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Economic challenges and GDP dynamics in Ukraine from 1991 to 2023: Analysis of growth and recessions

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Abstract. The need for a thorough study of the dynamics of economic indicators of gross domestic product (GDP) over more than 30 years of Ukraine's independence is due to a number of reforms, ongoing conflicts in eastern Ukraine, the COVID-19 pandemic and its consequences, the full-scale invasion of Russia, and global macroeconomic trends. The purpose of this study was to analyse in detail the economic processes that have influenced Ukraine's development since independence in terms of GDP dynamics to identify the key factors that contributed to economic growth and recessions. To achieve this goal, a comprehensive analysis of economic statistics, historical data and political events was conducted. The results of the study show that the transition from a Soviet-style planned economy to a market economy was accompanied by significant political and economic disorganization, as well as challenges related to structural changes and privatization processes. The article analyses the dynamics of Ukraine's main economic indicators, including GDP per capita, GDP growth (%) and budget deficit (%) for the period from 1991 to 2023. Key problems such as hyperinflation, budget deficit and public debt are identified, and measures aimed at stabilizing the financial system are explored. The impact of political events, such as the Orange Revolution, the annexation of Crimea, the COVID-19 pandemic, and the full-scale invasion of Russia, on Ukraine's economic development was analysed. The study assessed the role of international financial assistance and foreign direct investment in supporting the country's economy. The data obtained allowed identifying the main factors that contributed to economic growth and recessions, as well as assessing the effectiveness of reforms and policy decisions. Based on the information collected, recommendations were developed to ensure sustainable economic development in the future. The practical significance of this work is to define key economic factors and develop strategies that can contribute to stable economic growth and sustainable development of Ukraine in the context of a full-scale invasion

Keywords: structural reforms; political instability; foreign investment; macroeconomic stabilization; innovation; national transformation

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Introduction

Ukraine's economic development over the three decades of its independence has been shaped by a number of key processes. The period from 1991 to 2023 covers critical changes in the political and economic systems that had a significant impact on Ukraine's gross domestic product (GDP). Analysing these changes is a key factor influencing economic growth and determining the basic principles of formulating an effective economic policy and development strategy for the country in the future.

During the period under review, Ukraine has experienced a series of economic crises, including hyperinflation in the early 1990s, the financial crisis of 2008, and the crisis caused by the annexation of Crimea and the conflict in the east of the country in 2014, the pandemic of 2020, and the full-scale Russian invasion in early 2022. These events have had and continue to have a significant negative impact on the country's economy, causing a drop in GDP, a decline in investment, and an increase in unemployment. Understanding the causes and consequences of these crises is critical to developing strategies to mitigate their impact in the future. The study also highlights the impact of external factors, such as global economic crises, changes in world markets and international sanctions, on Ukraine's economic stability.

In addition, the study is relevant in the context of Ukraine's European integration processes. Identifying economic challenges and analysing GDP dynamics will help to develop effective measures for Ukraine's integration into the European Union, increasing its competitiveness in the international arena and attracting foreign investment.

Ensuring macroeconomic stability is a key task for any country. An analysis of GDP fluctuations allows assessing the effectiveness of political and economic decisions made in different periods and determining the necessary changes to maintain stable economic growth.

Structural transformations of the economy, interregional differentiation and qualitative problems of economic growth are relevant for both developed countries and countries with economies in transition, such as Ukraine, according to L. Simkiv *et al.* (2022). Usually, the tools of the "backwardness funnel" are used to determine the disproportion of economic growth in regions. Using this method, researchers have found that most regions lag behind the average Ukrainian GDP per capita for a period of four to six years.

O. Yemelyanov *et al.* (2019) analyse the ability of certain sectors of the economy to ensure a steady reduction in natural gas consumption in the context of economic growth and corresponding GDP growth. The authors identify six types of relationships between changes in sectoral value added and energy consumption, including natural gas, and establish the conditions under which economic growth can be accompanied by a reduction in energy consumption.

V. Palekhova (2021), analysing Ukrainian and Polish GDP indicators, found that the Polish economy generally complies with most of these rules, while the Ukrainian economy does not. Poland demonstrates success due to compliance with most of the rules, except for the demographic aspect, which is already being further adjusted. At the same time, in Ukraine, problems that are in line with global trends take the form of populism, corruption, inefficient investments, etc. This analysis helps to structure the main factors, identify multidimensional problems, such as migration, and identify secondary problems that indicate inconsistency in reforms.

O. Mykytiuk *et al.* (2020) investigate the role of welfare and investment as the main drivers of economic growth. The analysis of data from Ukraine, Georgia, Serbia, and Romania shows that foreign direct investment is one of the key sources of GDP growth. Investments contribute to economic development, and their increase has a positive impact on macroeconomic indicators, such as the inflation rate and the discount rate. This demonstrates the importance of creating a favourable investment climate to ensure sustainable economic growth in Ukraine.

The implementation of government policies aimed at supporting "active ageing" will contribute to economic growth by increasing formal employment of people over 60 and reducing informal employment. V. Heyets *et al.* (2019) use a linear regression equation to confirm the hypothesis of a positive impact of active ageing on economic dynamics and productivity in Ukraine. Thus, increased healthcare expenditures, which depend on the activity and mobility of older people, can contribute to economic growth. On the other hand, the absence of appropriate government policies leads to an increase in informal employment and the shadow economy, which negatively affects GDP. VAR modelling has confirmed the relationship between real GDP, informal employment and the size of the shadow economy in Ukraine.

There is a close relationship between the rate of economic growth and the competitiveness of a country: higher economic growth rates contribute to increased competitiveness and vice versa, as noted by H. Fyliuk *et al.* (2019). Various indicators were used to characterize competitiveness, including the Global Competitiveness Index (GCI). The authors substantiated that in order to reach the level of economic development of developed countries, Ukraine and other countries with an average income of USD 8000-9000 per capita GDP should ensure annual growth of at least 8%. This increase is necessary to improve the living standards of the population and achieve competitiveness on the global stage. In their research, L. Matvejciuk & O. Solovyov (2020) emphasize that in order to achieve sustainable economic growth, it is necessary to strengthen the role of the industrial sector, which is key to Ukraine's economy.

