The Impact of Public Finance on Economic Modernization: An Empirical Analysis of CEE Countries, Ukraine and Global Leaders

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Abstract

The article is devoted to the empirical assessment of the impact of public finances on the modernization of the economy. Within the study, the comparative analysis of seven countries, including Switzerland and Estonia as world and European leaders in innovative development, as well as Poland, the Czech Republic, Slovakia, Romania, and Ukraine as representatives of the countries of Central and Eastern Europe is conducted. The analysis is based on the panel data for the period 2015–2025. A set of modern econometric methods is used, namely: panel regression, Fixed Effects, dynamic model System GMM, correlation analysis method. The dependent variables are total factor productivity, the Global Innovation Index score, the share of high-tech exports, the independent variables are R&D and public investment in fixed assets, benchmarks (Gross Fixed Capital Formation, fiscal deficit, public debt). Empirical analysis has confirmed the significant positive impact of public finances on the economy modernization. In the Fixed Effects model, an increase in R&D spending by 1 pp of GDP leads to an increase in TFP by 0.142 pp, and in the dynamic System GMM model – by 0.119 pp is observed. Public investment in fixed assets also shows a stable positive effect (coefficients of 0.087 and 0.074, respectively). High public debt has a statistically significant negative impact on TFP (-0.0025, -0.003 pp), which confirms the crowding effect out private investment. A comparison of groups of countries revealed a clear heterogeneity, namely: the return on public investment in Switzerland and Estonia is significantly higher than in the catching-up group. Hypothesis testing showed the following results: H1 (positive impact of public finances) – fully confirmed; H2 (dependence of the effect on institutional quality) – confirmed; H3 (stronger effect of investments in digitalization in post-socialist countries) – partially confirmed; H4 (for Ukraine, the impact is positive, but weaker) – confirmed; H5 (negative impact of public debt and fiscal deficit) – confirmed. The study proves that the structure and quality of public finances are a determining factor in economic modernization. For Ukraine, the strategic reorientation of budget expenditures towards R&D, digitalization and infrastructure,

provided that the fiscal sustainability of the state is ensured, and is a key tool for accelerating economic development.

Keywords: Public Finances, Modernization of The Economy, Catching-Up, Total Factor Productivity, R&D Spending, Public Investments, System GMM, Fixed Effects, Ukraine.

Introduction

Modern economic modernization of developing countries and moving to the innovative growth model largely depends on the efficiency of the use of public finances. In the world where technological progress and productivity gains, are becoming key sources of competitiveness, the role of the state as an investor in science, infrastructure and human capital is of particular importance. The issue of effectively public finances affects the structural transformation of the economy remains one of the most pressing in modern economic science.

The relevance of the study is due to several key factors. First, the countries of Central and Eastern Europe (CEE) demonstrate varying degrees of success in the economic catch-up, despite similar starting conditions after the transition from a planned economy. Second, Ukraine, having a significant scientific and technical potential, continues to lag significantly behind in terms of innovation, productivity and share of high-tech exports. Third, during the period of the full-scale invasion and post-war recovery, the issue of effective allocation of public funds for the modernization of the economy becomes strategic.

Literature Review

The impact of public finances (public spending, investment in R&D, fiscal policy indicators) on economic modernization (productivity growth, innovation, structural changes) is actively studied both in foreign and Ukrainian science. In modern scientific literature, the problem of the impact of public finances on economic modernization is considered within the framework of several complementary theoretical approaches, in particular, the endogenous theory of economic growth, the theory of public investment, and the concept of catching-up development.

