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POST-OIL PERIOD IN AZERBAIJAN: ECONOMIC TRANSFORMATIONS, ANTI-INFLATION POLICY AND INNOVATIONS MANAGEMENT

Abstract. *Azerbaijan's economy is traditionally characterized by a high dependence on the oil industry. Thus, the revenues from producing and selling oil and oil products provided economic growth and financing for most consumer needs. However, the transition from the oil boom to the gradual decline of the oil industry has caused quite serious economic shocks and identified the need for significant structural transformations in the national economy. The article aims to study the potential of innovative development of Azerbaijan's economy in the post-oil period and to determine the priorities of the state's anti-inflationary policy. To test the hypothesis of the need to change the directions of economic regulation and anti-inflationary policy, a dynamic and structural analysis of key indicators of Azerbaijan's economic development (production, employment, exports, inflation, the balance of payments, government spending, etc.) during the oil boom and post-oil period was conducted. The structural transformations in the economy of Azerbaijan that have taken place over the past 20 years have been identified, which made it possible to put forward a hypothesis about the impact of world oil demand on the main parameters of the country's national economy. Regression analysis by the Newey West method (time-series data) revealed the specifics of the relationship between key indicators of oil industry development (oil production and sales, oil prices), inflation (consumer prices, exchange rate), production (structure and value-added of industry, investment, etc.), innovative development (expenditure on research and development, production and foreign trade of high-tech goods and services) and the social sector (government spending, employment, education) in two time periods: the oil boom (2005–2014) and the post-oil period (after 2014). It was proved that the transition from the oil boom to the post-oil period is associated with a change like cause-and-effect relationships between indicators of the development of the oil industry and several indicators of economic, innovative, and social development of Azerbaijan. Based on the identified changes in the specifics of causation, the directions of changing the priorities of state regulation of the economy in the context of overcoming inflation and ensuring the transition to an innovation-driven economy are substantiated.*

Keywords: oil boom, post-oil period, inflation, economy, structural transformations, innovations, economic regulation.

Introduction. Over the last decade, the world has undergone significant structural transformations related to the comprehensive dissemination of the concept of sustainable development and the construction of a carbon-neutral and environmentally friendly economy. The importance of preserving the environment and limiting harmful anthropogenic impacts has shifted the emphasis in economic research on efficiency analysis and growth to finding ways to reduce the carbon footprint and impact on the environment (Boutti et al., 2019). In particular, climate change has been shown to shift the focus of development in various areas of the national economy, not only in terms of welfare but also in security, including food and energy (Bhandari, 2021). These transformations, respectively, affect the development of the energy sector, leading to a comprehensive stimulation of energy production from renewable sources and a gradual reduction in energy use from fossil sources. A study by Ziabina and Kovalenko (2021) showed that current changes in the energy sector related to reducing energy production from fossil sources are only a transitional step toward building a carbon-neutral economy. However, such connections are quite complex. Thus, in particular, the price volatility analysis in carbon markets showed that the main

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determinants of price fluctuations change depending on the study period (El Amri et al., 2021). All of this indicates significant changes in the principles of functioning of national economies at different times and requires analysis to identify patterns between the same economic indicators at different times of the study. The national economy of Azerbaijan in this context is a very indicative case for analysis, given the significant role of the oil sector in its functioning at different stages of the world and national development.

Literature Review. The spread of the concept of sustainable development has led not only to the implementation of new political and economic programs but also to transforming public consciousness. In particular, purchasing only environmentally friendly products, rejecting plastic, etc., in the sharing economy are becoming more common (Yiu et al., 2020). All this has a corresponding effect on the development of the industrial economy, requiring its readjustment to new realities. Such structural transformations must acquire a global character, and the restructuring of the energy system in its ideal version should take place according to a single concept for the whole world (Knechtel, 2009).

At the same time, the impact of such a large-scale implementation of the new world economy concept will have different consequences for individual national economies. It will depend on their initial state and features of the organization of the national economy. Some studies proved that significant revenues from resource rents are a disincentive for the growth of the country's socio-economic development. For example, Biewendt (2020) found this negative effect on the example of the Human Development Index. On the other hand, transformations in the business environment are not always just a response to more environmentally conscious consumer demand. Researchers argue that the concept of socially and environmentally responsible business is spreading not only in countries with a high degree of development but is also popular in countries with economies in transition (Djalilov, 2022).