One of the main problems when considering changes in GDP is the growing disconnect between monetary and fiscal policies, which significantly affects the country's economic expansion. S. Mishchenko *et al.* (2019) used an autoregressive distributed lag (ARDL) model and found that the inconsistency between monetary and fiscal policies leads to high volatility of macroeconomic indicators. The analysis of the impact of the dynamics of the M3 monetary aggregate (an indicator of the money supply in the economy), the inflation rate and the weighted average prime interest rate on the real GDP growth rate indicates the need to overcome the antagonism between monetary and fiscal

policies and strengthen their coordination to stimulate economic growth (Chyzh & Urban, 2023).

The study of Ukraine's economic challenges and GDP dynamics over the period from 1991 to 2023 is a deeply researched topic that attracts numerous scholars and economists. A significant number of studies have analysed various aspects of the country's economic development, including structural reforms, the impact of external factors, macroeconomic policy, and socioeconomic consequences. However, the above issues require further study to ensure a more complete understanding and development of effective strategies for the country's economic development.

The aim of the study was to conduct a comprehensive analysis of economic changes and challenges that have affected Ukraine's GDP since independence, in the context of identifying the key factors that have led to economic growth and recessions. To achieve this goal, the following tasks were performed: identifying key economic issues; studying the impact of important political events, such as the Orange Revolution, the annexation of Crimea, the COVID-19 pandemic and the full-scale invasion of Russia, on the country's economy; developing recommendations to ensure the country's balanced development in the future and implementing comprehensive reforms aimed at improving economic stability and competitiveness.

Materials and Methods

To achieve the research objective, various sources were used, which allowed substantiating the dynamics of changes in the economic indicators of the Gross Domestic Product of Ukraine for the period from 1991 to 2023. The main sources of data were official statistical reports of the State Statistics Service of Ukraine, which provided detailed information on the country's economic performance. In addition, publications by international organizations such as the International Monetary Fund and the World Bank provided a global perspective and comparative analysis of Ukraine's economic development. Analytical reports by the Atlantic Council (Ukraine moves closer…, 2021) and the Centre for Economic Strategy provided additional analysis and recommendations based on in-depth analysis of current economic conditions and forecasts.

To analyse the economic development of Ukraine, data on GDP, inflation, budget deficit, foreign direct investment and other key macroeconomic indicators were collected. The economic transformations were characterized on the basis of data on GDP per capita in US dollars and annual growth rates, as well as budget deficit indicators, which allowed assessing the overall economic situation of the country at different periods over three decades.

Regression analysis was used to examine the relationships between key economic indicators, including between GDP and energy consumption, corruption, innovation and institutional change. The threshold regression allowed identifying critical GDP values at which significant changes in the relationships between key indicators occur and points where economic reforms can have the greatest impact, and to develop appropriate strategies to stimulate economic growth.

The impact of political and socio-economic factors on Ukraine's development was assessed using quantitative analysis. The comparative method was used to compare the economic and political development of several post-Soviet republics after gaining independence in 1991. In particular, the economic difficulties and political instability in Ukraine, Azerbaijan, Georgia, and Uzbekistan are examined, their GDP per capita and main challenges are indicated. This allows us to see the similarities and differences in their development paths, as well as the impact of various factors on their economies and social structures.

The econometric analysis included the use of regression models to determine the relationship between the reforms and changes in economic indicators such as GDP, inflation, unemployment, etc. Panel data was used to analyse the structural reforms implemented in Ukraine and their impact on economic indicators. At the same time, time series models helped to assess the impact of reforms on economic development in the long term. Using case-study tools, specific examples of reforms implemented in Ukraine were substantiated. Measures aimed at fighting corruption, improving the investment climate and increasing the transparency of public administration were described. A comprehensive approach to the study of the main research problem allowed us to summarize and substantiate recommendations for further economic reforms and strategies to increase Ukraine's GDP. These recommendations included measures to stabilize the political situation, modernize the economy, support innovative industries and attract foreign investment.

Results

Political and economic situation in the first decade after Ukraine's independence

In 1991, after gaining independence, Ukraine became one of the poorest Soviet republics, with a GDP per capita of only US$1307. Azerbaijan, Georgia, Kyrgyzstan, Tajikistan, and Uzbekistan experienced a similar political and socio-economic crisis. Since gaining independence, Azerbaijan has faced serious economic difficulties and political instability, in particular due to the conflict in Nagorno-Karabakh. Its GDP per capita in 1991 was one of the lowest among the post-Soviet republics. However, since the mid-1990s, the country has begun to stabilize, largely due to its oil and gas resources. The signing of the "Contract of the Century" in 1994 attracted significant foreign investment in the oil sector, which subsequently contributed to economic growth (The Underachiever: Ukraine's…, 2012).

In the first years of independence, Georgia experienced a severe economic crisis, accompanied by political instability and civil conflicts in Abkhazia and South Ossetia. The country's economy was disorganized and GDP per capita was low. It was only in the second half of the 1990s, after the start of reforms and the stabilization of the political situation, that the country's economic situation began to

improve, although the process was slow and unstable. Uzbekistan's independence was accompanied by the preservation of a large part of the Soviet administrative command system, which slowed the process of transition to a market economy. GDP per capita remained low, but the country avoided major economic disorganization due to centralized management. Uzbekistan has been slow to implement economic reforms, focusing on maintaining social stability and gradually transitioning to market relations.

Ukraine's historically established agrarian-industrial model has undergone significant transformations under the influence of political and economic processes of the twentieth century, including two world wars, civil war, forced collectivization, Stalinist industrialization and German occupation during World War II. These events led to environmental problems, social tensions and an imbalance between the agricultural and industrial sectors of the economy. After gaining independence, Ukraine began to build a functioning democratic state, an active civil society and a competitive economy integrated with both post-Soviet and European markets. However, the first years of independence were characterized by political instability and economic disruption.

