive capacity of the national economy, strengthening macroeconomic stability, and ensuring long-term sustainable development.

LITERATURE REVIEW

The concepts of sustainable development and economic resilience constitute the theoretical foundation of contemporary socio-economic transformations. Early studies on sustainable development emphasized the existence of ecological limits to economic growth and the necessity of achieving a balance among economic, social, and environmental objectives (Meadows et al., 1972; Daly, 1991). Subsequently, the concept of sustainable development evolved toward an integrated approach that combines economic efficiency, environmental responsibility, and social inclusion (Munasinghe, 2009; Shi et al., 2019). Within this paradigm, sustainable development is regarded as a long-term process requiring the coordinated interaction of financial, institutional, technological, and environmental factors (Mitra et al., 2013).

Economic resilience has subsequently emerged as a complementary concept that characterizes the ability of economic systems to withstand crisis shocks, adapt to structural changes, and restore economic growth. Classical macroeconomic studies emphasize the crucial role of institutional quality, the effectiveness of public investment, and fiscal sustainability in ensuring long-term macroeconomic stability (Barro, 1991; Stiglitz, 1989; Rodrik, 2015). The nonlinear relationship between public debt and economic growth under crisis conditions is substantiated in the study by Reinhart and Rogoff (2010). Contemporary research further conceptualizes economic resilience as a multidimensional characteristic encompassing the ability of economies to withstand shocks, recover, adapt, and undergo long-term structural transformation (IMF, 2023; Naumenkova et al., 2023).

In this context, sustainable finance has become increasingly important as a macroeconomic mechanism for promoting sustainable economic development (Friede et al., 2015; Pazienza et al., 2022). According to Schoenmaker and Schramade (2019), sustainable finance involves the integration of environmental, social, and governance (ESG) principles into financial and investment decision-making processes. Responsible investment practices and ESG-oriented financial strategies contribute to reducing financial risks while enhancing long-term economic efficiency (Sullivan & Mackenzie, 2017; Brooks & Oikonomou, 2018). The development of sustainable finance is further supported by European Union policy through the implementation of the EU Taxonomy, the Sustainable Finance Strategy, and the Corporate Sustainability Reporting framework, all of which direct financial resources toward environmentally and socially sustainable economic activities (European Commission, 2020, 2021a, 2021b, 2021c; Technical Expert Group on Sustainable Finance, 2020).

A substantial body of contemporary research is devoted to sustainable financing instruments as practical mechanisms for implementing the concept of sustainable finance (Fatica et al., 2021; Flammer, 2021; Weber & Saravade, 2019; OECD, 2025). Green bonds, sustainability-linked bonds, ESG investments, and green lending facilitate the mobilization of long-term capital for environmentally oriented projects and contribute to reducing systemic financial risks (Campiglio, 2016; Baker et al., 2018; Hachenberg & Schiereck, 2018). At the same time, innovative debt mechanisms, particularly debt-for-climate and debt-for-nature swaps, are regarded as effective instruments for strengthening fiscal sustainability while simultaneously financing climate and environmental initiatives (Chamon et al., 2022; Steele & Patel, 2020).

An important area of contemporary research is the innovation and technological dimension of sustainable development (Zenghelis, 2012). Sustainable investment stimulates directed technological change, accelerates the low-carbon transformation of the economy, and enhances industrial competitiveness (Acemoglu et al., 2012; Aghion et al., 2016). Technological modernization, the development of eco-innovations, and the adoption of circular economy principles and sustainable

production practices contribute to strengthening the adaptive capacity of economic systems and enhancing their long-term resilience (Jovane et al., 2008; Baldassarre et al., 2019). At the same time, financial institutions play a pivotal role in supporting these structural transformations by improving the efficiency of capital allocation (Bristow & Healy, 2014; Bruneckiene et al., 2019) and facilitating access to sustainable financing resources (Levine et al., 2009; Rose, 2007; Martin, 2012).

Ukrainian scholars have also made a significant contribution to the development of the theoretical foundations of sustainable finance and sustainable financing. In particular, Frolov (2025) developed the contemporary architecture of categories and concepts within the sustainable development financing paradigm and substantiated the role of sustainable finance within the system of economic relations. Serdyuk and Volok (2023) clarified the conceptual and categorical framework of sustainable development financing by distinguishing between the concepts of sustainable finance and sustainable financing. Nechyporuk (2024) examines the development of the financial system in the context of sustainable financing and substantiates the need to integrate ESG principles into public financial policy. Koshman (2024) analyzes the practical implementation of sustainable financing mechanisms in financial institutions in Ukraine and abroad. Furthermore, Myronchuk et al. (2024) examined contemporary approaches to financing sustainable development in the financial and credit sector, emphasizing the role of financial instruments in promoting long-term economic and environmental sustainability.

Despite the rapid development of research on sustainable finance, green investment, and economic resilience, limited attention has been devoted to the transmission mechanism through which sustainable finance influences the various components of economic resilience. Most existing studies focus either on individual sustainable financing instruments or on specific aspects of macroeconomic resilience, whereas the interrelationships among the financial-investment, debt-fiscal, and innovation-technological vectors of the transmission mechanism remain insufficiently explored. Therefore, the purpose of this study is to provide a theoretical substantiation of an integrated concept of the transmission mechanism through which sustainable finance influences economic resilience and to empirically assess its innovation-technological component.

AIMS AND OBJECTIVES

The purpose of the study is to theoretically substantiate the role of sustainable finance as a macroeconomic factor in ensuring the state's economic resilience in the context of modern structural transformations and to empirically assess the innovation-technological component of economic resilience.

To achieve this goal, the following tasks have been identified:

1. To reveal the theoretical and methodological principles of sustainable finance as a macroeconomic factor contributing to economic resilience and to substantiate the proposed transmission mechanism.
2. To conceptualize the role of sustainable finance instruments in the implementation of the financial-investment, debt-fiscal, and innovation-technological vectors of economic resilience.
3. To empirically assess the innovation-technological component of economic resilience by analysing the relationship between green bond issuance and the Eco-innovation Index.

The hypothesis of the study is that sustainable finance is a macroeconomic factor that contributes to the economic resilience of the state through the financial-investment, debt-fiscal, and innovation-technological vectors of the proposed transmission mechanism, while the innovation-technological component of this mechanism is empirically assessed in this study.

METHODS

Research Methods

In the course of the study, a combination of scientific methods and approaches was employed. In particular, the dialectical, systems, and institutional methods were used to examine the essence of sustainable finance as a factor of economic resilience. The methods of generalization and structural analysis were applied to assess the impact of sustainable finance on economic resilience. The methods of scientific abstraction and expert evaluation were employed to identify the directions for strengthening sustainable finance within the system of economic resilience.