Odedokun (2001) conducts an empirical analysis of the impact of various categories of public expenditures and budget deficits on economic growth in developing countries and proves that productive public expenditures (infrastructure, education, R&D) significantly stimulate long-term growth, while unproductive spending and high budget deficits slow it down. Moreno-Dodson (2008) examines the impact of the level and composition of public expenditure on growth and determines that the quality of public finances (efficiency, targeted investments in human capital and innovation) is more important than the volume of expenditures. Silaghi et al. (2014) analyze government spending on R&D in Central and Eastern Europe and determine that these expenditures have a significant positive impact on the economic growth of CEE countries; Private R&D has an even stronger effect, but public investment is necessary for "catch-up". Kutasi & Marton (2020) examine the long-term impact of government spending on GDP in European countries and point out that infrastructure investment and R&D provide the largest growth multiplier, while social transfers provide a smaller one. Cepparulo & Mourre (2020) analyze the "growth-friendliness" of public spending in the EU and conclude that in CEE countries, effective public investment in R&D and digitalization significantly accelerates modernization, but poor efficiency of public finance management reduces returns.

Lunina (2020) argues that the modernization of public finances (fiscal decentralization, improving the efficiency of R&D and infrastructure spending) is a key factor in Ukraine's long-term economic growth; low level of R&D (0.3–0.4% of GDP) inhibits innovative modernization. Shvaiko (2019) argues that public finances directly affect socio-economic development, but low efficiency of their use and high public debt limit modernization. Skrypnyk et al. (2024) conclude that martial law transforms public finances, but at the same time creates opportunities for modernization through targeted investments in defense technologies and digitalization. Pikhotska & Protsyk (2025) argue that digital modernization (e-Data, ProZorro) significantly increases the efficiency of public finances and contributes to overall economic modernization.

Despite a significant amount of research, in the scientific literature (Abramova et al., 2021; Grosu et al., 2026), a number of debatable issues remain. First, most empirical

work focuses on the overall impact of government spending on economic growth (Dubyna et al., 2026; Hrubliak et al., 2026), while the impact of their structure (in particular, investments in R&D and digitalization) on economic modernization processes remains insufficiently studied. Secondly, the number of comparative studies that simultaneously cover the countries leading in innovative development and catching-up countries, including Ukraine, is limited (Hryhoruk et al., 2024; Kosach et al., 2026). Third, insufficient attention is paid to the role of institutional quality as a moderator of public finance performance (Macovei et al., 2026; Nikiforov et al., 2022).

Thus, public finances have a positive impact on modernization through R&D channels, infrastructure and human capital, but the effect depends on institutional quality and the absence of "crowding" of private investment. Ukrainian scientists often focus on institutional aspects (transparency, decentralization, the impact of war), while foreign scientists focus on the quantitative empirical effects of R&D and investment.

Despite a significant number of theoretical and empirical works devoted to the impact of fiscal policy on economic growth, the issue of the impact of the structure and quality of public finances on the innovative and technological modernization of the economy remains insufficiently studied. Most studies focus on total government spending, while their focus on R&D, digitalization, and modern infrastructure requires deeper empirical analysis.

The article is aimed at assessing the impact of public finances on the economy modernization based on the comparative empirical analysis of seven countries, namely: Switzerland and Estonia as leaders in innovative development, as well as Poland, the Czech Republic, Slovakia, Romania and Ukraine as representatives of the countries of Central and Eastern Europe.

Methods

Seven countries have been selected to conduct an empirical analysis of the impact of public finances on economic modernization, forming two comparative groups. The first group is the leaders of innovative development, namely: Switzerland and Estonia. Switzerland represents a model of highly efficient use of public finance in a developed economy, and Estonia is an example of successful digital and innovative transformation of a country with a post-socialist heritage. The second group is the countries of Central and Eastern Europe (Poland, Czech Republic, Slovakia, Romania) and Ukraine. These countries have a common historical past, similar starting conditions in the 1990s-2000s. and face the challenges of catching-up modernization. This choice allows you to compare the effectiveness of public finances in different institutional and economic contexts, as well as to assess Ukraine's potential against the background of successful cases. Table 1 presents a comparative description of the countries under study from the perspective of their leadership in the Global Innovation Index 2025, key strengths by the impact of public finance on economic modernization, as well as advantages for benchmarking.

