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FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN UKRAINE: AN EMPIRICAL ANALYSIS

ПРЯМІ ІНОЗЕМНІ ІНВЕСТИЦІЇ ТА ЕКОНОМІЧНЕ ЗРОСТАННЯ В УКРАЇНІ: ЕМПІРИЧНИЙ АНАЛІЗ

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This study provides an analysis of the impact of FDI on economic growth in Ukraine over the period from 2001 to 2023. Utilizing macroeconomic data and a fixed-effects regression model, authors assess the interaction between FDI and key structural variables, including R&D expenditure, government spending on education, and consumer price inflation. The findings reveal that both inflows of FDI and investment in R&D yield a statistically significant positive effect on GDP growth, with R&D demonstrating a particularly pronounced short-term impact. We found a negative correlation between inflation and government expenditure on education with economic growth, emphasizing the importance of macroeconomic stability and the often-delayed returns associated with educational investments. These results show the urgent need for government policy measures to improve the investment climate, prioritize innovation, and ensure long-term sustainable development in the post-war Ukrainian economy. The analysis underscores the pivotal role that strategic investments and macroeconomic stability play in fostering sustainable economic growth in the post-war period in Ukraine.

Keywords: foreign direct investment, economic growth, GDP, regression model, uncertainty, post-war recovery.

Дослідження присвячене аналізу впливу прямих іноземних інвестицій (ПІІ) на економічне зростання України у 2001–2023 роках. Актуальність теми зумовлена необхідністю активізації інвестиційної діяльності як чинника сталого розвитку в умовах післявоєнного відновлення та трансформації економіки. ПІІ розглядаються як ключовий інструмент структурної модернізації, що може сприяти підвищенню продуктивності, зайнятості та інноваційної активності. Метою дослідження є емпіричне оцінювання зв’язку між надходженнями ПІІ та макроекономічною динамікою, формулювання висновків і рекомендацій щодо ефективної політики у сфері залучення ПІІ. У роботі застосовано економетричний підхід із використанням регресійного аналізу на основі статистичних даних. Побудовано модель, що враховує ПІІ, інвестиції у наукові дослідження й розробки

(НІОКР), державні видатки на освіту та інфляцію як змінні, що впливають на динаміку ВВП. Така модель визначає два обмежувальні чинники короткострокового економічного зростання: інфляцію споживчих цін і обсяг державних видатків на освіту. Результати аналізу свідчать про статистично значущий позитивний ефект ПІІ та інвестицій у НІОКР на зростання ВВП. Натомість інфляція та видатки на освіту продемонстрували негативну кореляцію з економічним зростанням, що може бути пов'язано з відкладеним ефектом інвестицій в освіту та впливом макроекономічної нестабільності. Отримані результати підкреслюють потребу в комплексній державній політиці, спрямованій на забезпечення привабливого інвестиційного клімату, підтримку інноваційної діяльності, зміцнення інституційної спроможності та довгострокову стабільність. Подальші дослідження будуть спрямовані на розширення пояснювальних змінних, зокрема на показники інфраструктури, якість інституцій (верховенство права, якість регулювання), а також макроекономічні змінні (відкритість для торгівлі, стабільність валюти). Практична цінність полягає у формуванні науково обґрунтованих підходів до реалізації гнучкої та стратегічно виваженої інвестиційної політики в Україні для сталого розвитку.

Ключові слова: прямі іноземні інвестиції, економічне зростання, ВВП, регресійна модель, невизначеність, післявоєнне відновлення.

Statement of the problem. Foreign direct investment (FDI) is a recognized instrument for economic development in transition economies, contributing to industrial development and normalizing the labor market situation. However, the scale and direction of its impact are uneven and depend on geopolitical factors, the country's macroeconomic conditions, and institutional settings. In Ukraine, which has been at war for more than three years and where structural weaknesses persist, the potential of FDI to contribute to sustainable growth remains uncertain. This uncertainty highlights the need for more thorough empirical research.

While the global scientific literature generally supports the positive impact of FDI on modernization and development, the findings for Ukraine are not as ambiguous as they seem at first glance. It is well known that political uncertainty, weak legal frameworks for protecting the property rights of foreign investors, and geopolitical tensions limit the positive impact of FDI on GDP. These features necessitate an analysis of the relationship between FDI and GDP growth in Ukraine. Our research is primarily aimed at economists engaged in developing the most effective growth directions and helping to develop investment-oriented strategies for the recovery of Ukraine in the post-war period.