To empirically assess the relationship between sustainable finance instruments and the innovation-technological component of economic resilience, Pearson correlation analysis and multiple linear regression analysis were applied. Pearson

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correlation analysis was used to determine the strength and direction of the relationships among the selected indicators. Multiple linear regression analysis served as the principal empirical method, making it possible to determine the statistical significance of individual factors and to assess their combined influence on the innovation-technological component of economic resilience.

The econometric model is specified as follows:

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \varepsilon$$

where: Y – Eco-innovation Index, used as an indicator of the innovation-technological component of economic resilience; X_1 – green bond issuance (%); X_2 – energy poverty (%); X_3 – environmental taxes (% of GDP); α_0 – intercept; α_1–α_3 – regression coefficients; *ε – random error term.*

The proposed model makes it possible to assess the impact of individual sustainable finance instruments and environmentally oriented macroeconomic indicators on the innovation-technological component of economic resilience.

The adequacy of the estimated model was evaluated using the following statistical criteria:

1. Fisher's F-test – to assess the overall statistical significance of the regression model.
2. Student's t-test – to examine the statistical significance of the individual regression coefficients.
3. Coefficient of determination (R^2) and adjusted coefficient of determination (Adjusted R^2) – to determine the proportion of variation in the dependent variable explained by the independent variables.
4. Standard error of the regression – to assess the accuracy of the estimated econometric model.

The application of this methodological approach makes it possible to quantitatively assess the relationship between sustainable finance instruments and the innovation-technological component of economic resilience. It also enables verification of the statistical significance of the obtained results and provides an empirical basis for assessing the transmission effect of sustainable finance as a macroeconomic factor contributing to the economic resilience of the state.

Research Information Base

The research information base consists of official statistical data obtained from international organizations and European analytical platforms. In particular, data from Eurostat, the European Environment Agency (EEA), the Eco-Innovation Observatory, the European Commission, and publicly available statistical databases on the development of the sustainable finance market were used.

The empirical analysis is based on account statistics from international databases as of 2024. In particular, the Eco-Innovation Index and the Global Consumption Impact Index are taken from the European Environment Agency (EEA). Green bond issuance figures are obtained from the European Environment Agency (EEA). Energy poverty and environmental taxes are taken from Eurostat. All indicators follow an international methodology that ensures cross-country comparability.

The empirical sample comprises 15 European countries: Germany, France, Italy, Spain, the Netherlands, Belgium, Austria, Poland, the Czech Republic, Slovakia, Slovenia, Estonia, Sweden, Denmark, and Switzerland. The countries were selected according to the following criteria: the availability of a complete and comparable dataset for all the indicators included in the study and the representation of countries with different levels of sustainable finance market development. This approach ensures sufficient variability of the indicators for conducting correlation and regression analyses.

The dependent variable is the Eco-innovation Index, which serves as an indicator of the innovation-technological component of economic resilience. The independent variables include green bond issuance, energy poverty, and environmental taxes. The selection of these indicators is based on the conceptual framework of the study. Within the scope of this research, the empirical analysis focuses on the innovation-technological vector of the proposed transmission mechanism. This approach is due to the availability of comparable international statistical data and the possibility of quantitatively assessing the impact of sustainable finance instruments on the Eco-innovation Index as an indicator of the innovation-technological component of economic resilience. The financial-investment and debt-fiscal vectors are examined at the conceptual level and represent promising directions for future empirical research.

The Global Consumption Impact indicator is an important indicator for descriptive purposes. It is worth noting that this indicator is not used in the regression model because the empirical analysis assesses the innovation-technological component of economic resilience as the dependent dimension, using selected indicators associated with the proposed transmission mechanism.

Research Limitations

The sample size (n = 15) is determined by the limited number of EU countries for which a complete and methodologically comparable set of the selected statistical indicators is available. Moreover, several EU countries were not included in the empirical sample because the development of sustainable financing instruments remains limited or because comparable statistical data for the selected indicators are unavailable. The Eco-innovation Index is used as an indicator of the innovation-technological component of economic resilience, reflecting the study's focus on the concept of economic resilience rather than economic efficiency. Despite these limitations, the proposed methodological approach provides exploratory empirical evidence on the relationship between sustainable finance instruments and the innovation-technological component of economic resilience. The results obtained require further verification using a larger cross-country sample.

RESULTS

Economic volatility and the increasing scale of systemic fluctuations have intensified the need to ensure macroeconomic resilience. Economic resilience is a structural property of an economic system that reflects its capacity to withstand economic shocks, adapt to changing macroeconomic conditions, and restore economic growth. Within the framework of ensuring economic resilience, sustainable finance plays an important role as a factor in achieving economic, social, and environmental outcomes. Sustainable finance is an important macroeconomic factor. It represents a system of financial relations, mechanisms, and instruments aimed at integrating environmental, social, and governance (ESG) criteria into financial and investment decision-making processes in order to ensure long-term sustainable economic development. A functional component of sustainable finance is sustainable financing.

Sustainable financing encompasses financial relations associated with the mobilization, allocation, and use of financial resources while taking into account long-term environmental, social, and governance priorities. Its primary objective is to ensure a balance between economic efficiency, environmental responsibility, and social inclusion. Sustainable financing involves the integration of ESG criteria into the evaluation of investment projects, risk management, and the development strategies of financial institutions. This approach facilitates the reallocation of capital toward economic activities that promote long-term economic growth, enhance the stability of the financial system, and minimize systemic risks.

The practical implementation of sustainable finance is carried out through a set of specialized financial instruments. These instruments facilitate the mobilization of financial capital for the implementation of sustainable development projects. The principal sustainable finance instruments include green, social, sustainability, and sustainability-linked bonds, ESG investments, green lending, sustainability-linked loans, sustainable investment funds, blended finance mechanisms, sustainable insurance instruments, and financing mechanisms for climate projects and the carbon market. These instruments ensure the efficient allocation of financial resources to activities that support the decarbonization of the economy, the development of environmentally friendly technologies, corporate social responsibility, and enhanced institutional sustainability. The use of sustainable finance instruments forms a comprehensive mechanism for influencing macroeconomic stability. They contribute to reducing financial and climate-related risks, stimulating innovation, supporting the green transformation of production, and enhancing the investment attractiveness of the economy. Accordingly, expanding the application of sustainable finance instruments is an important prerequisite for the development of financial systems and for ensuring long-term economic sustainability.