After Ukraine gained independence in 1991, a large-scale transition from a Soviet-style planned economy to a market economy took place. This process was accompanied by significant structural changes and disorganization of economic activity. The severance of economic ties with other former Soviet republics, which had been important trading partners, led to a decline in production and exports. Privatization of land and other real estate was part of broader economic reforms. The main goal was to reduce state control over the economy, increase the efficiency of enterprises and attract investment. However, the process has been plagued by numerous problems, including corruption, lack of transparency and political instability. Successful privatization deals, such as the sale of Kryvorizhstal, were the exception to the rule. In general, the privatization process contributed to the formation of elements of an "oligarchic system" that controlled large segments of the economy and did not always generate significant economic growth.

One of the most serious challenges of this period was hyperinflation. In particular, in 1992-1994, inflation reached incredibly high levels, reaching several thousand per cent per year. This meant that the prices of goods and services increased many times over, which significantly reduced the purchasing power of the population. Citizens lost their savings, wages did not keep pace with the rapid price increases, leading to mass impoverishment (The Underachiever: Ukraine's…, 2012). In 1996, Ukraine's GDP was USD 46.08 billion. In the following years, the country gradually recovered from the crisis of the early 1990s, and GDP began to grow, reaching USD 181.31 billion in 2008. This growth was driven by stabilization measures, the introduction of a new currency (the hryvnia), and the start of privatization of state-owned enterprises (Ukraine: Gross domestic…, 2024).

The significant decline in production also acted as a negative trigger for the then unstable economic development. Most enterprises failed to adapt to the new market conditions, and their products lost competitiveness both on the domestic and foreign markets. The budget deficit and public debt became another serious problem. The government was forced to resort to significant borrowing, which increased the debt burden on the economy. At the same time, budget expenditures on social needs, such as healthcare, education and social protection, were being cut, further worsening the socio-economic situation.

The introduction of the national currency, the hryvnia, in 1996 was an important step towards stabilizing the financial system. However, the stabilization process was complex and required significant efforts by the government and the National Bank of Ukraine to control inflation and stabilize the exchange rate (Spytska, 2023). It is worth noting that before the presidency of Leonid Kuchma (1994-1996), macroeconomic and structural policies were inconsistent. Liberalization, stabilization, privatization and institutional changes, which covered aspects of the Washington Consensus, were accompanied by growing corruption and shadow economy, which made economic stabilization difficult (Table 1). The budget deficit was 14.4 per cent of GDP, barter, the use of so-called "surrogate money" and foreign currency were widespread, and official GDP almost halved between 1990 and 1994 (Ukraine: Gross domestic…, 2024).

Table 1. Dynamics of the main economic indicators of Ukraine (1991-2000)

Year	GDP per capita (USD)	GDP growth (%)	Budget deficit (%)
1991	1307	-9.7	14.4
1992	1100	-13.6	12.8
1993	950	-18.0	15.2
1994	900	-22.7	14.4
1995	880	-12.2	13.7
1996	860	-9.7	12.1
1997	870	2.1	10.8
1998	880	2.3	9.4
1999	890	2.5	8.7
2000	900	5.8	7.3

Source: compiled by the author based on data from The Underachiever: Ukraine's Economy Since 1991 (2012)

Thus, Ukraine faced profound economic and political challenges in the first decade after independence. High levels of corruption, an expanding shadow economy and political instability hampered the development and establishment of functional administrative institutions. Despite a difficult start and significant challenges, Ukraine has managed to lay the foundations for future growth and development. Thus, starting in the 2000s, the national economy began to show signs of recovery, and GDP grew by 5.8%.

Economic challenges and political crisis at the beginning of the new millennium

In the new millennium, especially in the period from 2000 to 2004, Ukraine continued to actively privatize state-owned enterprises in order to create a competitive market environment and improve economic efficiency. Privatization was one of the key economic reforms aimed at transforming the former socialist structures into modern market mechanisms. State assets were sold to private investors, including both domestic and foreign capital entering the Ukrainian market.

The privatization process attracted significant investments in various sectors of the economy, in particular to modernize production and introduce new technologies, which increased labour productivity and the competitiveness of Ukrainian products on the international market. During this period, GDP grew steadily, with an average annual growth rate of around 7-9%. This growth was driven not only by structural changes in the economy, but also by external economic factors, such as favourable conditions on global markets and growing demand for Ukrainian products.

However, along with positive aspects, the privatization process in Ukraine has been accompanied by significant problems. A significant part of state assets was acquired by individuals close to the political elite, often at low prices, which led to a significant corruption component in the privatization process. This led to an uneven distribution of assets and deepened social inequality in the country. As a result, many privatized enterprises did not receive the necessary investment for development, and their productivity continued to be low.

Corruption scandals related to privatization caused a wide public outcry and reduced the level of trust in the government and economic reforms in general. The lack of transparency and effective control over privatization undermined the confidence of foreign investors and created additional risks for the country's economic development.

While noting both sides of the privatization process, it is important to emphasize that the period from 2000 to 2004 was an important stage in Ukraine's economic history, determining further trends in the development of a market economy and influencing the structure of the national economy (Ukraine: Gross domestic…, 2024). The events of the Orange Revolution in 2004 were a precondition for creating new prospects for economic development through integration with the European Union. In 2009, Ukraine's GDP declined to USD 117.08 billion due to the global financial crisis. This decline was due to a decrease in external demand for Ukrainian products, a reduction in investment, and financial difficulties within the country (Ukraine: Gross domestic…, 2024). After the 2009 crisis, the economic situation in the country stabilized and in 2013 GDP increased to USD 175.78 billion. This situation demonstrated the effectiveness of economic reforms, increased investment flows and improved foreign trade.

Implementation of comprehensive reforms, course towards European integration and stabilization of GDP

The signing of the Association Agreement with the EU in 2014 was an important step in this direction. However, political instability, the conflict in eastern Ukraine and the annexation of Crimea by Russia in 2014 led to a significant decline in economic activity. Thus, Ukraine's GDP declined by 6.6% in 2014 and by 9.8% in 2015.