Analysis of recent research and publications. A substantial body of recent literature has examined the determinants, functions, and consequences of FDI in global and country-specific contexts. These studies collectively emphasize the dual role of FDI as a catalyst for economic growth and structural transformation while highlighting the role of institutional quality, policy stability, and sustainable development priorities in shaping the national investment environment.

Tkalenko S., Derii Zh., Butenko N., Makedon H., and Semchenko-Kovalchuk O. emphasize that "FDI functions as a key mechanism for attracting external capital, fostering employment generation, facilitating technology transfer, and disseminating advanced managerial and production practices" [11].

Gu G. W. and Hale G. propose "a model in which firms' FDI decisions are influenced by factors such as emission productivity and environmental and operational risks" [3].

Wei X., Mohsin M., and Zhang, Q. highlight "the critical importance of maintaining robust international trade and FDI as essential enablers of green finance development; policymakers must proactively address the pressing challenge of accelerating the deployment of renewable energy sources in the context of expanding commercial activity and FDI flows" [13].

Mahna T., Jain S., and Yadav S. S. argue that "FDI constitutes a pivotal channel for capital inflows and acts as a catalyst for sustainable development by promoting technology transfer and the diffusion of environmentally sustainable practices in host countries"[5].

The study Voumik L., Rahman M., Rahman M., Ridwan M., Akter S., and Raihan A. highlights "the multifaceted relationship between FDI, economic growth, trade openness, and urbanization in the context of Australia's economic development. The analysis shows that FDI, economic expansion, and increasing trade volumes are key drivers of long-term economic growth, albeit with significant implications for resource consumption and infrastructure demand"[12].

Milas C., Panagiotidis T., and Papapanagiotou G. argue that "FDI plays a role in fostering market competition. Their empirical analysis reveals that FDI responds negatively to rising domestic economic policy uncertainty, increases in long-term interest rates, and real exchange rate appreciation"[6].

Central to comprehending the indirect consequences of FDI on economic growth is

spillover effects. Otieno O. and Aduda J. say that "FDI can boost productivity in host economies via competition, linkages and labour mobility" [8]. Minh V. and Trinh P. also point out that "the positive effects of FDI are not unconditional" [7]. Their threshold analysis shows that only when host countries have sufficient absorptive capacity do economic gains from FDI materialize. Specifically, trade openness and institutional quality are prerequisites for FDI benefits. Without these, further FDI may achieve negligible or negative returns.

Ryabushka L. and Yusiuk A. identify "several macroeconomic and institutional factors that significantly influence foreign direct investment (FDI) inflows to Ukraine. Their findings highlight the importance of nominal GDP as a measure of market potential, along with the US dollar exchange rate and average wages" [9].

Cieślik A. and Gurshev O. writing in the pre-war period, emphasized "the necessity for Ukraine to improve market access mechanisms in the short term, given the persistence of substantial entry barriers. The authors also draw attention to the predominance of vertical motives for FDI, which may exacerbate economic inequality within the country" [1].

Dombrovska S. identifies "several key factors contributing to Ukraine's investment attractiveness, including the availability of a highly skilled workforce, access to natural resources, ongoing economic reforms, and the country's strategic geographic location" [2].

Highlighting previously unresolved parts of the overall problem. Ukraine's unique post-2001 development trajectory, marked by repeated political upheavals, war, and structural fragility, requires a country-specific empirical assessment that goes beyond the general trends observed in more stable or rapidly growing economies. Our study advances the scholarly debate on Ukraine's economic development by providing updated regression data on the Ukrainian economy over a long period from 2001 to 2023 that includes both pre-war and war data. Previous empirical analyses either relied on shorter time frames, preceded the full-scale invasion, or omitted the dynamic interdependencies between institutional variables and FDI performance. Our study lays the foundation for future research on how post-conflict economies can better leverage foreign capital for sustainable development.

Formation of the objectives of the article (task statement). The objective of this study is to empirically evaluate the impact of FDI on economic growth in Ukraine and to formulate relevant conclusions and recommendations for effectively leveraging FDI to support sustainable economic development.

This study employs an econometric approach to assess the impact of FDI on Ukraine's economic growth over 2001-2023. The analysis integrates descriptive statistics and correlation analysis using annual macroeconomic data.

Summary of the main research material. When starting the analysis, we took into account that "the cumulative effect of rising GDP, inward FDI flows, and trade integration places additional pressure on national capacities, including energy supply and institutional resilience" [12]. Another important factor considered was that "when considering the context of Ukraine, determinants such as economic stability, institutional quality, and infrastructure could play a key role in shaping foreign direct investment" [3]. The analysis also incorporated the fact that "sustained progress in attracting foreign investment critically depends on the cessation of military conflict, followed by comprehensive improvements in the business climate" [2].