The destructive anthropogenic impact is created not only by the economic processes of heavy processing and extractive industries but also by the development of transnational trade (He, 2019). On the other hand, it is important to study the complex economic links that emerge in countries with commodity-oriented economies, in particular, to study the relationship of the extractive industry with other sectors of the economy, including through the impact on other indicators (Hassan and Abdullah, 2015). For example, Harvie and Verrucci (1991) draw attention to the fact that countries with significant development of the oil industry should pay attention not only to the potential income from the movement of natural resources but also take into account the costs incurred in this area.

Also important is the link between business innovation, in particular the energy sector, and oil prices. Thus, in the context of rising oil prices, in the energy sector, there are incentives for the transition to innovative energy-saving and renewable technologies (Cheon and Urpelainen, 2012). It reduces oil consumption and causes prices to fall due to falling demand. Accordingly, the only promising way to develop the oil industry is the introduction of innovative methods that can increase the efficiency of its operation and compensate for losses. In this context, it is also important that renewable energy and green investment have a confirmed positive impact on the country's energy efficiency and GDP growth as a whole (Pavlyk, 2020). At the same time, environmental transformations in all sectors of the economy are an integral part of the radical restructuring of the world economy (Us et al., 2020).

The post-oil period has become an indicator of the readiness of countries and individual territories for effective transformations in their economic policies. Thus, in particular, changes in global oil demand have revealed the weakness of resource-oriented economies and confirmed the need to develop and apply stabilization mechanisms to cover losses due to economic shocks in the oil industry (Tarigan et al., 2017). For example, it has been proven that the existence of oil funds could balance the losses of the national economy during periods of falling oil prices (Barkhordar and Saboohi, 2013). Such a mechanism has been used in the economy of Azerbaijan. However, modern research indicates significant imperfections in its functioning, which increases the threats to the economy's function in the post-oil period (Yücesoy, 2013).

Davudova (2022) studied the economy of Azerbaijan in the post-oil period, using monthly data on several economic indicators. This study allowed interpretation of the national economy as an open, balanced economic system only at certain analysis intervals. At the same time, it turned out to be unbalanced in other years. A study of changes in Azerbaijan's fiscal policy by Aliyev and Gasimov (2018) showed that changes in the pace of development of the oil industry significantly affected the country's fiscal policy, which in periods of large-scale oil production and sales was formed solely by resource revenues, while in the post-oil period changes in economic and fiscal policy have become inevitable. On the other hand, researchers (Mohaddes and Wtlliams, 2013) argued that the inflation policy of oil countries is also largely dependent on the oil cycle, and increasing its coordination could eliminate adverse economic shocks. At the same time, other researchers predict that at the present stage, the impact of price shocks on oil on inflation in countries would no longer be as large as in previous periods (Yücel, 2018; Ahmadov et al., 2018). It is largely due to the higher level of readiness of national economic policies for adverse trends in the global market environment.

In countries whose economies depend on oil exports, anti-inflationary policies play a significant role in ensuring the stability of the national economy. In particular, it has been shown that a floating exchange rate policy is more effective for such countries than a fixed exchange rate policy (Mashayehi, 1991). At the same time, for these countries, the specificity of the monetary policy lies in the priority of core inflation rather than in managing headline inflation (Wang et al., 2019). It should also be noted that the maximum impact of oil prices on consumer inflation expectations is observed in the post-crisis (Istiak and Alam, 2019). On the other hand, it has been proven that the central bank's focus on managing inflation can reduce its average level (Castillo et al., 2020).