The conceptual foundation of sustainable financing lies in combining microeconomic efficiency with the objectives of long-term sustainable development. As a result, financial strategies aimed at strengthening climate resilience are reinforced. As a macroeconomic factor, sustainable financing exerts its influence through a wide range of market instruments. Its institutional architecture is based on the interaction of key financial market participants, primarily commercial banks, insurance institutions, and pension funds.

The transmission mechanism of sustainable financing is defined as a system of structural, institutional, and macro-financial channels. It is based on the reallocation of financial capital through its influence on the dynamics of macroeconomic indicators. This mechanism encompasses the causal relationships underlying resource redistribution, the adjustment of fiscal parameters, and the diffusion of technological innovation. As a result, qualitative ESG principles are translated into quantitative determinants of macroeconomic stability. The transmission mechanism of sustainable finance ensures the

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mobilization, allocation, and efficient use of sustainable financial resources under conditions of increased economic volatility. To systematize the multilevel interaction between sustainable finance and economic resilience, a conceptual model has been developed that reflects the architecture of the transmission mechanism through which sustainable finance influences macroeconomic processes. The model structures the main vectors, channels, and instruments through which sustainable finance contributes to the reallocation of financial resources, the reduction of macroeconomic vulnerability, the enhancement of the adaptability of the economic system, and the strengthening of long-term economic resilience (Figure 1).

Figure 1 illustrates the multi-vector integrative relationship between sustainable finance and economic resilience. The model demonstrates a sequential transition from sustainable finance instruments through the financial-investment, debt-fiscal, and innovation-technological vectors to the strengthening of macroeconomic stability, the enhancement of the adaptability of the economic system, and the formation of economic resilience. This approach provides a systematic representation of the relationships among the individual elements of the mechanism and substantiates the directions for the empirical verification of the proposed conceptual framework.

The main functional pathways of the proposed model are represented through a unified transmission mechanism, which is structured into three interrelated vectors.

Financial-investment vector. This vector reflects the causal sequence through which sustainable finance instruments influence economic resilience. The allocation of sustainable financial resources reduces the long-term cost of capital and contributes to reducing structural imbalances. The operational mechanism is based on redirecting institutional capital toward energy-efficient systems, intelligent digital infrastructure, and improvements in corporate governance. Investment in sustainable infrastructure and innovation projects increases the overall volume of capital investment, generates multiplier effects in the real sector, and reduces systemic financial risks. It also optimizes the structure of national capital by continuously redirecting financial resources toward low-carbon and socially oriented sectors. As a result, corporate investment policy becomes increasingly focused on minimizing systemic financial vulnerabilities and supporting long-term economic growth.

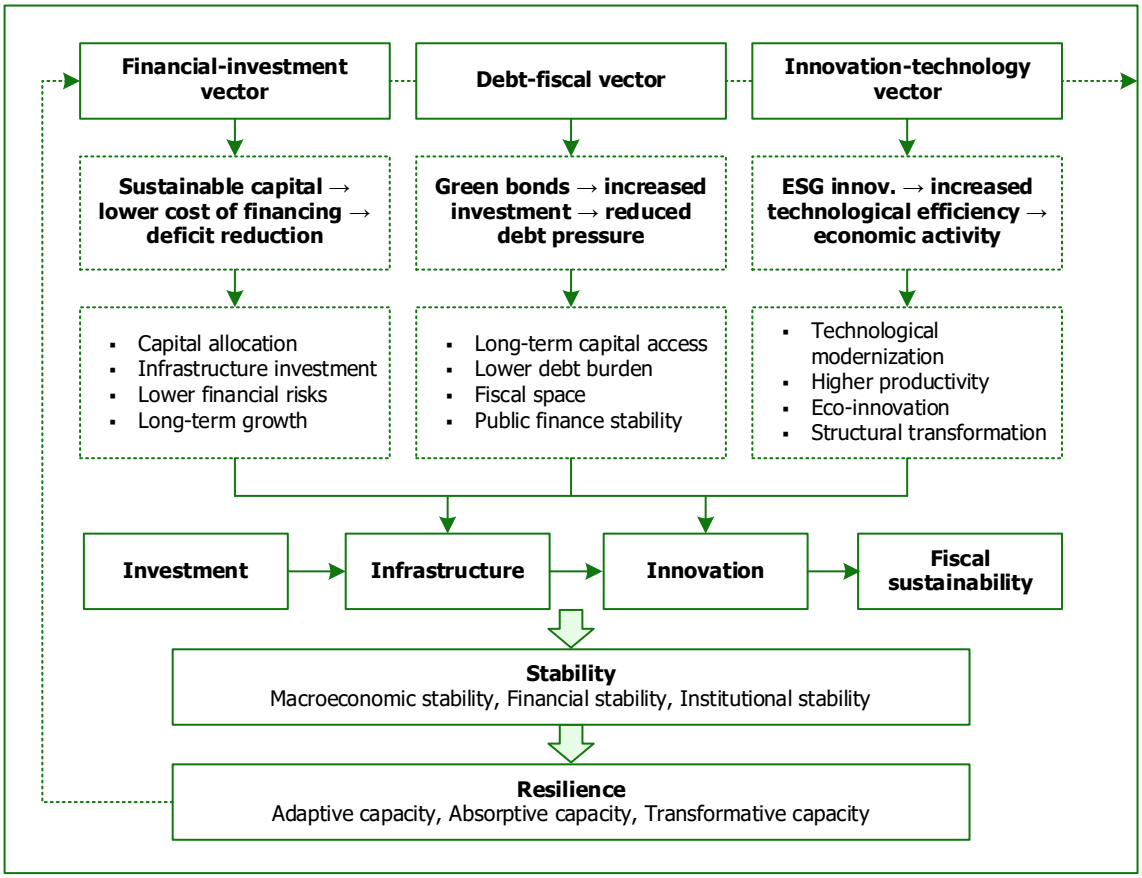

Figure 1. Conceptual model of the multi-vector integrative relationship between sustainable finance and economic resilience.

Debt-fiscal vector. This vector reflects the transition from the targeted issuance of green, social, and sustainability bonds to increased public investment. Such a transition contributes to reducing debt pressure. Through the issuance of green bonds, governments and corporate entities gain access to long-term institutional capital on more favourable financing terms. This mechanism contributes to optimizing the structure of public debt, strengthening fiscal discipline, and expanding fiscal space. The mobilization of sustainable financial resources supports more efficient budget expenditure management and more sustainable public debt dynamics through the implementation of targeted green incentives and environmentally oriented tax instruments.