To empirically assess the impact of FDI on economic growth in Ukraine, we conducted an econometric analysis based on annual macroeconomic data. We held the dataset structure and the selected variables constant throughout the study period.

The dependent variable in the model is the GDP growth rate (annual %), while the primary independent variable of interest is the net FDI inflow (balance of payments, current US dollars). To control additional macroeconomic factors that may influence growth dynamics, several control variables were included in the regression specification, including Research and Development (R&D) Expenditure as a Percentage of GDP, Public Expenditure on Education as a Percentage of GDP, and Consumer Price Inflation (annual change in %).

These variables were chosen to capture key structural dimensions affecting economic performance in the Ukrainian context.

The baseline regression model specified for the analysis was as follows:

$$GDP\ Growth\ Rate = \beta_0 + \beta_1 * ln(FDI) + \beta_2 * ln(R\&D\ expenditures) + \beta_3 * Government\ expenditure\ on\ education + \beta_4 * Inflation + \varepsilon$$

To set the stage for the empirical analysis, we first want to summarize the main trends in key macroeconomic and investment variables for Ukraine from 2001 to 2023.

Table 1

Descriptive Statistics of Variables (2001–2023) for Ukraine

Variable	Unit	Mean	Median	Std. Dev.	Min	Max
GDP growth rate	%	0.83	3.20	9.16	-28.76	11.80
Net inflows of FDI	billion US$	4.45	4.57	3.30	-0.20	10.70
R&D expenditure	% of GDP	0.69	0.72	0.24	0.33	1.07
Government expenditure on education	% of GDP	5.76	5.80	0.67	4.53	7.40
Consumer price inflation	%	11.92	10.95	10.05	-0.24	48.70

Source: Created based on World Bank [14]

Between 2001 and 2023, Ukraine's GDP growth rate averaged just 0.83 percent, while the median was notably higher at 3.20 percent. This gap reflects a handful of deep contractions – down to nearly -29 percent – pulling the mean below the typical year and swings as large as almost +12 percent in boom years. The standard deviation of 9.16 percent underlines how output has been buffeted by crises from the global financial shock to the full-scale invasion. Foreign direct investment net inflows averaged about 4.45 billion US dollars, with a median close to 4.57 billion and a standard deviation of 3.30 billion. Aside from a single slight net outflow year, FDI has ranged between roughly -0.2 and +10.7 billion, showing that – in the right climate – Ukraine can attract substantial foreign capital, even as year-to-year flows vary meaningfully. Spending on research and development has remained very low but stable, hovering around 0.69 percent of GDP (median 0.72 percent) with little movement outside the 0.33 – 1.07 percent band. Education outlays are larger – averaging 5.76 percent of GDP with a median of 5.80 percent – and have varied more modestly between 4.53 and 7.40 percent, suggesting gradual policy adjustments rather than abrupt budget swings. Consumer price inflation has been the most volatile, averaging 11.92 percent but fluctuating between a slight deflation of -0.24 percent and hyperinflation near 49 percent. A standard deviation exceeding 10 percent highlights the severe price shocks that have repeatedly hit the economy.

In this regard, it is appropriate to mention the study Ryabushka and Yusiuk [9] in which they found out the significance of institutional indicators, nominal GDP, and the regional trade agreement between Ukraine and the European Union. These variables were found to be statistically significant, underscoring their critical role in enhancing Ukraine's investment attractiveness amidst European integration and broader macroeconomic stability [9].

Furthermore, to assess how foreign direct investment and key macro-structural variables have shaped Ukraine's economic performance over the 2001–2023 period, we estimate a fixed-effects regression of annual GDP growth on FDI inflows, R&D intensity, Government Expenditures on Education, and Inflation. This specification controls unobserved, time-invariant factors while isolating the within-country effects of each regressor.

The regression for Ukraine over 2001–2023 explains 81 percent of the variation

Table 2

Regression Results: Impact of FDI on Economic Growth in Ukraine (2001–2023)

Variable	Coefficient	Standard Error	t-statistic	p-value
Net inflows of FDI	4.75	19.43	5.11	0.0001
R&D expenditure	11.17	2.79	4.006	0.0010
Government Expenditure on Education	-8.44	1.57	-5.37	0.0000
Consumer price inflation	-0.45	0.16	−2.77	0.0135
Constant	-45.16	19.43	-2.32	0.0336
R-squared	0.81			