Also important is that researchers have proven the effectiveness of the innovative path of development for countries with a commodity-oriented economy. For example, one of the consequences of rising world fuel prices has been the stimulation of structural transformations in the energy sector, particularly the development of bioenergy (Wonglimpiyarat, 2010). Hu et al. (2022) emphasized that oil prices have become one of the most influential factors in the development of green innovation. Li et al. (2022) consider a more complex mechanism for the relationship between oil prices and innovative economic development. Thus, the price volatility of crude oil is a determinant of environmental degradation. At the same time, technological innovation and the development of renewable energy are both a response to the effects of this impact and a precautionary measure to address threats to environmental safety. In this context, the transition to producing environmentally-friendly vehicles is also considered in response to rising prices for oil and petroleum products (He et al., 2022). In addition, it is determined that the demand for crude oil depends significantly on the volume of the industry, while economic transformations associated with the growing role of innovative technological industries reduce international trade in crude oil and, accordingly, determine the need for transformation in oil countries (Yu et al., 2022).

It is important that there are two ways of innovative development in the oil and gas industry. The first way is forced technological and production innovations in response to the strengthening of environmental regulation by the state or international organizations, and the second way is an attempt to gain additional competitive advantages by increasing the internal and external efficiency of processes in the company (Ford et al., 2014). Radnejad et al. (2017) argued that the transition to an open innovation model allows oil companies to effectively meet the challenges of the external market and regulatory environment. In addition, with increasing levels of innovation in oil consumers due to rising fuel prices, traditional business models are becoming inefficient (Crabb and Johnson, 2010). One of the main directions of innovative development in the oil refining industry is its decarbonization to reduce environmental harm (Griffiths et al., 2022). Thus, oil countries should aim not only to replace one source of income with another but to make significant transformations in technologies and approaches to the organization of the national

economy (Al-Qudsi, 2008). Thus, in particular, the production industry needs to be transformed and the approaches to business organization and management (Eliasson, 2005).

Methodology and research methods. The study provides for the determination of dynamic, structural, and causal patterns of the development of the national economy of Azerbaijan during the oil boom and post-oil period. In the first stage, a dynamic and structural analysis of statistical indicators of Azerbaijan's economic development over the past 20 years aimed at identifying key trends in the national economy under the influence of global changes in oil demand. Graphic analysis was chosen as the research method. Thus, the first stage provides an analysis of the following areas of economic development of Azerbaijan over the past 20 years: 1) the dynamics of crude oil prices; 2) the structure of value-added in the economy – the ratio of shares of value-added created in the industry, agriculture, and services; 3) the dynamics of value-added created in production, as well as the ratio of value-added created in the main industries; 4) the structure of employment in the economy of Azerbaijan – the ratio of shares employed in industry, agriculture, and services; 5) characteristics of Azerbaijan's exports – indicators of exports of fuel resources, which reflects the traditional export for the economy, as well as high-tech exports, which characterizes innovative development; 6) indicators of the balance of international trade in absolute and relative terms; 7) parameters of inflationary development of Azerbaijan's economy.

The second stage involved the construction of causal relationships between the indicators of the oil industry and the main indicators that characterize inflation in the national economy of Azerbaijan, as well as the parameters of its economic and social sectors. Two defining periods were chosen for the calculations – the oil boom period (2005-2014) and the post-oil period (2015-2020).

Three parameters that are factor variables in the constructed econometric models are selected as indicators characterizing the development of the oil sector: 1) Azerbaijan's Crude Oil Production, barrels/day – OilProd; 2) Crude oil prices, $ per barrel – OilPrice; 3) Crude Oil Exports for Azerbaijan – OilExport.

To characterize inflationary processes in the economy of Azerbaijan, three indicators (dependent variables) were selected: 1) Consumer price index (2010 = 100) – CPI; 2) Inflation, consumer prices (annual %) – Infl_CP; 3) Inflation, GDP deflator (annual %) – Deflator.

Economic processes were assessed using a sample of 12 indicators (dependent variables): 1) Adjusted net national income (annual % growth) – Income_growth; 2) GDP (current US$) – GDP; 3) GDP growth (annual %) – GDP_growth; 4) Gross value added at basic prices (GVA) (constant 2015 US$) – GVA; 5) Agriculture, forestry, and fishing, value added (% of GDP) – Agr_VA; 6) Industry (including construction), value added (% of GDP) – In_VA; 7) Services, value added (% of GDP) – Serv_VA; 8) Foreign direct investment, net inflows (% of GDP) – FDI_infl; 9) Foreign direct investment, net outflows (% of GDP) – FDI_outfl; 10) New businesses registered (number) – New_Bus; 11) New business density (new registrations per 1,000 people ages 15-64) – New_Bus_D.