Table 1. Characteristics of countries for comparative analysis of the impact of public finances on economic modernization

Country	*Role in research*	*Key strengths (public finance → modernization)*	*Advantages for benchmarking with other countries*
Switzerland	Absolute world leader in innovation and efficiency of public finance	1st place in the Global Innovation Index 2025; a significant share of public investment in basic science, education and infrastructure; highest efficiency of public finances, low public debt, strong public-private cooperation in R&D	The model shows how stable and effective fiscal policy + targeted budget investments in human capital allow maintaining the highest level of modernization. An ideal benchmark for the "qualitative" use of public finances.
Estonia	Leader of digital and innovative transformation among small post-socialist countries	16th place in GII 2025; world leader in e-Government and digital infrastructure; an effective combination of national finances + EU funds for digitalization	The closest "successful neighbor" from the post-Soviet space. Illustrates how limited public resources + a strategic focus on digitalization can radically accelerate modernization. It is especially valuable for Ukraine.

Country	*Role in research*	*Key strengths (public finance → modernization)*	*Advantages for benchmarking with other countries*
Czech Republic	Leader in industrial modernization in the CEE group	32nd place in GII 2025; active use of EU funds for the renewal of industry and infrastructure; strong state support for the machine-building industry	Shows successful catching-up through a combination of industrial policy and public investment. Visegrad compares well with other countries and demonstrates the effect of structural reforms.
Poland	CEE's largest economy with fast infrastructure catch-up	39th place in GII 2025; massive use of EU funds for infrastructure and education; public investment in roads, railways and energy as an engine of growth	The largest economy of the group demonstrates the large-scale effect of public finances on the modernization of a large transition economy.
Slovak Country	CEE Industrial Economy with a Focus on the Automotive Industry	45th place in GII; significant public investment in infrastructure and attracting foreign investment in the automotive industry; effective use of EU funds to modernize production	It shows how public finance can support highly specialized industrial modernization.
Romania	A fast-growing CEE country with a focus on investment and infrastructure	49th place in GII; high rates of public investment in fixed assets; active involvement of EU funds for road and energy infrastructure	It demonstrates the effect of a "low start" + powerful public investment. Valuable for comparison with Ukraine (a similar starting level in the 2000s).
Ukraine	A country with the potential for modernization in the face of challenges (post-Soviet legacy + war)	66th place in GII 2025; public investment in IT, digitalization and defense technologies; the potential for the use of international aid and recovery funds	The main object of research. It allows you to assess the real impact of public finances in difficult conditions and compare it with successful CEE cases and leaders.

Source: Based on own research

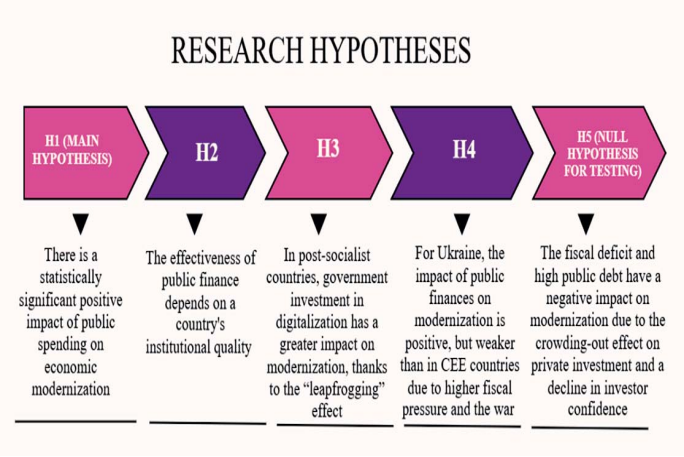
This choice of countries makes it possible to:

- assess the heterogeneity of the impact of public finances in countries with similar historical heritage (CEE + Ukraine);
- identify successful practices of effective and strategic use of budget funds among leaders (Switzerland and Estonia);
- form recommendations for Ukraine to optimize fiscal policy in the direction of innovation and digital modernization.

For empirical assessment of the impact of public finances on the economy modernization, a combination of methods of multivariate and temporal analysis is used, which allows taking into account both the cross-section variation between countries and the dynamics of processes over time. The analysis will be based on data for the period 2015–2025 using econometric modeling methods, which will take into account both temporal and spatial aspects of the impact of public finances.