Source: Created based on World Bank [14]

in annual GDP growth once country-specific effects are controlled for, indicating an excellent in-sample fit. All four explanatory variables are statistically significant at conventional levels. Net FDI inflows carry a coefficient of +4.75 ($p < 0.001$), meaning that a one-percentage-point rise in FDI as a share of GDP is associated with a 4.75-point boost to GDP growth in the same year. Research and development spending has an even larger positive effect – each additional percentage point of GDP devoted to R&D corresponds with an 11.17-point increase in growth ($p = 0.001$). By contrast, government education expenditure has a negative coefficient of -8.44 ($p < 0.001$), suggesting that a one-point increase in education outlays as a share of GDP is linked to an 8.44-point drop in growth that year; this likely reflects the fact that the returns to human-capital investments accrue over multiple years rather than immediately. Inflation also dampens output, with each extra percentage point of consumer-price inflation reducing growth by 0.45 points ($p = 0.0135$). Finally, the significant negative intercept (–45.16, $p = 0.0336$) adjusts the model's baseline and has no direct economic interpretation.

The scatterplot (fig. 1) compares each year's actual GDP growth to the model's predicted value, with the orange 45° line marking perfect prediction (actual = predicted). Most points cluster fairly close to this line when growth is between 0 % and +10 %, which tells us the model does a solid job forecasting "normal" or positive growth years. However, when growth turns strongly negative, the points start to veer off more – especially the most extreme downturn around -29 %, which the model only predicts at about -25 %. This underestimation of deep contractions suggests the model struggles to fully capture the severity of large shocks in the economy.

In this final analysis stage, we combine the story told by our descriptive statistics, the bivariate correlations, and the fixed-effects regression to present a comprehensive picture of how FDI and other structural forces have shaped Ukraine's growth since 2001.

The Pearson correlations indicate that R&D expenditure shows the strongest positive link with GDP growth ($r \approx +0.43$), meaning that years in which Ukraine devotes a larger share of GDP to R&D tend to coincide with higher output

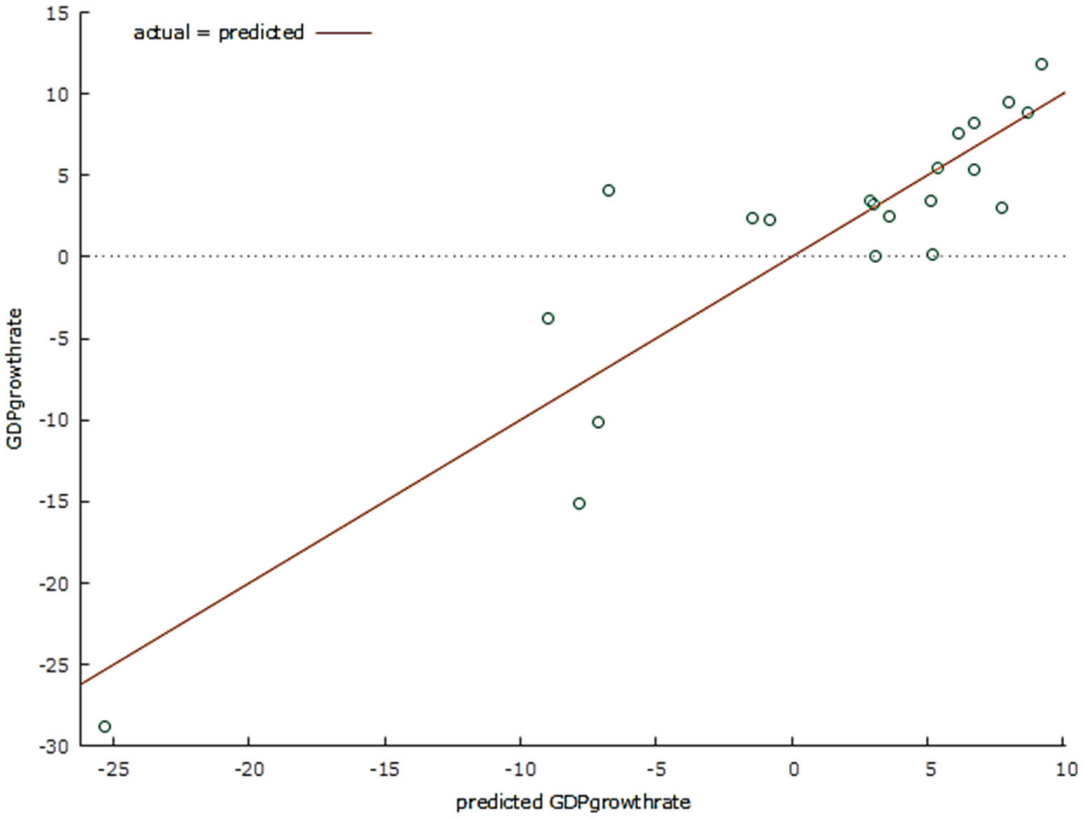

Fig. 1. Actual vs Predicted GDP growth rate for Ukraine

Source: Created based on World Bank [14]

growth. Net FDI inflows also correlate positively, though more moderately (r ≈ +0.33), suggesting that greater foreign investment in a given year often goes hand in hand with stronger economic performance.