Direction of innovative development is presented by 10 indicators (dependent variables): 1) Research and development expenditure (% of GDP) – R&D; 2) ICT goods exports (% of total goods exports) – ICT_exp; 3) ICT goods imports (% total goods imports) – ICT_imp; 4) Computer, communications and other services (% of commercial service imports) – Com_imp; 5) Computer, communications and other services (% of commercial service exports) – Com_exp; 6) High-technology exports (% of manufactured exports) – HT_exp; 7) Medium and high-tech exports (% manufactured exports) – MHT_exp; 8) Medium and high-tech manufacturing value added (% manufacturing value added) – MHT_VA; 9) Patent applications, nonresidents – Pat_nr; 10) Patent applications, residents – Pat_r.

To characterize the social sector, 8 indicators (dependent variables) were selected: 1) Domestic general government health expenditure (% of GDP) – Health_Exp; 2) Domestic general government health expenditure per capita (current US$) – Health_ExpPC; 3) Government expenditure on education, total (% of GDP) – Ed_EXp; 4) Government expenditure on education, total (% of government expenditure) –

Ed_GovExp; 5) Unemployment with intermediate education (% of the total labor force with intermediate education) – Unempl_IE; 6) Unemployment with basic education (% of the total labor force with basic education) – Unempl_BE; 7) Unemployment with advanced education (% of the total labor force with advanced education) – Unempl_AE; 8) Unemployment, total (% of the total labor force) (modeled ILO estimate) – Unempl.

In order to describe the causal relationships that occur between the studied variables, the method of regression modeling was chosen. The specification of the regression model with autocorrelation of the standard error by the Newey West method was chosen considering the specifics of the input statistics. The calculations involve constructing a set of one-factor statistical relationships that allow assessing the impact of each specific indicator of the development of the oil industry on specific indicators of inflation, economic and innovative development, and the social sector. Thus, 9 independent regression equations were constructed to assess the impact of oil industry development factors on inflation. In turn, 33 independent regression equations were built to assess the impact on economic development indicators, 30 independent regression equations – to assess the impact on innovation development, and 24 independent regression equations – to assess the impact on the functioning of the social sector. The study involved the construction of two sets of independent regression equations separately for each study period.

Results. Global energy policy trends have changed significantly in recent decades. Thus, Figure 1 shows the dynamic trend of world crude oil prices. In particular, there was a gradual dynamic growth of price indicators from 2000 to 2008, which was replaced by a sharp decline in 2008, due in part to the impact of the global financial crisis.

— Crude oil prices, $ per barrel
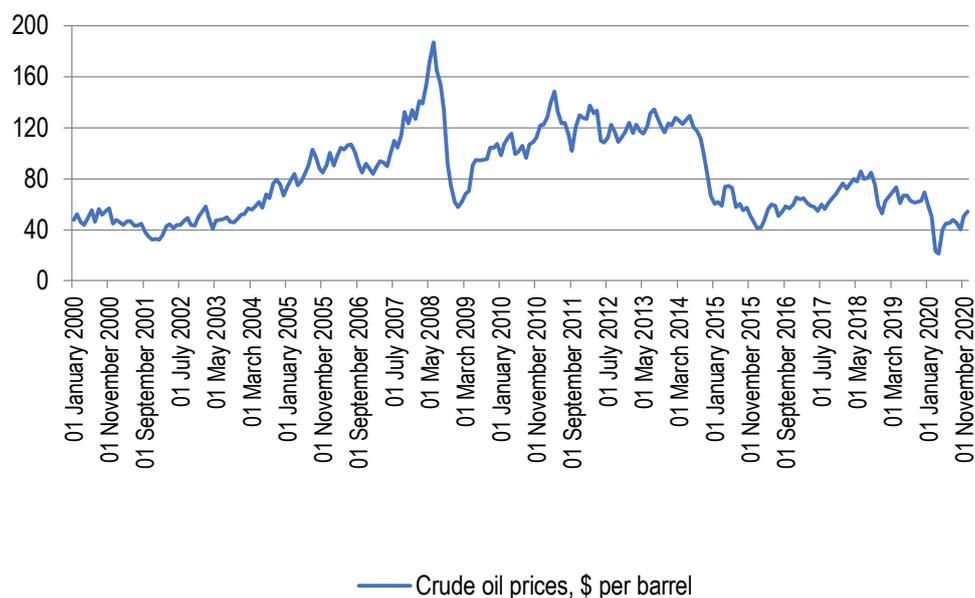
Figure 1. Crude oil prices per barrel during 2000-2020
Sources: developed by the authors based on the Macrotrends LLC data.