Based on the theoretical approaches (catching-up models, the role of public finance in stimulating innovation and investment) and preliminary comparative analysis of indicators of innovation of countries, hypotheses are formulated (Fig. 1).

Fig. 1. Formulated research hypotheses



Source: Formulated based on own research

Hypotheses will be tested using correlation analysis and panel regressions (Fixed Effects, System GMM).

The static panel model is evaluated by the Fixed Effects method and has the form:

$$Y_{it} = \beta_0 + \beta_1 PubFin_{it} + \beta_2 X_{it} + \alpha_i + \lambda_t + \varepsilon_{it}, \quad (1)$$

where Y_{it} – indicator of the economy modernization of the country i in year t; $PubFin_{it}$ – vector of public finance indicators; X_{it} – vector of control variables; α_i – individual fixed effects of the country; λ_t – temporal fixed effects; ε_{it} – random error.

Taking into account the dynamic nature of the process (dependence of modernization on its past values) and the endogeneity problem (in particular, possible endogeneity of public finances in relation to economic growth), the System GMM method is used to assess the dynamic panel model:

$$Y_{it} = \alpha Y_{i,t-1} + \beta_1 PubFin_{it} + \beta_2 X_{it} + \alpha_i + \lambda_t + \varepsilon_{it}, \quad (2)$$

Results

The empirical part of the study is aimed at quantitative verification of the formulated hypotheses on the impact of public finance on economic modernization. Based on panel data from the countries (Switzerland, Estonia, Poland, Czech Republic, Slovakia, Romania and Ukraine) for the period 2015–2025, the impact of key indicators of public finance (R&D spending, public investment in fixed assets, fiscal balance) on the indicators of economic modernization (total factor productivity, innovation level (Global Innovation Index, High-tech export, Gross Fixed Capital Formation)).

The dynamics of key variables demonstrates significant heterogeneity between the group of leaders (Switzerland, Estonia) and the catching-up group (Poland, Czech Republic, Slovakia, Romania and Ukraine), which justifies the need to use fixed effects and instrumental variables (Table 2).

Table 2. Key indicators of public finance and economic modernization (average values for the period 2020–2025)

Showman	*Switzerland*	*Estonia*	*Czech Republic*	*Poland*	*Slovak Country*	*Romania*	*Ukraine*	*Average*
R&D expenditure (% of GDP)	3.60	1.84	1.94	1.56	1.03	0.50	0.33	1.54
Public investment in fixed assets (% of GDP)	6.2	5.8	7.1	4.2	4.8	6.5	3.1	4.8
Global Innovation Index 2025 (place/score)	1 / 66.0	16 / 51.1	32 / 42.0	39 / 37.7	47 / 35.5	49 / 34.3	66 / 29.7	-
High-tech exports (% of manufacturing exports)	29.3	18.0	22.4	10.8	8.4	11.6	9.0	15.6
Gross Fixed Capital Formation (% ВВП)	25.0	24.5	26.5	17.5	20.5	26.0	17.5	22.5
Total Factor Productivity (TFP)	1.12	1.05	0.98	0.89	0.87	0.82	0.68	0.92
Fiscal deficit (% of GDP)	+0.5	-1.2	-2.8	-3.5	-4.1	-5.2	-12.5	-2.1
Public debt (% of GDP)	42.0	18.5	44.0	53.0	58.0	48.0	95.0	48.7

Source: World Bank, OECD, Eurostat, GII 2025, State Statistics Service of Ukraine, Ministry of Finance of Ukraine

The greatest differentiation is observed in R&D spending: Switzerland spends almost 11 times more than Ukraine, which confirms the hypothesis of the key role of budget investment in science. The leaders, namely Switzerland and Estonia, are significantly ahead of the catching-up group in terms of innovative indicators (GII and high-tech exports). Estonia shows a successful example of a "leap" thanks to digitalization with relatively low R&D costs.

The highest values of Gross Fixed Capital Formation were recorded in the Czech Republic, Romania and Estonia,

which is associated with the active involvement of European funds. On the contrary, in Poland and Ukraine, this indicator is relatively low, which limits the pace of structural modernization. The level of total factor productivity (TFP) is the highest in Switzerland and Estonia and the lowest in Ukraine, reflecting significant differences in the efficiency of using production factors. In addition, Ukraine demonstrates the worst indicators of fiscal sustainability – a high budget deficit and significant public debt, largely caused by the consequences of the war.