After 2014, the Ukrainian government initiated a series of comprehensive reforms aimed at stabilizing the economy and increasing its competitiveness. The reforms covered several key areas, including the energy sector, decentralization of power, improvement of the business climate and the fight against corruption. The aim of the reforms was to create more transparent and efficient economic governance mechanisms, which should have contributed to productivity growth and foreign investment.

Significant changes were made in the energy sector to reduce dependence on imported energy resources and improve the country's energy efficiency. State subsidies for gas were reduced, allowing for the introduction of market-based pricing mechanisms, and contributed to the stabilization of the financial system, as state budget expenditures on energy subsidies were reduced and the fiscal deficit was reduced. In addition, the reform of the energy sector has helped attract investment in infrastructure modernization and the development of alternative energy sources. The reforms also included decentralization of power, which involved the transfer of significant powers and resources to the local level. This was aimed at improving the efficiency of governance and stimulating regional economic development. Decentralization helped to strengthen local governance and boost local initiatives, which had a positive impact on economic activity in the regions.

At the same time, the government implemented measures to improve the business climate, enhance the regulatory environment and simplify business processes. In particular, the government simplified business registration procedures, reduced the number of regulatory barriers, and introduced new mechanisms to support small and medium-sized businesses. These steps contributed to the growth of entrepreneurial activity and the attraction of domestic and foreign investment in various sectors of the economy. A separate area of reforms was the fight against corruption schemes, which significantly hampered the implementation of reforms and damaged the country's reputation in the international arena. The government has implemented a number of anti-corruption measures, including the creation of independent anti-corruption institutions, reform of law enforcement agencies and the judiciary. This has

improved trust in state institutions and reduced corruption, which has had a positive impact on the investment climate.

As a result of the reforms implemented, the Ukrainian economy has begun to show signs of stabilization. Ukraine's gross domestic product (GDP) began to grow slowly, demonstrating a positive trend of 2-3% annually. This indicated a gradual recovery of the economy after the crisis and laid the foundation for further sustainable growth. Since 2016, Ukraine's economic recovery has been gradual, with gross domestic product (GDP) increasing to USD 153.95 billion in 2019. This economic growth was made possible by the implementation of key reforms and substantial support from international financial institutions (The Underachiever: Ukraine's…, 2012).

The stabilization of the political environment allowed the government to focus on implementing the necessary structural reforms, which included reforming the banking sector, strengthening public financial management and increasing transparency in the management of state-owned enterprises. In addition, financial and technical support from international organizations such as the International Monetary Fund, the World Bank and the European Bank for Reconstruction and Development, which provided not only financial resources but also expert assistance for the implementation of reforms, was an important factor in the economic recovery. As a result of these measures, Ukraine's economy demonstrated positive trends that contributed to GDP growth and gradual stabilization of macroeconomic indicators.

In 2020, Ukraine's GDP declined to USD 130.92 billion as a result of the global COVID-19 pandemic, which caused a significant economic downturn (Fig. 1). The pandemic affected all sectors of economic activity, leading to a decrease in consumption and investment, as well as a decline in production and exports. These factors negatively affected the country's macroeconomic indicators.

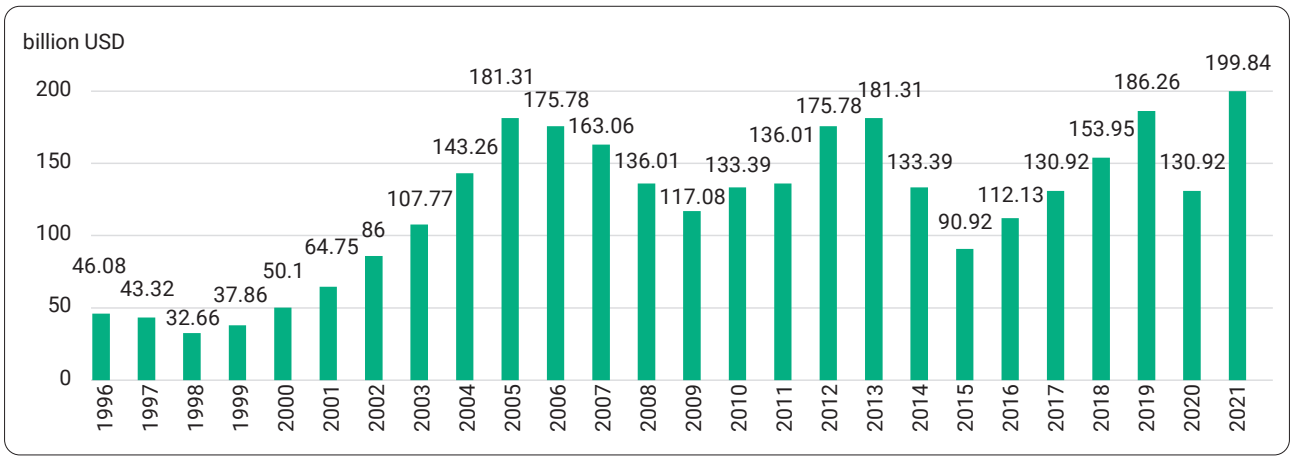

Figure 1. Dynamics of Ukraine's GDP (1996-2021)
Source: compiled by the author based on data from Ukraine: Gross domestic product (GDP) from 1996 to 2028 (2024)

Due to the easing of quarantine restrictions after 2020, economic activity recovered and consumption and investment increased, leading to a significant increase in the country's GDP. In 2021, Ukraine's GDP reached USD 199.84 billion.

Sectoral distribution of Ukraine's GDP

The sectoral distribution of Ukraine's GDP is extremely important for understanding the structure of the national economy and its dynamics over the period of independence. For example, industry, which used to dominate the economy, has experienced a significant decline, while other sectors, such as agriculture and services, have begun to gain importance. The services sector has started to play an increasingly important role, in particular, due to the development of information technology, financial services and trade. In 2010, the share of the services sector in Ukraine's GDP was around 55%. The agricultural sector remains an important sector, contributing a significant share of exports and creating jobs in rural areas. According to the World Bank, in 2014, the share of industry in GDP declined to 25%, while the service sector remained at around 60% (Fig. 2).