Table 3

Correlation Analysis (2001–2023) for Ukraine

№	Dependent	Independent	Pearson
1	GDP_growth	FDI	0.33
2	GDP_growth	R&D	0.43
3	GDP_growth	Inflation	-0.30
4	GDP_growth	EDUC	-0.34

Source: Created based on World Bank [14]

On the flip side, both consumer-price inflation and government education spending have moderate negative correlations with growth (r ≈ -0.40 and r ≈ -0.34, respectively). Higher inflation years correspond with weaker or contracting GDP, reflecting how volatile price rises can disrupt investment and consumption. Likewise, larger public outlays on education in a single year are associated with lower growth that same year – consistent with the idea that the payoffs from human capital investments only emerge over a longer horizon.

Based on the modelling results for Ukraine, net FDI inflows and R&D expenditure are both strong positive drivers of GDP growth, with R&D having an even more pronounced short-term effect than FDI. To stimulate investments in Ukraine, prioritizing FDI inflows and increasing R&D expenditure substantially as a share of GDP would benefit economic growth. Increasing research and development (R&D) spending promotes the development of innovative technologies, increases the added value of products, and attracts foreign direct investment (FDI). Investment in R&D stimulates the creation of advanced technologies that increase the productivity and competitiveness of the economy, which, in turn, attracts foreign investors interested in high-tech markets with high added value. For example, countries with high R&D spending, such as South Korea or Israel, show significant FDI inflows into high-tech sectors. This finding is supported by other studies, in particular [4] and [10].

Consumer price inflation substantially negatively impacts economic growth, highlighting the imperative of price stability in creating a good investment environment. The negative relationship between government expenditure on education and growth in this model implies that, even though it is necessary for human capital building in the long run and indirectly favourable to attract investment, the short-run benefits to economic growth may not be realized within the period considered. Toward this, policymakers must complement spending increases with targeted reforms to make spending on education more efficient – focusing on vocational training, science, technology, engineering, and mathematics curricula, and lifelong learning programs aligned with the demands of foreign investors. Moreover, scholarship programs, public-private collaboration in skills development, and encouragement to firms to provide on-the-job training can accelerate the translation of educational inputs into workforce competencies directly accessible to foreign-affiliated companies.

Conclusions. Our study presents an empirical assessment of the relationship between FDI and Ukraine's economic growth over 2001-2023. Using fixed-effects regression analysis, we found that net FDI inflows positively and significantly affect GDP growth. For instance, a one-percentage-point increase in FDI corresponds to a 4.75-point increase in economic growth if we keep other variables constant. Moreover, R&D expenditures have shown an even stronger positive effect, mentioning the importance of innovation-led growth in the Ukrainian context.

Conversely, our model also identifies two constraints on short-term growth: consumer price inflation and government expenditure on education. Inflation has shown a statistically significant negative effect on GDP growth, reinforcing the need for monetary stability as a precondition for investment attractiveness. Surprisingly, government expenditure on education is also negatively correlated with short-term growth, a phenomenon we likely attribute to the lagged nature of returns to human capital investment. Overall, our results highlight the need to prioritize increased foreign direct investment, R&D investment, and macroeconomic stabilization in Ukraine's post-war recovery strategy while recognizing that certain development expenditures, such as education, require long-term horizons to yield measurable and foreseeable economic benefits.

Effective government policies towards foreign investment and the strength of diplomatic relations are the most crucial institutional drivers of a nation's attractiveness for FDI. Good diplomatic relations and clear, straightforward foreign investment policies encourage investment by

providing a predictable and stable environment. In the case of Ukraine, the crucial role belongs to guaranteeing the security of the country and the resilience of its economy. Therefore, decisive steps for integration into European value chains and accession to the EU are becoming vitally necessary in the nearest future.

Further research could involve expanding the explanatory variables to include infrastructure indicators (roads, electricity access), institutional quality metrics (rule of law, regulatory quality) along macroeconomic variables (inflation, openness to trade, currency stability). In addition, sector-specific FDI data and interaction conditions (e.g., how political stability moderates the impact of GDP) may capture better results. Policymakers must thus use holistic and flexible investment strategies which take into consideration economic indicators, sectoral focus, institutional quality and resilience preparation to exploit the full potential of foreign direct investment for sustainable development.

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