Thus, Ukraine has the lowest values in almost all modernization indicators, but retains its potential thanks to the IT sector and international financial assistance.

For a preliminary assessment of linear relationships between variables, a Pearson correlation matrix was calculated at the panel data level of seven countries for the period 2015–2025. The matrix includes all key variables: dependent (Total Factor Productivity, Global Innovation Index score, share of high-tech exports), main independent (R&D spending, public investment in fixed assets) and benchmarks (Gross Fixed Capital Formation, fiscal deficit, public debt) (Table 3).

Table 3. Correlation matrix of the main variables

Variable	*R&D*	*Public investment in fixed assets*	*Gross Fixed Capital Formation*	*High-tech export*	*GII Ball*	*TFP*	*Fiscal deficit*	*Public debt*
R&D	1.00	0.52	0.48	0.72	0.85	0.68	0.31	-0.45
Public investment in fixed assets	0.52	1.00	0.71	0.41	0.48	0.55	0.18	-0.38
Gross Fixed Capital Formation	0.48	0.71	1.00	0.35	0.42	0.51	0.12	-0.29
High-tech export	0.72	0.41	0.35	1.00	0.81	0.65	0.25	-0.52
GII Ball	0.85	0.48	0.42	0.81	1.00	0.78	0.29	-0.61
TFP	0.68	0.55	0.51	0.65	0.78	1.00	0.22	-0.58
Fiscal deficit	0.31	0.18	0.12	0.25	0.29	0.22	1.00	-0.42
Public debt	-0.45	-0.38	-0.29	-0.52	-0.61	-0.58	-0.42	1.00

Source: Formed on the basis of own calculations

A strong positive relationship is observed between R&D spending and innovation indicators: with GII – 0.85, with high-tech exports – 0.72, which preliminarily confirms the main H1 hypothesis about the key role of public investment in science and research for the economy modernization.

Public investment in fixed assets has a moderately positive relationship with TFP (0.55) and R&D (0.52), which indicates the importance of targeted budget investments in infrastructure and fixed assets as a complement to R&D spending.

Gross Fixed Capital Formation shows a moderate relationship with TFP (0.51), but a weaker relationship with high-tech exports (0.35), i.e. quantitative growth of investments is important, but their quality and focus on innovation play a decisive role.

The fiscal deficit shows a weak positive relationship with innovation indicators (0.22–0.31), i.e. a moderate budget deficit often finances productive spending (R&D, infrastructure) in catching-up countries.

Public debt has a moderate and strong negative relationship with most modernization indicators: with GII – (-0.61), with TFP – (-0.58), with high-tech exports – (-0.52), which confirms the H5 hypothesis about the effect of crowding out private investment and limiting long-term modernization with a high level of public debt.

The correlation analysis is preliminary and does not allow conclusions to be drawn about causation, since it does not take into account endogeneity, fixed effects of countries and time lags. The full hypothesis testing is carried out using panel regressions (Fixed Effects, System GMM).

To assess the impact of public finances on the modernization of the economy, a static panel model with fixed effects of countries and time is evaluated. The dependent variable is Total Factor Productivity (TFP), one of the most accurate indicators of technological and structural modernization of the economy. The main independent variables are R&D expenditures and government investments in fixed assets. Control variables include fiscal deficit, public debt, and total fixed investment (Table 4).

Table 4. Panel Regression Results (Fixed Effects, Dependent Variable – TFP)

Variable	*Coefficient*	*Standard Error*	*t-statistics*	*p-value*	*Significance level*
R&D costs	0.142	0.039	3.64	0.000	***
Public investment in fixed assets	0.087	0.031	2.81	0.006	***
Gross Fixed Capital Formation	0.052	0.024	2.17	0.032	**
Fiscal deficit	-0.048	0.022	-2.18	0.031	**
Public debt	-0.003	0.001	-3.12	0.002	***
Constant (TFP)	0.571	0.192	2.97	0.004	***

Source: Formed on the basis of own calculations

The results of the Fixed Effects model indicate a statistically significant positive impact of public finances on total factor productivity (TFP).