Innovation-technological vector. This vector demonstrates how ESG-oriented innovations and sustainable infrastructure funds contribute to improving technological efficiency and stimulating economic activity. It forms the basis for the qualitative modernization of the economy. The innovation-technological vector facilitates industrial restructuring through the energy transition and accelerated technological renewal. It promotes the rapid diffusion of eco-innovations and high-technology industries. The implementation of renewable energy technologies and more efficient resource use reduces energy dependence. Such technological modernization accelerates the adoption of environmentally friendly and digital solutions. As a result, the adaptive capacity of the real sector to withstand economic shocks is strengthened.

The combined effect of these three vectors ensures both stability, reflecting the short-term capacity to absorb shocks, and resilience, reflecting long-term adaptive recovery and sustainable economic growth. Sustainable finance contributes to reducing the systemic vulnerability of the national economy. The financial-investment, debt-fiscal, and innovation-technological vectors jointly form an integrated transmission mechanism. Consequently, the necessary structural preconditions are created to systematically strengthen the economy's capacity to withstand both exogenous and endogenous shocks.

Sustainable financing instruments influence the formation and distribution of financial resources to ensure the implementation of the principles of sustainable development. In this context, the effectiveness of the sustainable financing toolkit forms a favorable environment for attracting investments, strengthening fiscal sustainability and technological modernization. Such macroeconomic and technological changes determine the financial and investment, debt-fiscal and innovation-technological vectors. As a result of their application, macroeconomic stability is maintained, systemic vulnerability is reduced, and the adaptive capacity of the economy is increased. Accordingly, economic resilience is the main macroeconomic result of the synergistic interaction of these vectors.

Each individual vector of the developed mechanism has a corresponding group of indicators. In particular, the financial and investment vector is reflected by sustainable financing instruments that form long-term investment capital. The indicators of this vector are green bond issuance. The debt-fiscal vector is represented by environmental taxes together with sustainable public financing and public debt management mechanisms. The innovation-technological vector is defined by indicators of technological modernization and eco-innovation. The eco-innovation index is the basis of empirical analysis. The financial-investment and debt-fiscal vectors are conceptually justified. The corresponding application practice is associated with the limitation of international statistical data.

The empirical indicators presented in Table 1 represent the structural components of sustainable finance. In particular, green bond issuance reflects the operational capacity of market-based financial instruments within the financial-investment vector. The Eco-innovation Index and the Global Consumption Impact indicator characterize the innovation-technological vector. Environmental taxes and the level of energy poverty reflect the fiscal and social constraints associated with macroeconomic sustainability. Since the proposed transmission mechanism is multidimensional, the present empirical analysis is intentionally limited to the innovation-technological vector, whereas the financial-investment and debt-fiscal vectors are conceptualized theoretically and constitute directions for further empirical investigation.

The empirical sample comprises 15 European countries: Germany, France, Italy, Spain, the Netherlands, Belgium, Austria, Switzerland, Poland, the Czech Republic, Slovakia, Slovenia, Estonia, Sweden, and Denmark. The countries were selected based on the availability of a complete and comparable set of statistical data for all the indicators included in the study. The sample also reflects different models of socio-economic development and varying levels of sustainable finance market development across European countries. This approach ensures sufficient variability of the indicators for conducting correlation and regression analyses.

The system of indicators monitored by the European Environment Agency (EEA) and Eurostat is designed for countries that are closely integrated with the EU-27. Although Switzerland is not a member of the European Union, it is closely integrated with the EU-27 through a network of bilateral agreements. As Ukraine has not yet been fully integrated into the unified EEA reporting system, the indicators examined in this study are not yet officially calculated for Ukraine using a comparable methodology. The relatively small sample size is therefore determined by the limited number of European countries for which a complete set of the selected indicators is available under the unified EEA and Eurostat methodology.

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Accordingly, the obtained results should be interpreted as evidence of the statistical relationships identified within the selected sample.

Table 1. Key indicators of the sustainable finance market and GDP as of 2024. Note: *Green bonds as a percentage of total bonds issued by corporations, governments, and both corporations and governments in the EU-27, 2014-2024. *(Source: built by the authors (European Environment Agency (EEA), 2026)*

Country	GDP, EUR billion	Green bond issuance*, (%)	Eco-innovation Index	Energy poverty, (%)	Environmental taxes, (%)	Global impact of consumption
Austria	494.09	12	157.1	1.90	4.60	1.6
Belgium	620.27	2	109.2	7.50	5.20	1
Czechia	321.98	2	125.6	6.10	4.60	1.2
Denmark	429.7	17	157.7	6.9	4.6	1.9
Estonia	39.5	2	116.5	4.1	7.6	1
France	2,919.9	16	144	5.10	3.90	1.7
Germany	4,328.97	10	140.7	8.20	4.20	1.3
Italy	2,199.6	9	150.1	3.50	6.10	1.4
Netherlands	1,122.46	9	133.1	7.10	7.20	1.3
Poland	852.54	1	69.7	4.70	7.10	1.4
Slovakia	141.7	4	98.9	8.1	5.6	1
Slovenia	67.4	2	121.5	3.6	7.6	1.2
Spain	1,594.33	6	91	19.20	10.10	1.1
Sweden	610.8	32	165.2	3.9	4.8	2.1
Switzerland	886.01	11	142.2	0.50	4.40	2.0

The synergistic relationship between sustainable finance as a macroeconomic factor and economic resilience is realized through three main vectors of the transmission mechanism: the financial-investment, debt-fiscal, and innovation-technological vectors. Each of these transmission channels is closely interconnected with the social dimension of economic resilience, particularly the level of energy poverty, which determines the vulnerability of households to energy and price shocks. At the same time, the Eco-innovation Index and the Global Consumption Impact indicator serve as determinants for assessing the structural and external dimensions of economic resilience. Green bond issuance functions as a market-based instrument for mobilizing long-term capital to finance infrastructure, energy, and modernization projects. In particular, France (16%), Austria (12%), Switzerland (11%), and Germany (10%) demonstrate the highest levels of green bond issuance. Such dynamics create favourable financial conditions for financing adaptation measures aimed at strengthening macro-financial stability (European Environment Agency (EEA), 2026).

The Eco-innovation Index reflects the ability of an economic system to modernize production processes and adopt technologies that reduce its overall structural vulnerability. Among the countries included in the sample, Austria and Italy record the highest values of this index (157.1 and 150.1, respectively). These values indicate a high capacity for technological modernization and innovation-driven development. Such a structure of the economy enhances its ability to adapt to macroeconomic shocks and mitigates long-term systemic risks (European Environment Agency (EEA), 2026).