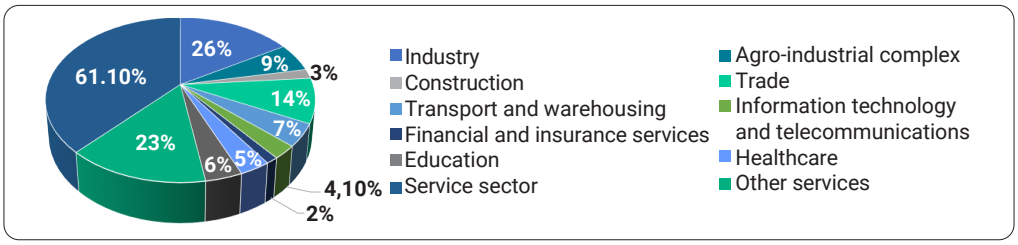

Figure 2. Analysis of the distribution of GDP share in different segments of the Ukrainian economy as of 2021
Source: compiled by the author based on the data of Gross domestic product of Ukraine in 2021 (n.d.)

Recent years have seen an increase in the role of innovative and high-tech industries, as well as intensification of international trade and investment. According to the National Bank of Ukraine, in 2021, the share of information technology and telecommunications in GDP increased to 4.1%, which is evidence of a gradual shift in the economy towards high-tech sectors

The impact of a full-scale invasion on the overall economic situation in Ukraine

In 2022, as a result of Russia's full-scale invasion, Ukraine's GDP fell by almost 30%. However, in 2023, economic growth exceeded expectations. Thus, experts of the National Bank of Ukraine estimated the annual real GDP growth rate at 5.7%, while the initial forecast for 2023 was only 0.3% (Statistics at the…, 2024). According to the National Bank of Ukraine and the International Monetary Fund, GDP is expected to grow by more than 4% annually in the coming years. Even if the war is projected to end by the end of 2024, Ukraine's real GDP will only reach pre-war levels in 2030. After all, in 2022, potential output fell by more than USD 150 billion, and much of the production capacity and infrastructure was destroyed.

The World Bank, together with the Government of Ukraine, the European Union and the United Nations, has jointly estimated the total cost of reconstruction and economic recovery in Ukraine over the next decade at US$486 billion. This amount covers large-scale efforts to rebuild infrastructure, rebuild housing, restore industrial facilities and introduce new projects to ensure sustainable economic growth and development after the period of military conflict. The planned investments involve the active participation of international partners and organizations, which will provide the necessary financial support for the implementation of large-scale projects.

As of the end of 2023, direct losses caused by the war were estimated at USD 152 billion. These losses affect several key economic sectors, including housing, transport infrastructure, trade, industry, agriculture, and energy. Destroyed residential buildings, damaged roads and bridges, lost productive capacity of enterprises and destroyed cultural sites pose serious obstacles to the normal functioning of the economy and require significant financial investments for reconstruction (Studinski, 2022).

Particular attention should be paid to estimates of the indirect costs of war, which amount to almost $500 billion. Indirect costs include lost economic opportunities, reduced labour productivity, a decline in the country's investment attractiveness, healthcare, and social security costs for the victims, as well as costs for temporary housing and support for internally displaced persons. These losses have a significant long-term impact on the economy, reducing its potential for rapid recovery and growth. The need to rebuild economic infrastructure after the war requires a consolidated effort by the international community, which can provide financial and technical assistance to Ukraine. Reconstruction and recovery plans should include both immediate measures to rebuild critical facilities and long-term strategies aimed at creating conditions for sustainable economic development and improving the quality of life of citizens. International financial institutions, partner governments and private investors should play a key role in this process by providing the necessary resources and investments to rebuild Ukraine's economy.

Human capital has also suffered significant losses: more than 6.4 million Ukrainians have become refugees and another 3.7 million are internally displaced, representing 23% of the pre-war population (Table 2). The war has led to a significant deterioration in educational services, and the decline in the number of highly skilled workers will affect overall productivity by around 7% by 2035.

Table 2. Analysis of the dynamics of the deviation of real GDP from the level of 2021 and annual real GDP growth from 2021 to 2035

Year	Deviation of real GDP from the level of 2021 (%)	Real GDP growth (%)
2021	0	0.0
2022	-25	-25.0
2023	-5	5.0
2024	-10	4.0
2025	-9	4.5
2026	-8	4.2
2027	-7	4.1
2028	-6	4.0
2029	-5	4.3
2030	-4	4.1
2031	-3	4.2
2032	-2	4.5
2033	-1	4.7
2034	0	5.0
2035	3	5.2

Source: compiled by the author based on data from Ukraine: Gross domestic product (GDP) from 1996 to 2028 (2024)

Foreign direct investment is an important source of capital for the Ukrainian economy, contributing to industrial modernization, job creation and productivity growth. However, the level of this investment has fluctuated significantly depending on the political and economic stability in the country. For example, after the annexation of Crimea and the outbreak of the conflict in eastern Ukraine in 2014, investment fell sharply as investors began to avoid risks associated with instability. In 2022, foreign direct investment fell to $848 million, down from $7.3 billion the previous year, due to the impact of Russian aggression. International financial assistance, in particular, from the US and the EU, played a key role in stabilizing the Ukrainian economy during the crisis. Since the start of Russia's full-scale invasion in 2022, Ukraine has received significant financial support from international partners. For example, the US Congress allocated a total of $113 billion in aid to Ukraine, of which $61.8 billion was earmarked for military assistance and the rest for civilian aid and infrastructure reconstruction (Krishna, 2023). This support has helped to maintain macroeconomic stability and meet the basic needs of the population.

Structural reforms, energy independence and business integration

In order to develop effective ways and strategies to increase Ukraine's gross domestic product, a comprehensive approach, including both short-term and long-term measures, is needed. Among the priority steps are stabilizing the political situation and ensuring security, which will create a favourable climate for domestic and foreign investment. It is also important to modernize and diversify the economy, in particular, by supporting innovative industries and technology start-ups (Fig. 3).