The next wave of the upward trend was observed in 2009-2014. In this period, the growth is more moderate and is accompanied by periodic price fluctuations. At the same time, starting from 2014-2015,

the general trend is declining, which is a consequence of the globalization of sustainable development policy and the transformation of energy policy, which is associated with declining demand for fossil energy sources.

Global fluctuations in oil prices have impacted the economies of countries with significant oil production. In this context, the economy of Azerbaijan should be considered, for which the oil sector plays a leading role, providing most of the country's revenues. At the same time, the country's economy must be as diversified as possible for balanced long-term development, avoiding negative economic shocks. Thus, the analysis of the structure of value-added created in Azerbaijan's economy over the past 20 years (Figure 2) showed certain dynamic changes. Thus, in the early 2000s, the industry provided about 50% of value-added in the economy. From 2000 to 2008, there was an increase in the share of value-added created in the industry. Noteworthy here, it correlates with world indicators of rising prices and demand for oil. At the same time, since 2009, there has been a gradual reduction in the value-added created in the industry. In contrast, the reverse trend is characterized by the services sector, while the agricultural sector has gradually reduced the value-added. As of the end of 2020, the share of value-added in the industry fell to the level of 2000. Herewith the value-added of the agricultural sector was about 5% of GDP, while the value-added of the services sector reached its historical maximum.

■ Industry (including construction), value added, % of GDP

■ Services, value added, % of GDP

■ Agriculture, forestry, and fishing, value added, % of GDP
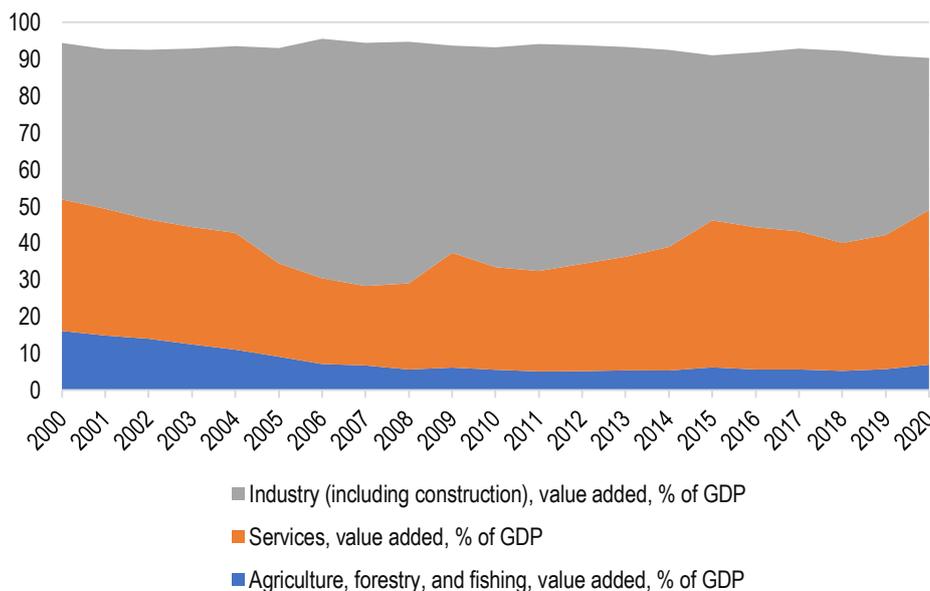
Figure 2. Structure of value-added in Azerbaijan's economy during 2000-2020
Sources: developed by the authors based on the World Bank's data.