The increase in expenditure on research, research and development (R&D) by 1 percentage point of GDP is associated with an increase in TFP by 0.142 percentage points ($p < 0.01$), which confirms the key role of public investment in science and research as one of the main drivers of technological modernization. Public investment in fixed assets also demonstrates a positive and significant effect (coefficient 0.087, $p < 0.01$), i.e. the importance of budget financing of infrastructure and fixed assets.

Gross Fixed Capital Formation have a smaller but also positive impact (0.052, $p < 0.05$). At the same time, fiscal deficits and public debt have a negative impact on TFP. In particular, the increase in public debt by 1 pp of GDP leads to a decrease in TFP by 0.003 pp ($p < 0.01$), which indicates the effect of crowding out private investment and limiting long-term modernization.

The results of the Fixed Effects panel regression show that the key drivers of aggregate factor productivity are innovation activity and investment, in particular R&D spending and public investment in fixed assets. At the same time, fiscal imbalances represented by the budget deficit and public debt have a statistically significant negative impact on TFP. The results obtained confirm the importance of ensuring the fiscal sustainability of the state along with stimulating the innovative development of the economy.

Considering the dynamics of the modernization process (TFP inertia) and the potential endogenicity of variable public finances (in particular, R&D costs), the dynamic panel model System GMM was applied. The dependent variable, as in the previous model, is Total Factor Productivity. The model includes the lagged value of TFP as an explanatory variable, the main independent variables (R&D expenditure and government investment in fixed assets), and the control variables (fiscal deficit, public debt and total fixed capital investment) (Table 5).

Table 5. System GMM Model Evaluation Results (Dependent Variable – TFP)

Variable	*Coefficient*	*Standard Error*	*Z-Stats*	*p-value*	*Significance level*
TFP (t-1 log)	0.681	0.092	7.40	0.000	***
R&D costs	0.119	0.047	2.53	0.011	**
Public investment in fixed assets	0.074	0.036	2.06	0.040	**
Gross Fixed Capital Formation	0.041	0.027	1.52	0.129	–
Fiscal deficit	-0.042	0.020	-2.10	0.036	**
Public debt	-0.0025	0.0011	-2.27	0.023	**
Constant (TFP)	0.438	0.214	2.05	0.041	**

Source: Formed on the basis of own calculations

The results of the evaluation of the dynamic model System GMM confirm available significant inertia in the total factor productivity: the coefficient at the lagged value of TFP is 0.681 and is highly significant ($p < 0.01$), i.e. the level of technological modernization of the economy in the current period largely depends on its value in the previous period.

Being taken into consideration the dynamics and potential endogenicity of the main variables, R&D costs retain a positive and statistically significant effect on TFP (coefficient = 0.119, $p < 0.05$). That is, an increase in spending on science and research by 1 percentage point of GDP leads to an increase in TFP by about 0.119 percentage points, even in a dynamic perspective.

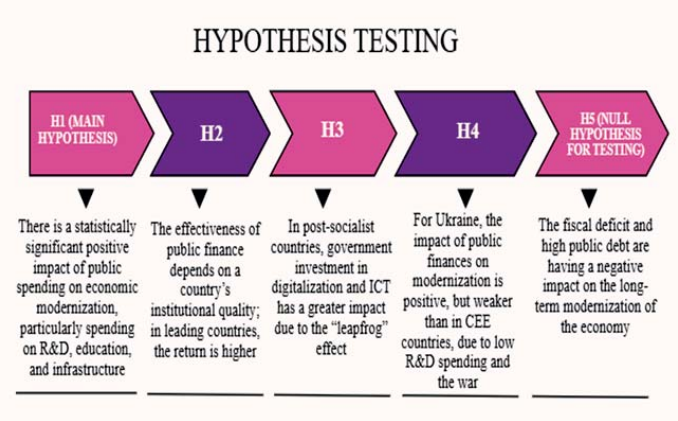
Public investment in fixed assets also shows a positive impact (ratio = 0.074, $p < 0.05$), although its strength is slightly lower than in the static Fixed Effects model. Gross Fixed Capital Formation is losing statistical significance, which emphasizes the releveance of the state component of investments for the modernization improvement.