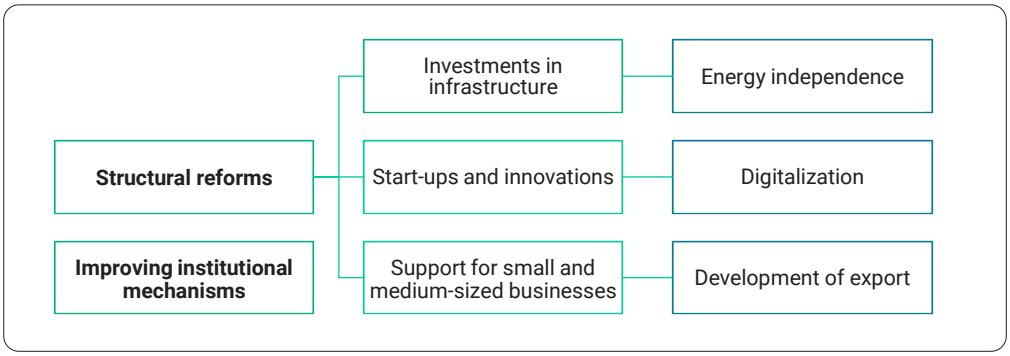

Figure 3. Possible ways and strategies to increase Ukraine's GDP
Source: compiled by the author

To boost Ukraine's GDP, it is critical to continue structural reforms, including fighting corruption, increasing transparency in public administration and improving the investment climate. Reducing corruption and improving institutional arrangements will help attract more foreign investment and support domestic business development. Building energy independence is an important aspect of economic stabilization. The resource conservation system requires the development of own energy sources, including alternative ones, followed by the modernization of the relevant infrastructure. This governmental position will reduce dependence on energy imports and increase the economy's resilience to adverse external factors.

Channelling investment flows into infrastructure, especially transport and energy, is a prerequisite for rapid economic growth. Modernization of infrastructure will help boost productivity, improve logistics and regional development. Attracting international financial resources and government infrastructure development programmes can be important catalysts (European Central Bank, 2017). Expanding exports can significantly increase Ukraine's economic potential. To do so, it is necessary to diversify export markets, develop new industries that can compete on the global market, and support export-oriented enterprises. It is also important to conclude international trade agreements that will open new markets for Ukrainian goods and services.

Innovation and new technologies play a key role in the economic growth and development of countries. They help to increase productivity, create new jobs and stimulate competitiveness. Innovations make it possible to use available resources more efficiently, which leads to higher production volumes and improved quality of products and services. The introduction of new technologies allows for the production of more products with fewer inputs, which increases the overall efficiency of the economy and contributes to GDP growth.

Innovation plays a key role in opening up new markets and creating new products, which in turn expands export opportunities and contributes to revenue growth. For example, the development of information technology has spurred the emergence of new industries such as digital services and e-commerce, which contribute significantly to economic growth.

Countries that actively invest in research and development are becoming more attractive to international investors. Investments in innovation help to create high-tech jobs, which increases the level of qualifications of specialists and, consequently, their productivity. It also helps to strengthen positions in global markets and increase the competitiveness of the national economy. Small and me-

dium-sized businesses play a key role in Ukraine's GDP growth due to their ability to adapt and innovate quickly. This segment of the economy creates a significant number of jobs, reduces unemployment and increases household incomes. In addition, competitiveness indicators are increasing, which leads to improved quality of goods and services and lower costs for consumers.

Discussion

The analysis of economic dynamics from 1991 to 2023 shows that the country faced numerous challenges in its development, including the transformation from a planned to a market economy, political instability, military conflicts, and global economic crises. The study shows that domestic factors such as reforms, institutional capacity and investment climate have a significant impact on economic performance. Successful reforms and stabilization of the macroeconomic environment in some periods contributed to GDP growth, while political and economic instability led to recessions.

The introduction of GDP-linked bonds has a significant impact on economic growth in a stochastically growing small open economy. Z. Kalamov & K. Zimmermann (2023) consider a scenario where the government borrows on the international financial market, collects tax revenues and provides public infrastructure, and public debt can be either conventional or GDP-indexed. The above model, calibrated for developing Ukraine, shows that the introduction of such bonds helps to increase the optimal debt-to-GDP ratio, increase the share of public and private capital, and raise the level of taxes. But Q. Chen *et al.* (2024) develop a mathematical model based on a system of two nonlinear delayed differential equations that describes the relationship between GDP growth and public debt. In the model, GDP growth is directly proportional to public debt, and the absence of debt or its low level leads to slow economic growth. It is worth noting that the introduction of GDP-linked bonds increases the optimal debt-to-GDP ratio, which may be important for Ukraine, which often faces problems with high public debt levels. This may show how such bonds can help manage the debt burden.

M. Sikder and J. Wood (2024) note in their research that the integration of green logistics (GL) and circular economy (CE) has an impact on environmental performance and sustainable development for countries that seek to achieve economic GDP growth with environmental sustainability. The authors estimate short- and long-term effects and heterogeneous causal relationships. The long-term results show that CE and GL can reduce CO_2 emissions, while municipal waste generation (GMW) has a negative impact on the environment. M. Mohsin *et al.* (2022) also emphasize in their work the need to adapt green resources to preserve the environment and suggest that policymakers create a regulatory framework to support environmental sustainability. At the same time, X. Wu *et al.* (2023) point out the importance of analysing the relationship between economic growth, rural tourism and the environment, which can help to understand how economic changes affect environmental sustainability in different countries. This approach will allow devising strategies aimed at balancing economic development and environmental protection. In this context, it is impossible to disagree with the results of the research by X. Li *et al.* (2024), which finds that GDP has a significant spatial autocorrelation, gradually decreasing from the centre to the periphery, with residential areas having the highest correlation with GDP, which contributes to urban planning and regional development in terms of environmental protection.