On the other hand, the need to analyze the manufacturing industry in the country, the development of which illustrates the ability of the national economy to create a finished product and meet internal and external needs. Thus, the data in Figure 3 show the manufacturing industry's low development in Azerbaijan's economy. Thus, the total share of value-added created in the manufacturing industry throughout the study period does not exceed 10% of GDP. Moreover, since 2004 there has been a permanent reduction in this indicator. Over the past 10 years, the manufacturing industry's value-added has not exceeded 5% of GDP. At the same time, the most significant role in the manufacturing industry is

occupied by the food industry. In some periods, the share of value-added from food, beverages and tobacco in this sector reached about 40% of the value-added of the manufacturing industry. In second place in the structure of Azerbaijan's manufacturing industry is the machine-building industry, providing 10-15% of the value-added of the country's manufacturing industry. It is also possible to note rather stable rates of development in the chemical industry – the added value created in this sector fluctuates at 5-7% of the added value of the manufacturing industry. At the same time, the textile and clothing industry is permanently 2-4% of the value-added of the manufacturing industry. The rest of the value-added is occupied by other sectors.

Textiles and clothing, % of value added in manufacturing

Chemicals, % of value added in manufacturing

Food, beverages and tobacco, % of value added in manufacturing

Machinery and transport equipment, % of value added in manufacturing

Other manufacturing, % of value added in manufacturing

Manufacturing, value added, % of GDP
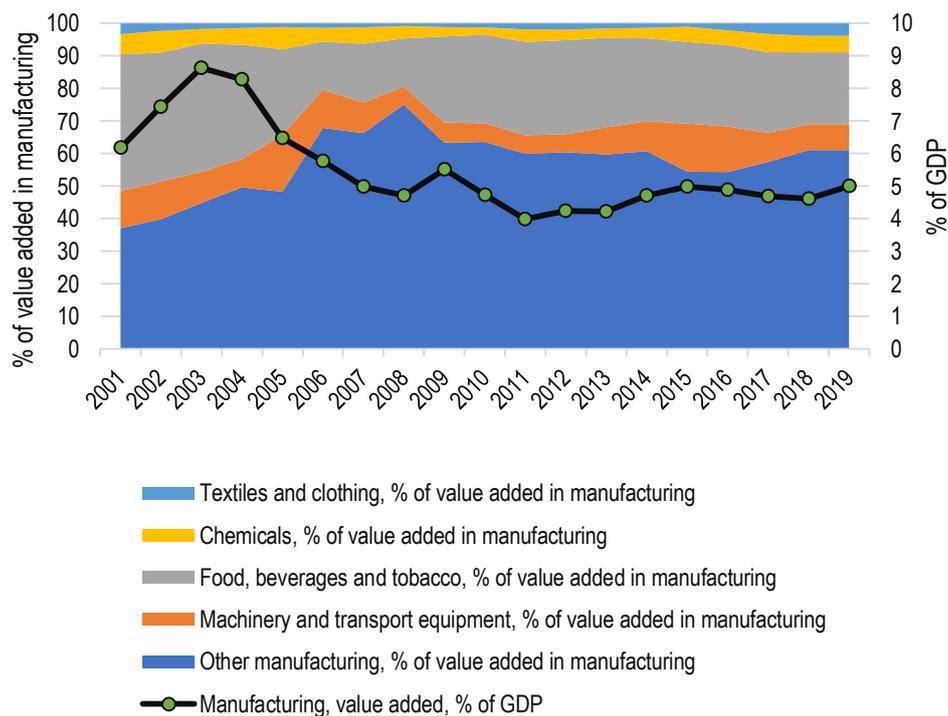
Figure 3. Dynamics and structure of manufacturing in Azerbaijan's economy during 2001-2019
Sources: developed by the authors' on the World Bank's data.