The level of energy poverty reflects the social dimension of economic vulnerability. Countries with higher levels of energy poverty, particularly Spain (19.2%) and France (5.1%), demonstrate greater sensitivity to energy shocks and price fluctuations, which constrains the overall level of economic resilience. Reducing energy poverty through energy-efficiency programmes, targeted subsidies, and social support measures is therefore an important factor in strengthening the adaptive capacity of the economic system. Within the debt-fiscal vector, environmental taxes perform both corrective and fiscal functions. Spain (10.1%), the Netherlands (7.2%), and Poland (7.1%) report relatively higher shares of environmental taxes in the overall tax structure (European Environment Agency (EEA), 2026), contributing to the expansion of fiscal space and the mobilization of domestic financial resources for adaptation and innovation policies. At the same time, the effectiveness of these instruments depends on the efficiency of the transmission channels through which governments allocate and target the corresponding budget revenues.

The Global Consumption Impact indicator reflects the external dimension of economic resilience by characterizing the resource dependence and global environmental footprint of the national economy. Higher values of this indicator, particularly in Switzerland and France, indicate a greater environmental footprint within global value chains and a higher dependence on imported resources. Reducing this indicator through the localization of critical production, improved resource efficiency, and the introduction of domestic innovations represents an effective mechanism for strengthening the long-term economic resilience of the state.

To assess the empirical relationships, it is important to examine the interaction among the key analytical indicators that shape the architecture of macroeconomic stability. In this context, green bond issuance serves as the principal financial determinant (X_1). This indicator reflects the capacity of the financial-investment vector of the transmission mechanism to mobilize long-term financial capital through sustainable finance instruments.

The selection of the Eco-innovation Index as the dependent variable is justified by its ability to characterize the innovation-technological dimension of economic resilience. The Eco-innovation Index measures the capacity of an economy for structural modernization, technological adaptation, improved resource efficiency, and the adoption of environmentally friendly innovations. These characteristics determine the ability of an economic system to respond effectively to external shocks, facilitate structural transformation, and maintain long-term competitiveness. Therefore, within the framework of this study, the Eco-innovation Index is used as an indicator of the innovation-technological component of economic resilience, making it possible to assess the transmission effect of sustainable finance on the processes of structural transformation of the economy. The econometric model assesses only the innovation-technological component of economic resilience, not the multidimensional concept of economic resilience as a whole.

Based on the collected data, a correlation and regression analysis were conducted. To examine the combined effect of all explanatory variables, a multiple linear regression model was estimated. Within the proposed econometric model, the explanatory variables include green bond issuance (%) (X_1), energy poverty (%) (X_2), and environmental taxes (% of GDP) (X_3).

The estimated econometric model reveals a statistically significant relationship between sustainable finance instruments and the Eco-innovation Index. The resulting multiple linear regression equation provides a mathematical representation of the transmission effect of sustainable finance on the innovation-technological component of economic resilience:

$$y=139{,}8805+1{,}9838X_1-1{,}4030X_2-3{,}6151X_3$$

where: y – Eco-innovation Index, used as an indicator of the adaptive capacity and the innovation-technological component of economic resilience. The indicator is not intended to represent economic resilience as a whole, but is one of its structural components; X_1 – Green bond issuance (%), representing a sustainable finance instrument; X_2 – Energy poverty (%), reflecting the social dimension of economic vulnerability; X_3 – Environmental taxes (% of GDP), representing the fiscal instrument of government regulation.

The model fit indicates a strong overall relationship between the selected sustainable finance instruments and the innovation-technological component of economic resilience, as evidenced by the multiple correlation coefficient (R = 0.8303). The coefficient of determination (R^2 = 0.6894) indicates that 68.94% of the variation in the Eco-innovation Index is explained by the explanatory variables included in the model. The adjusted coefficient of determination (Adjusted R^2 = 0.6046) confirms the satisfactory explanatory power of the model after accounting for the number of explanatory variables and the sample size (Table 2).

Table 2. Regression statistics for the estimated model of economic resilience.

Regression Statistics	Value
Multiple R	0.830275
R Square (R^2)	0.689356
Adjusted R^2	0.604635
Standard Error	17.13278
Observations	15

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The estimated regression model demonstrates a relatively high explanatory power (Table 2). The multiple correlation coefficient (Multiple R = 0.8303) indicates a strong relationship between the dependent variable and the selected explanatory variables. The coefficient of determination (R^2 = 0.6894) shows that approximately 68.94% of the variation in the Eco-innovation Index is explained by the independent variables included in the model. The adjusted coefficient of determination (Adjusted R^2 = 0.6046) confirms that the model retains satisfactory explanatory power even after accounting for the number of explanatory variables and the sample size.

Based on the results of the multiple linear regression analysis, the coefficient for X_1 (green bond issuance) is 1.9838 and is statistically significant ($p = 0.0086 < 0.05$) (Table 3).

Table 3. Estimated coefficients of the multiple linear regression model.

Variable / Explanatory Variable	Coefficient	Standard Error	t-Statistic	p-Value
Intercept	139.8805	21.01259	6.656984	0.000036
x1 (Green bond issuance)	1.983777	0.622073	3.188977	0.008622
X2 (Energy poverty)	-1.403	1.293262	-1.08485	0.30119
X3 (Environmental taxes)	-3.61514	3.487455	-1.03661	0.322168

This result supports the research hypothesis regarding the positive effect of sustainable finance instruments on the innovation-technological component of economic resilience. Specifically, an increase in green bond issuance by one percentage point is associated with an average increase of 1.98 points in the Eco-innovation Index, ceteris paribus. This finding indicates that the development of the green finance market contributes to attracting long-term investment capital, promoting environmental modernization, and facilitating the adoption of innovative technologies, thereby strengthening the innovation-technological component of economic resilience.

The coefficient for X_2 (energy poverty) equals -1.403, but is not statistically significant ($p = 0.3012 > 0.05$). The negative sign of the coefficient is consistent with theoretical expectations, as a higher level of energy poverty may potentially constrain the investment capacity of households and governments, thereby limiting the development of eco-innovation. However, the obtained results do not provide sufficient statistical evidence to confirm the existence of such an effect within the selected sample.

The coefficient for X_3 (environmental taxes) equals -3.6151 and is likewise not statistically significant ($p = 0.3222 > 0.05$) (Table 3). The negative coefficient may reflect country-specific differences in environmental taxation policies and the varying stages of environmental transformation across the sampled economies. The negative coefficient may reflect differences in environmental taxation systems between countries, stages of the green transition, and ways of distributing environmental tax revenues. Nevertheless, the lack of statistical significance precludes drawing conclusions about the independent effect of this indicator on the innovation-technological component of economic resilience. At the same time, the impact of environmental taxation on economic resilience is not unidirectional. On the one hand, environmental taxes expand fiscal capacity by generating additional public revenues that may be directed toward green investment, environmental modernization, and sustainable development programmes. On the other hand, excessive environmental tax pressure may increase production costs, reduce firms' available investment resources, and temporarily constrain innovation activity. Therefore, the overall effect of environmental taxation depends on the balance between fiscal support for sustainable transformation and the additional financial burden imposed on economic agents.