There is no disagreeing that applying an integrated approach with circular economy principles to policies aimed at reducing CO_2 emissions takes into account the relationship between economic activity and the environmental sustainability of a country. At the same time, X. Yao *et al.* (2022) provide suggestions for developing policy initiatives to achieve environmentally sustainable economic growth by analysing the impact of energy consumption, industrialization, GDP growth and urbanization in 23 developing countries over the period 1995-2018, using the Panel ARDL approach and the heterogeneous causality test. M. Mashhadi Rajabi (2023) uses a dynamic recursive computable general equilibrium (CGE) approach to model the Australian economy and analyses the impact of two carbon tax policies with three revenue recycling approaches, confirming that a carbon tax, together with appropriate revenue recycling, reduces CO_2 emissions and contributes to GDP growth.

The COVID-19 pandemic has had a significant impact on global GDP, causing the largest economic downturn since the Great Depression (Silagadze, 2022). In 2020, global GDP declined by around 3.5%, the worst performance since World War II. This situation was caused by the suspension of economic activity due to quarantine measures and lockdowns. Deaths from COVID-19 had a minor impact on GDP, while changes in quarantine measures had a significant impact on economic activity, especially in emerging economies, as noted by J.E. Gagnon *et al.* (2023). Indeed, the pandemic has exacerbated global economic imbalances, widening the gap between developed and developing countries. High-income countries have been able to implement more effective support measures, while low- and middle-income countries, including Ukraine, have experienced much greater difficulties during this period.

An equally important issue is the analysis of the threshold effect of GDP on the causal relationship between GDP and energy consumption. Using the threshold regression technique and panel data from 26 OECD countries for the period 1971-2014, B.L. Tran *et al.* (2022) investigated whether there is a threshold value of GDP in the relationship between GDP and energy consumption. The empirical results showed that when real GDP per capita is less than USD 48,170, there is a unidirectional causal relationship from energy consumption to GDP in both the short and long run.

The results of the study can guide Ukrainian experts in developing energy-saving initiatives and adapting energy

policy to the level of economic development, thus contributing to sustainable economic growth and reducing dependence on energy resources. R. Alvarado *et al.* (2023) emphasize the importance of studying the relationship between natural resource rents, technological innovation and economic complexity using panel data methods for GDP indicators. By applying cointegration techniques with structural breaks, the authors find a long-run relationship between natural resource rents and technological innovation. It is worth noting that the importance of economic diversification to reduce dependence on natural resources is key to Ukraine's resource conservation policy (Yaremko & Dumych, 2024). At the same time, it is necessary to develop various sectors of the economy to ensure sustainable economic growth.

At the same time, it is equally important to understand economic challenges and GDP dynamics in order to formulate policies aimed at sustainable development and efficient use of resources. G. Semieniuk (2024) analyses the history of GDP structural revisions in the United States and international comparisons of purchasing power parity, and compares the results of decoupling for the period 1994-2021 for most countries. The study finds that between 10% and 15% of countries change their decoupling status from energy or materials at ten-year intervals, and many countries that previously decoupled are either stopping or starting to decouple again.

Y. Komaki (2023) investigates the high GDP forecast errors of Japan compared to Canada, the United Kingdom, and the United States, finding that the reason is significant fluctuations in quarterly GDP growth rates, and emphasizes the need to study the factors that cause these fluctuations. O. Bolivar (2024) presents an innovative GDP forecasting strategy for developing countries, including Bolivia, reducing the lag in the release of monthly economic growth from six to two months by integrating machine learning techniques with traditional data sources and satellite imagery, which is tested for reliability using various criteria.

An important issue remains the justification of the specifics of using sign restrictions to identify shocks to aggregate demand and aggregate supply in the economies of leading countries. For example, J.C. Della Chang *et al.* (2023) use historical decompositions to analyse the components of real GDP growth and inflation caused by these shocks. Using the Pagliacci approach, the study assesses the importance of supply shocks for short-term fluctuations in output. Indeed, the above studies highlight the need for thorough reporting, forecasting and data sharing to improve comparisons and monitoring of the current state. It is international experience that is relevant for Ukraine in the context of its integration into the global economy and participation in international environmental sustainability initiatives.

It is worth noting that effective energy-saving management can contribute to a significant increase in GDP, which is relevant for Ukraine in the context of economic challenges and the need for growth (Shahini *et al.*, 2024). For example, a market-based energy conservation model for improving energy conservation in China is presented in the results of research by J. Xue *et al.* (2024). This model consists of three parts: an optimization model with two objectives (GDP and social benefits), a model for determining the optimal volume of energy-saving allowance trading in each province with a division into buyers and sellers of allowances, as well as a cooperative game model for energy saving allowances; and a Nash distribution model for fair distribution of benefits from cooperation between provinces. The analysis was carried out on the case of Shandong, Zhejiang and Jiangsu provinces, showing that interprovincial cooperation based on option trading increased social benefits by 2.79% and GDP by 273.636 × 10^9 CNY. After fairly distributing the benefits, each province benefited from the cooperation, demonstrating the effectiveness of the proposed model. At the same time, Y. Sun *et al.* (2024) are of the opinion that higher GDP growth targets suppress corporate innovation in China, especially in less developed regions, through direct and indirect government intervention mechanisms, which highlights the risks of over-focusing on short-term economic success for long-term prosperity.

Large-scale globalization transformations require the use of innovative approaches such as deep learning algorithms and artificial neural networks to forecast economic indicators, which can be useful for improving forecast accuracy and decision-making in times of economic instability. U. Shahzad *et al.* (2023) use deep learning (DL) and artificial neural network (ANN) algorithms to predict the response of GDP to supply chain disruptions, energy prices, economic policy uncertainty, and Google trends in the United States based on monthly data from 2008 to 2022.

The study covers various recessionary episodes, such as the 2008 mortgage crisis, the COVID-19 pandemic, Russia's recent invasion of Ukraine, and the current economic recession in the United States. The results show the high sensitivity of monthly GDP fluctuations to changes in supply chain productivity and highlight the significant role of Google trends in ensuring the consistency of GDP forecasts. The findings also point to the greater forecasting efficiency of DL compared to ANN, which has important implications for global policymakers, decision-makers, and firm managers. At the same time, R. Gatti *et al.* (2024), on the other hand, highlight the impact of data transparency on the accuracy of GDP growth forecasts, finding that increased data transparency significantly reduces forecast errors, with World Bank forecasts being more accurate and less optimistic than IMF and private sector forecasts, with particularly large forecast errors in the Middle East and North Africa region.