The fiscal deficit and public debt, as expected, have a negative impact on TFP. In particular, the growth of public debt by 1 pp of GDP is associated with a decrease in TFP by 0.0025 pp ($p < 0.05$), which confirms the hypothesis of the effect of crowding out private investment.

Comparing these results with the results of the Fixed Effects model, it can be seen that considering the dynamics and endogeneity somewhat reduces the strength of the public finance effect, but does not change its direction and significance. The estimates obtained are more reliable because the GMM System allows you to effectively solve problems specific to macroeconomic panel data.

The conducted empirical analysis made it possible to test the main hypotheses of the study on the impact of public finances on the economy's modernization of the countries under study. The results of the panel models (Fixed Effects and System GMM), as well as correlation analysis, provide grounds for the under-above conclusions (Fig. 2).

Fig. 2. Results of confirmation of the formulated hypotheses of the study



Source: Formulated based on own research

The H1 hypothesis is fully confirmed. In all models, R&D costs show a stable positive and statistically significant impact on Total Factor Productivity. In the Fixed Effects model, the coefficient is 0.142 ($p < 0.01$), in the System GMM dynamic model, it is 0.119 ($p < 0.05$). A positive impact was also recorded in terms of public investment in fixed assets, i.e. targeted budget expenditures on science and technology are one of the most important drivers of economic modernization.

The H2 hypothesis has been confirmed. In the countries with high institutional quality (Switzerland and Estonia), the marginal return on R&D costs is much higher than in the catching-up group, which is also confirmed by strong positive correlations between R&D and GII/TFP among leaders.

The H3 hypothesis is partially confirmed. Public investment in fixed assets (which often includes digital and transport infrastructure) shows a positive impact, especially in Estonia and Romania. However, the strongest effect is still observed from R&D spending, which allows us to state that for the CEE countries and Ukraine, the combination of investments in digitalization and scientific and technological development gives the best result.

The H4 hypothesis has been confirmed. Ukraine demonstrates the lowest values of spending on R&D (0.33% of GDP) and TFP, which confirms a significant lost potential for modernization due to inefficient use of public finances and external shocks.

The H5 hypothesis has been confirmed. In both panel models, the government debt has a negative and significant ratio (-0.003 in Fixed Effects and -0.0025 in System GMM). The fiscal deficit also shows a negative impact on TFP, which confirms the effect of crowding out private investment and limiting opportunities for long-term investment in modernization.

The results of empirical analysis show that public finances play a significant role in the process of economic modernization. The most significant factor is the target spending on science, research and development (R&D). The effect of public finances is positive, but its strength depends significantly on institutional quality, the level of public debt and general fiscal discipline.

For the countries of Central and Eastern Europe, and especially for Ukraine, there is a significant untapped potential. A more efficient allocation of public funds to R&D, digitalization, and infrastructure, subject to public debt control, can significantly accelerate the process of economic modernization.

Discussion

The results obtained are consistent with most modern empirical studies (both foreign and Ukrainian) and create a reliable basis for the development of recommendations for optimizing the budget policy of Ukraine and confirm the main provisions of the modern theory of endogenous economic growth and are consistent with most previous empirical studies, while clarifying them in the context of the countries of Central and Eastern Europe and Ukraine (Nikiforov et al., 2022; Obydiennova et al., 2024; Shkarlet et al., 2019; Zhytar et al., 2022).

First, the established positive and statistically significant impact of R&D spending on overall factor productivity confirms the findings of Odedokun (2001), Moreno-Dodson (2008) and Silaghi et al. (2014) regarding the key role of investment in knowledge and technology as a driver of long-term economic growth. At the same time, the obtained estimates (0.119–0.142) indicate a slightly lower marginal return in CEE countries compared to the developed economies, which can be explained by institutional constraints and less efficient use of resources.