Overall, the obtained results partially support the proposed research hypothesis. The empirical analysis confirms a statistically significant positive effect of green bond issuance, as a key sustainable finance instrument, on the innovation-technological component of economic resilience. At the same time, no statistically significant effects were identified for energy poverty or environmental taxes, indicating the need for further research based on a larger sample and the inclusion of additional explanatory variables. The scatter plot (Figure 2) further illustrates the positive relationship between green bond issuance and the Eco-innovation Index.

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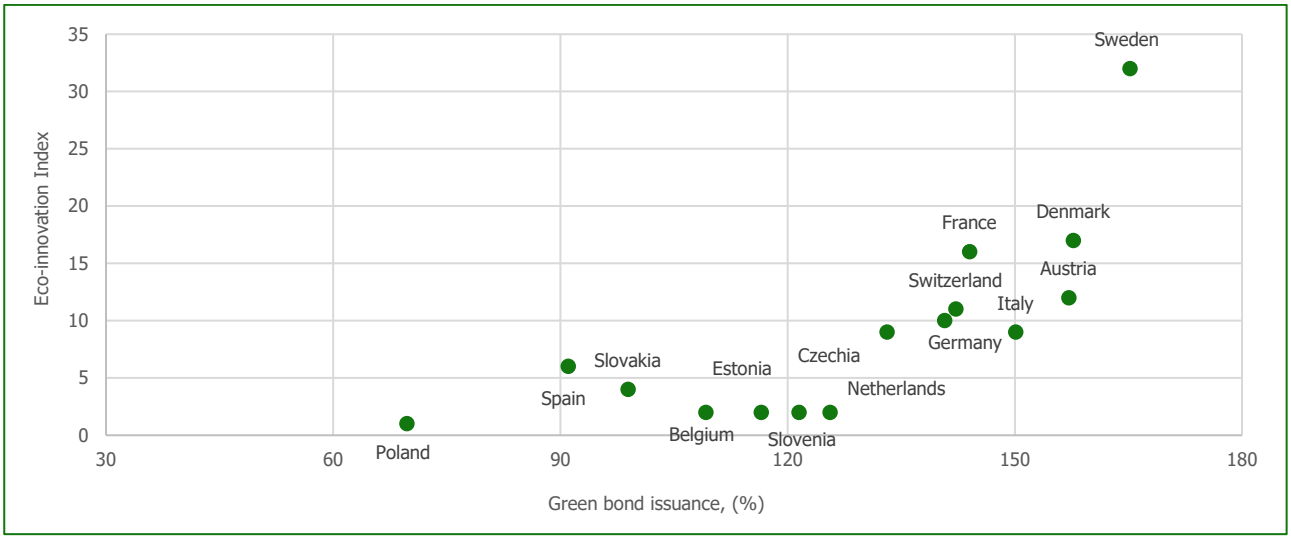

Figure 2. Scatter plot illustrating the relationship between green bond issuance and the Eco-innovation Index across selected European countries. *(Source: built by the authors (European Environment Agency (EEA), 2026)*

The scatter plot illustrates the empirical relationship between the level of sustainable finance and the intensity of eco-innovation activity as a structural component of economic resilience. The calculated Pearson correlation coefficient for the selected countries indicates a strong positive linear relationship according to the Chaddock scale. This relationship is consistent with the theory of endogenous growth and with empirical evidence highlighting the role of sustainable finance in stimulating innovation and strengthening economic resilience. An increase in green bond issuance facilitates the reallocation of capital toward low-carbon and resource-efficient projects, thereby strengthening the components of the Eco-innovation Index. As a result, the innovation-technological component of economic resilience is enhanced.

The positive relationship between the expansion of sustainable finance and the innovation-technological component of economic resilience is further supported by the results of the multiple linear regression analysis. The estimated regression model shows that 68.94% of the variation in the Eco-innovation Index ($R^2 = 0.6894$) is explained by green bond issuance (X_1), energy poverty (X_2), and environmental taxes (X_3). Countries that actively apply sustainable finance instruments demonstrate a greater capacity for technological adaptation under conditions of economic shocks. The observed patterns indicate an increasing relationship between environmentally oriented financial flows and the innovation-driven transformation of the economy, which is consistent with the principles of the green transition.

The relationship between sustainable finance and the innovation-technological component of economic resilience is reinforced by the synergistic interaction of the proposed transmission channels. In particular, the financial-investment vector demonstrates a statistically significant positive effect ($\alpha_1 = 1.9838$; $p = 0.0086 < 0.05$), indicating that higher levels of green bond issuance contribute to mobilizing long-term investment capital, improving access to sustainable finance, and supporting technological modernization. The estimated regression model and the scatter plot jointly support the proposed research hypothesis by confirming the positive contribution of sustainable finance instruments, particularly green bonds, to the innovation-technological component of economic resilience.

The integrative analysis conducted allows us to detail the specifics of the impact of sustainable financing instruments on macroeconomic resilience:

1. Countries with a high level of green bond market development, in particular Sweden ($X_1 = 32\%$), Denmark ($X_1 = 17\%$) and France ($X_1 = 16\%$), have greater opportunities to finance environmental modernization and the development of eco-innovations.
2. Countries with the highest Eco-innovation Index indicators, such as Sweden ($Y = 165.2$), Denmark ($Y = 157.7$) and Austria ($Y = 157.1$), are characterized by high innovation and technological potential, which contributes to strengthening economic resilience and increasing the ability of the economy to adapt to external shocks.
3. Significant energy poverty indicators, for example, Spain 19.2%, justify the need to redistribute budget resources in favor of current social transfers and compensatory subsidies. This approach limits the financial capacity of the state to make long-term strategic investments in technological renewal.

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4. Environmental taxation in countries that are at the first stages of sustainable transition, for example, Poland, is characterized by a contradictory impact. A high fiscal burden in the form of eco-taxes affects the reduction of working capital of real sector entities. In conditions of an adaptation shock, internal investment reserves for self-financing of sustainable projects are limited.