The analysis demonstrates the importance of international support and cooperation for economic stabilization, as well as the significant impact of green technologies and the circular economy on environmental sustainability. The study also highlights the importance of data transparency for accurate forecasting of economic growth and the need to adapt energy policy to the level of economic development. Prospects for further research include the development of innovative approaches to forecasting economic indicators,

the use of machine learning and artificial neural network methods, and the study of the relationship between economic activity and environmental sustainability, which will contribute to the development of more effective strategies for the sustainable development of Ukraine's economy.

Conclusions

This study has identified and confirmed numerous important aspects of Ukraine's economic development over the three decades of independence. One of the main findings is that Ukraine, like many other post-Soviet republics, experienced a deep political and socio-economic crisis in the early 1990s. GDP per capita in 1991 was only US$1307.

It is determined that the historically formed agrarian-industrial model of Ukraine has undergone significant transformations under the influence of political and economic processes of the twentieth century. Events such as two world wars, civil war, forced collectivization, Stalinist industrialization and German occupation led to environmental problems, social tensions and imbalances between the agrarian and industrial sectors of the economy.

An analysis of economic development has shown that since independence, Ukraine has experienced political instability, economic disorganization and hyperinflation. These factors have significantly complicated the transition from a Soviet-style planned economy to a market economy. However, despite the difficult "start" of an independent Ukraine, gradual reforms and stabilization measures, such as the introduction of a new currency (the hryvnia) and the privatization of state-owned enterprises, have contributed to a gradual recovery from the crisis and the resumption of economic growth. The findings of the study show that successful reforms aimed at fighting corruption, increasing transparency in public administration and improving the investment climate are critical to ensuring sustainable economic growth. For example, reforms in the energy sector and decentralization of power, as well as improvements in the business climate, have significantly contributed to the stabilization of the financial system and economic recovery.

It has also been established that foreign direct investment and international financial assistance play a key role in stabilizing and restoring Ukraine's economy. Attracting investment contributes to industrial modernization, job creation and productivity. In addition, financial and technical support from international organizations such as the IMF, the World Bank and the EBRD has helped to stabilize macroeconomic indicators and ensure positive economic growth trends. In general, to stabilize GDP in Ukraine, it is necessary to take a comprehensive approach to solving economic problems, ensuring political stability, structural reforms, infrastructure modernization, energy independence, support for SMEs and intensified international cooperation. Only under these conditions can we expect sustainable economic development and improved welfare of the population.

To improve its performance in the future, Ukraine needs to continue its integration into the global economy, conclude international trade agreements and actively attract investment in high-tech sectors. Supporting small and medium-sized businesses, developing innovative technologies, and promoting exports could be key drivers for sustainable economic growth. Although the study of economic challenges and GDP dynamics in Ukraine in the period from 1991 to 2023 is significant, it has several limitations that should be taken into account. First, individual interpretations of historical events may differ, which affects the objectivity and universality of the study's conclusions. The influence of political processes makes forecasting difficult, and economic instability affects the accuracy of the analysis of growth and recessions. In addition, cultural and social differences in different regions of the country play an important role in the perception of economic processes, and international events and geopolitical changes have an impact on the country's overall development.

Prospects for further research may include a more detailed study of the impact of political factors on the country's economy, analysis of microeconomic stability, research on the relationship between economic instability and socio-cultural aspects of development, research on the prospects for foreign economic relations and the possibility of global trends affecting Ukraine's economic dynamics. Another important area could be the analysis of innovative approaches to stimulating economic growth and the study of the impact of digitalization on the development of the Ukrainian economy.

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Conflict of Interest

None.

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Економічні виклики та динаміка ВВП України в період з 1991 по 2023 роки: аналіз росту та рецесій

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Анотація. Необхідність ґрунтовного вивчення динаміки економічних показників валового внутрішнього продукту (ВВП) за більше ніж 30 років незалежності України зумовлена низкою реформ, тривалими конфліктами на Сході України, пандемією COVID-19 та її наслідками, повномасштабним вторгненням рф, а також глобальними макроекономічними тенденціями. Метою даного дослідження був детальний аналіз економічних процесів, які вплинули на розвиток України після здобуття незалежності, у розрізі динаміки ВВП для виявлення ключових факторів, що сприяли економічному зростанню та спадам. Для досягнення мети проведено комплексний аналіз економічної статистики, історичних даних та політичних подій. Результати дослідження показують, що перехід від планової економіки радянського типу до ринкової економіки супроводжувався значною політичною та економічною дезорганізацією, а також викликами, пов'язаними зі структурними змінами та процесами приватизації. Проаналізовано динаміку основних економічних показників України, включаючи ВВП на душу населення, темпи зростання ВВП (%) та дефіцит бюджету (%) за період з 1991 по 2023 роки. Виявлені ключові проблеми, такі як гіперінфляція, бюджетний дефіцит та державний борг, і досліджені заходи, спрямовані на стабілізацію фінансової системи. Було проведено аналіз впливу політичних подій, таких як Помаранчева революція, анексія Криму, пандемія COVID-19 та повномасштабне вторгнення РФ, на економічний розвиток України. У ході дослідження було оцінено роль міжнародної фінансової допомоги та іноземних прямих інвестицій у підтримці економіки країни. Отримані дані дозволили визначити основні фактори, які сприяли економічному зростанню та рецесіям, а також оцінити ефективність проведених реформ і політичних рішень. На основі зібраної інформації було розроблено рекомендації для забезпечення стійкого економічного розвитку в майбутньому. Практична значущість цієї роботи полягає у визначенні ключових економічних факторів і розробці стратегій, що можуть сприяти стабільному економічному зростанню та стійкому розвитку України в умовах повномасштабного вторгнення

Ключові слова: структурні реформи; політична нестабільність; іноземні інвестиції; макроекономічна стабілізація; інновації; національна трансформація