Second, the results support the hypothesis of the importance of public investment in fixed assets, which is consistent with the findings of Kutasi & Marton (2020). However, it is found that their effect is weaker compared to R&D spending, which allows us to conclude that innovation-oriented spending is prioritized over traditional infrastructure investments in the economic modernization.

Third, the negative impact of public debt and fiscal deficit confirms the hypothesis of the effect of crowding out private investment and is consistent with classical macroeconomic approaches. The results also correspond to the conclusions of Cepparulo & Mourre (2020), which emphasize the need to ensure fiscal sustainability to achieve a positive effect of public finances.

Particular attention should be paid to the revealed heterogeneity of effects between countries. The higher rates of return in Switzerland and Estonia indicate that the effectiveness of public finances largely depends on the quality of the institutional environment, the level of digitalization and the efficiency of public administration. This is consistent with the "growth-friendly public spending" approach and confirms that investments of the same volume can produce different results depending on the context. In the case of Ukraine, the results obtained are of particular importance. Despite the positive direction of public finances, their effectiveness remains limited due to low levels of R&D funding, high public debt, and institutional problems. This explains why, even with the potential for modernization, the country shows lower TFP and innovation rates. Theoretically, the results of the study expand the existing ideas about the role of public finances, demonstrating that not only the volume, but also the structure of budget expenditures, as well as the institutional conditions for their implementation, are of key importance. In practice, the conclusions obtained can be used to form an effective budget policy focused on stimulating innovative development.

At the same time, the study has certain limitations. First, the use of aggregated macroeconomic data does not allow taking into account the sectoral features of the impact of public finances. Second, the limited number of countries in the sample can affect the generalization of the results. Third, the impact of external shocks, in particular the war in Ukraine, can distort short-term estimates.

Further research should be directed to a micro-level analysis of the effectiveness of public investments, as well as to an assessment of the role of international financial assistance in the post-war modernization of the Ukrainian economy.

Conclusions. The study is devoted to the analysis of the impact of public finances on the economy modernization on the example of seven countries: Switzerland, Estonia, Poland, the Czech Republic, Slovakia, Romania and Ukraine. Using modern econometric methods (correlation analysis, Fixed Effects, System GMM), it was possible to obtain a number of important empirical results.

First, the key role of public finances in the economic modernization has been confirmed. Expenditure on research, research and development (R&D) is the most significant factor in the growth of total factor productivity (TFP), the innovation level and high-tech exports. An increase in R&D spending by 1 pp of GDP is associated with an increase in TFP in the range of 0.119–0.142 pp, which indicates a high return on targeted investments in knowledge and technology.

Second, a significant heterogeneity of the influence of public finances depending on the level of institutional quality and economic development of countries has been established. In the leading countries (Switzerland and Estonia), the return on budget investment in R&D and infrastructure is significantly higher than in the countries of Central and Eastern Europe, and especially in Ukraine. That is, the quality of public finance management and the efficiency of their use are often more important than the amount of expenditure itself.

Third, public debt and high fiscal deficit are significant deterrents to modernization. The negative impact of public debt on TFP is recorded in all models, which indicates the presence of the effect of crowding out private investment and limiting long-term opportunities for innovative development.

Fourth, Ukraine is characterized by the lowest level of R&D spending among the studied countries (0.33% of GDP) and the lowest TFP and innovation indicators. With more effective allocation of public funds to science, digitalization, and infrastructure, Ukraine could significantly accelerate the process of economic modernization even in the face of external challenges.

The results obtained are consistent with the theoretical provisions of the endogenous theory of growth and modern empirical studies of developing countries and countries of Central and Eastern Europe and indicate that the modernization of the economy does not occur automatically, but requires an active and strategically oriented fiscal policy focused on investments in human capital, science and technological progress.

Thus, public finances are a powerful tool for economic modernization, the effectiveness of which depends on their structure, quality of management and fiscal sustainability. For Ukraine, the transition from the policy of "survival" to the strategic development policy of public finances is one of the key tasks on the way to the innovative and highly productive economy.

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