Economic resilience is the ability of a national economy to adapt to endogenous and exogenous influences and ensure an optimal level of socio-economic stability. An appropriate approach is especially necessary for countries going through large-scale military conflicts. Methodologically, it is important to note that Ukraine was not included in the econometric sample and regression model due to the lack of comparable data. The European Environment Agency (EEA) and Eurostat do not currently officially calculate the analyzed indicators for non-EU countries. However, assessing Ukraine's key indicators through the identified European patterns is important for analyzing its asymmetric resilience. The following analysis of Ukraine is conceptual in nature and is not part of an empirical study. A relevant conceptual framework is important for substantiating effective ways of building a sustainable development policy in Ukraine. This approach is particularly relevant in the context of the war and post-war period.

The Ukrainian experience demonstrates the practical implementation of sustainable finance through state energy-efficiency programmes. In particular, in 2021, NPC Ukrenergo issued USD 825 million in green Eurobonds to support the development of renewable energy. At the same time, the domestic green bond market in Ukraine remains underdeveloped due to the country's elevated risk profile, limiting the effective functioning of the financial-investment transmission channel. Environmental tax revenues in Ukraine remain relatively low, accounting for approximately 1–1.15% of total budget revenues. Under wartime conditions, these revenues are allocated entirely to the general state budget to finance defence expenditures rather than dedicated recovery funds.

To address these challenges and support the transition toward a sustainable post-war economy, Ukraine should strengthen the use of EU integration instruments. This requires a shift from short-term fiscal measures driven by wartime conditions toward the development of a national Green Taxonomy, the application of international guarantees (e.g., from the World Bank or the European Bank for Reconstruction and Development (EBRD)) to facilitate the issuance of targeted reconstruction bonds, and the direct financing of decentralized eco-innovative energy projects.

One example of sustainable finance mechanisms that directly contribute to economic resilience in Ukraine is the implementation of the Build Back Greener principles, which emphasize the reconstruction of damaged infrastructure through the development of sustainable, environmentally friendly, and energy-efficient systems. From a macroeconomic perspective, this approach activates the investment multiplier channel and contributes to a long-term transformation of the structure of public expenditure. The use of targeted green financing for reconstruction generates a dual economic effect. First, it substantially reduces the operating costs associated with maintaining restored infrastructure. Investments in thermal modernization and autonomous energy generation enable public authorities and municipal institutions to reduce energy procurement costs by 30–45%, thereby lowering fiscal pressure on both local and central government budgets and creating additional fiscal space. Second, the transition toward regional renewable energy sources strengthens the energy autonomy of individual regions, reducing their exposure to volatility in global fossil fuel markets and mitigating the risks associated with physical damage to centralized energy infrastructure.

For Ukraine, the practical implementation of these principles represents an important factor in enhancing the effectiveness of post-war reconstruction by attracting financial resources that are largely inaccessible through conventional lending because of exceptionally high sovereign risk. As traditional international investors remain reluctant to invest in active conflict zones, sustainable finance, particularly through blended finance mechanisms and concessional green grants provided by international financial institutions, represents an important source of reconstruction financing.

An important financial foundation for this approach is the Renewable Energy Solutions financing agreement signed between the United Nations and Ukraine on 13 October 2025. The agreement provides for the mobilization of EUR 16.5 million in targeted financing to deploy environmentally friendly energy solutions at public infrastructure facilities. The project is implemented through non-repayable grant financing, eliminating debt-servicing costs for local communities. The estimated economic effect of this financing is annual budget savings exceeding EUR 2.1 million, resulting from improved energy efficiency and the generation of renewable electricity. According to the project estimates, the initial investment is expected to achieve a full payback period of approximately 7.8 years. At the same time, the implementation of the project contributes to strengthening macroeconomic stability at the local level.

Under these conditions, sustainable finance functions as an important factor for enhancing economic resilience by simultaneously supporting economic recovery and long-term stability. The key mechanisms through which sustainable finance influences Ukraine's economic resilience during martial law include:

1. Energy security. Under wartime conditions, Ukraine remains highly dependent on imported energy resources. Investment in renewable energy sources and modernization of energy infrastructure reduces this dependence and directly strengthens economic stability. Energy security provides the foundation for the stable functioning of industrial enterprises, logistics systems, and social services, thereby increasing the economy's adaptability to external shocks. In this context, the application of the financial-investment and innovation-technological vectors is particularly important.
2. Growth of employment and economic potential. Sustainable finance generates a multiplier effect through the creation of new jobs in the "green" sector. Energy efficiency programs and infrastructure restoration stimulate domestic demand and enhance social stability. Increased employment, especially in regions affected by conflict, provides a basis for rapid recovery of regional economic activity. The financial-investment vector plays a central role in the implementation of this mechanism.
3. Innovation and technological development. Investments in green technologies stimulate the development of national innovation potential. Economic diversification through the adoption of energy-efficient and low-carbon technologies reduces vulnerability to global price and logistics shocks. The experience of EU countries demonstrates that innovation-driven economies exhibit higher resilience during crisis periods, confirming the importance of integrating eco-innovations into Ukraine's post-war recovery policy (OECD, 2025). Accordingly, the innovation-technological vector is of strategic importance.
4. Attracting international aid. A sustainable finance approach increases Ukraine's attractiveness to international donors and investors oriented toward ESG criteria. This opens additional sources of capital for restoring critical infrastructure and modernizing industry, directly contributing to economic resilience. The debt-fiscal vector is particularly relevant in this context.

Overall, sustainable finance represents a crucial instrument for strengthening Ukraine's economic resilience in the post-war period. Its implementation simultaneously supports economic growth, energy security, innovation, and the attraction of international resources. In the context of contemporary global challenges, integrating sustainable development principles into national recovery programs enables Ukraine not only to restore its economy after the war but also to establish a foundation for long-term stability and competitiveness.

DISCUSSION

The results of the study support the growing role of sustainable finance as an important macroeconomic factor contributing to economic resilience under conditions of global instability and structural economic transformation. The findings are consistent with the approaches of Schoenmaker and Schramade (2019), who argue that sustainable finance contributes to long-term economic stability through responsible capital allocation and risk management mechanisms. They also support the conclusions of Friede et al. (2015) and Wang (2020) regarding the positive contribution of ESG-oriented investments to financial sustainability.

The study theoretically demonstrates that sustainable finance influences economic resilience through three interrelated transmission vectors: financial-investment, debt-fiscal, and innovation-technological. This conceptual framework is consistent with the ideas of Campiglio (2016), who emphasized the role of green finance in supporting the low-carbon transition, and Acemoglu et al. (2012), who highlighted the importance of sustainable investment for technological modernization and structural economic transformation. Furthermore, the proposed conceptual approach is in line with the findings of Flammer (2021) and Agliardi and Agliardi (2019), who emphasized the role of green bonds in strengthening fiscal sustainability and attracting long-term investment capital.

The empirical analysis of the selected European countries revealed a statistically significant relationship between sustainable finance instruments and the innovation-technological component of economic resilience (Nowak et al. 2015). In particular, economies with more developed green bond markets tend to demonstrate higher values of the Eco-innovation Index, indicating greater capacity for technological adaptation and innovation-driven development. These findings are also consistent with the studies of Martin (2012) and Bristow and Healy (2014), who interpret economic resilience as the ability of economies to adapt to crises while maintaining long-term competitiveness.

Unlike most previous studies, which primarily examine individual sustainable financing instruments or specific aspects of sustainable development, the present study proposes an integrated conceptual framework that explains the transmission mechanism through which sustainable finance contributes to economic resilience. The proposed approach extends the existing literature by combining financial-investment, debt-fiscal, and innovation-technological vectors within a unified

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analytical framework. At the empirical level, the findings indicate that the statistically significant relationship is currently confirmed for the innovation-technological component of economic resilience, particularly through the development of the green bond market. This suggests that the effects of sustainable finance on economic resilience may differ across transmission channels and highlights the importance of further empirical verification of the remaining conceptual vectors.

At the same time, the study has several limitations. The empirical analysis is limited to a sample of European countries and does not fully account for institutional and geopolitical differences among national economies. Moreover, the empirical verification focuses on the innovation-technological component of economic resilience, while the financial-investment and debt-fiscal vectors are considered at the conceptual level and require further empirical investigation. In addition, economic resilience is a multidimensional concept that cannot be comprehensively captured by a single system of indicators. Nevertheless, the obtained findings support the proposed conceptual framework and indicate that sustainable finance represents not only an instrument of environmental policy but also an important macroeconomic mechanism for strengthening the adaptive capacity of the economy and supporting long-term economic resilience.

CONCLUSIONS

The conducted research supports the proposed concept of sustainable finance as an important macroeconomic factor contributing to the economic resilience of the state. It was established that its impact is realized through sustainable finance instruments, which form a transmission mechanism for strengthening the financial and economic resilience of the national economy. The proposed transmission mechanism is theoretically substantiated, whereas its innovation-technological component is empirically assessed in this study. This mechanism enhances the ability of the economic system to adapt to exogenous and endogenous challenges, reduces economic vulnerability, and supports macroeconomic stability.

The study theoretically substantiates three interrelated vectors of the transmission mechanism through which sustainable finance influences economic resilience. The financial-investment vector ensures the mobilization of long-term capital and promotes the development of the green finance market. The debt-fiscal vector contributes to strengthening the sustainability of public finances and improving public debt risk management. The innovation-technological vector stimulates the development of eco-innovation, technological modernization, and the digital transformation of the economy.

The empirical analysis of European countries is limited to the innovation-technological component of the proposed transmission mechanism and revealed a statistically significant relationship between green bond issuance and the Eco-innovation Index as an indicator of the innovation-technological component of economic resilience. The estimated econometric model demonstrates satisfactory explanatory power and overall statistical significance. Among the explanatory variables, only green bond issuance exhibits a statistically significant positive effect. No statistically significant effects were identified for energy poverty or environmental taxes within the selected sample. These findings indicate that the development of the green bond market contributes to strengthening the innovation-technological component of economic resilience.

Overall, the obtained results support the proposed research hypothesis and are consistent with the conceptual model of the transmission mechanism of sustainable finance. At the same time, the empirical analysis presented in this study is limited to the innovation-technological component of economic resilience. Therefore, further empirical research should focus on the financial-investment and debt-fiscal vectors of the proposed transmission mechanism. Thus, the empirical results provide exploratory evidence of a positive relationship between selected sustainable finance indicators and the innovation-technological component of economic resilience, particularly through green bond issuance. The financial-investment and debt-fiscal vectors remain theoretically substantiated and require further empirical verification. This confirms the achievement of the research objective and supports the proposed conceptual framework.

The practical significance of the obtained results lies in their potential application to the formulation of state financial and economic policy. The findings may be used to support the development of sustainable finance instruments, promote the green bond market, encourage eco-innovation, and facilitate the modernization of the national economy. Future research should focus on expanding the information base, improving the econometric model, and integrating macroeconomic, social, institutional, and environmental indicators to provide a more comprehensive assessment of economic resilience.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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СТАЛЕ ФІНАНСУВАННЯ ЯК ЧИННИК ЗАБЕЗПЕЧЕННЯ ЕКОНОМІЧНОЇ РЕЗИЛЬЄНТНОСТІ ДЕРЖАВИ

Сучасні фінансово-економічні трансформації актуалізують проблему забезпечення економічної резильєнтності як здатності економічних систем адаптуватися до впливу екзогенних та ендогенних чинників. У цьому контексті особливої актуальності набуває дослідження ролі сталих фінансів у зміцненні економічної резильєнтності держави. Метою дослідження є теоретичне обґрунтування та емпірична оцінка ролі сталих фінансів як макроекономічного чинника забезпечення економічної резильєнтності в умовах сучасних структурних трансформацій. У статті доведено, що вплив сталих фінансів реалізується через інструменти сталого фінансування, які формують трансмісійний механізм, що функціонує за трьома взаємопов'язаними векторами: фінансово-інвестиційним, боргово-фіскальним та інноваційно-технологічним. Запропонований концептуальний підхід пояснює, як сталі фінанси сприяють зміцненню макроекономічної стабільності, зниженню економічної вразливості й підвищенню адаптивності національних економік до внутрішніх і зовнішніх викликів. За результатами емпіричного аналізу встановлено статистично значущий взаємозв'язок між інструментами сталого фінансування та інноваційно-технологічною складовою економічної резильєнтності. Побудована регресійна модель підтвердила статистично значущий позитивний вплив випуску зелених облігацій на значення Індексу екоінновацій. Отримані результати свідчать, що розвиток ринку зелених фінансових інструментів сприяє зміцненню інноваційно-технологічної складової економічної резильєнтності. Обґрунтовано інтегрований взаємозв'язок між сталими фінансами та економічною резильєнтністю й визначено основні канали впливу сталих фінансів на макроекономічну стабільність. Практичне значення одержаних результатів полягає в можливості їх використання під час формування державної фінансово-економічної політики, спрямованої на розвиток інструментів сталого фінансування, стимулювання екоінновацій і зміцнення економічної резильєнтності держави в умовах сучасних структурних трансформацій.

Ключові слова: економічна резильєнтність, стале фінансування, сталі фінанси, макроекономічна стабільність, зелене фінансування, ESG-інвестування, екоінновації, державна фінансова політика, сталий розвиток

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