In order to ensure the balanced development of the country, it is important not only to diversify its production activities but also to ensure employment of the country's population, which would build the potential for long-term development. Figure 4 shows the structure of employment in the economy of Azerbaijan. Thus, over the past 20 years, most of the country's population (50%) has been employed in the service sector. In the second place is the share of the population employed in the agricultural sector – during the study period, the employment rate ranges from 35 to 40% of total employment. Indicative is that industry employment is the lowest – the maximum figure for 20 years does not reach even 15%. Taking into account the results of the previous analysis, this confirms that Azerbaijan's crude oil economy has significant risks to the country's well-being, especially in the current conditions of transformation of world energy priorities.
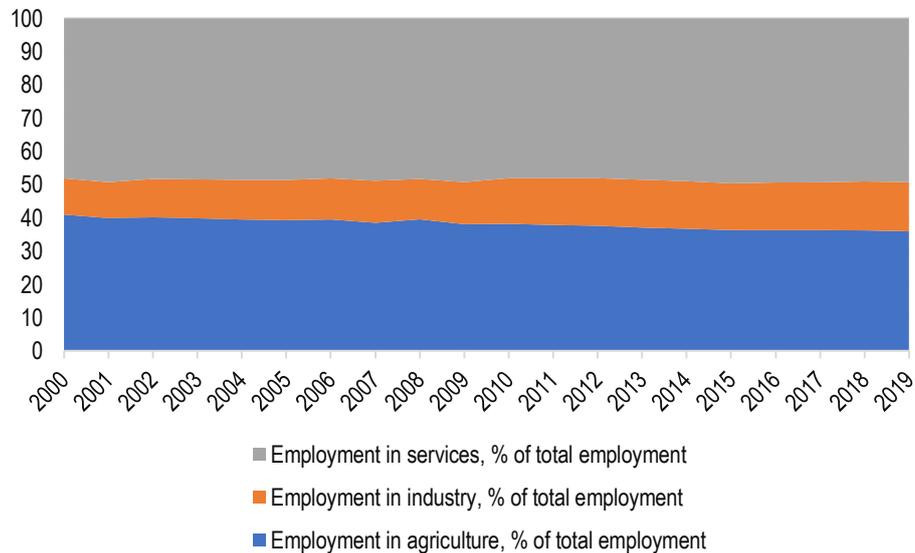
Figure 4. Structure of employment in Azerbaijan's economy during 2000-2020
Sources: developed by the authors' on the World Bank's data.

Despite quite significant transformations within the economy and in the world environment, it should be noted that the structure of Azerbaijan's exports has hardly changed over the past 20 years (Figure 5). Thus, fuel exports remain dominant, while exports of high-tech goods are at an extremely low level. It indicates a low level of global competitiveness of the country in modern conditions.
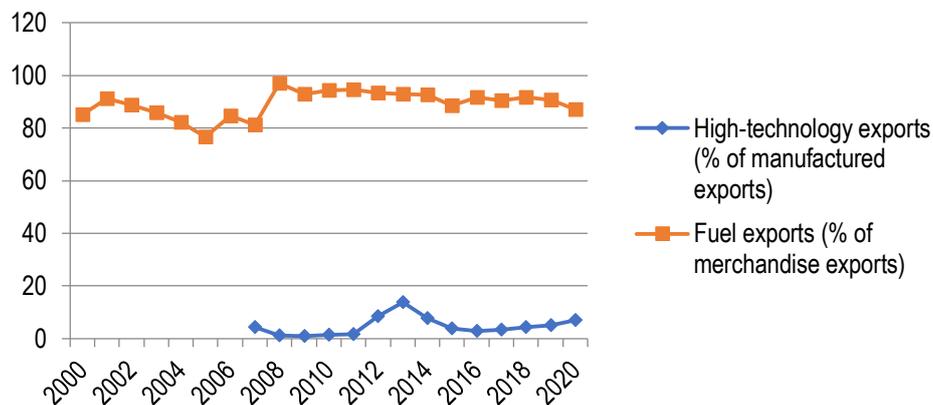
Figure 5. Dynamics and structure of export in Azerbaijan's economy during 2000-2020
Sources: developed by the authors' on the World Bank's data.

Global transformations of the oil sector have significantly affected not only the internal indicators of Azerbaijan's economy but also the indicators of its international trade. Figure 6 shows that during the oil boom, the economy of Azerbaijan was characterized by positive values of the balance of payments in

absolute and relative terms. At the same time, there was a sharp decline in these parameters after 2014. Besides, in some years, the balance of payments becomes negative.
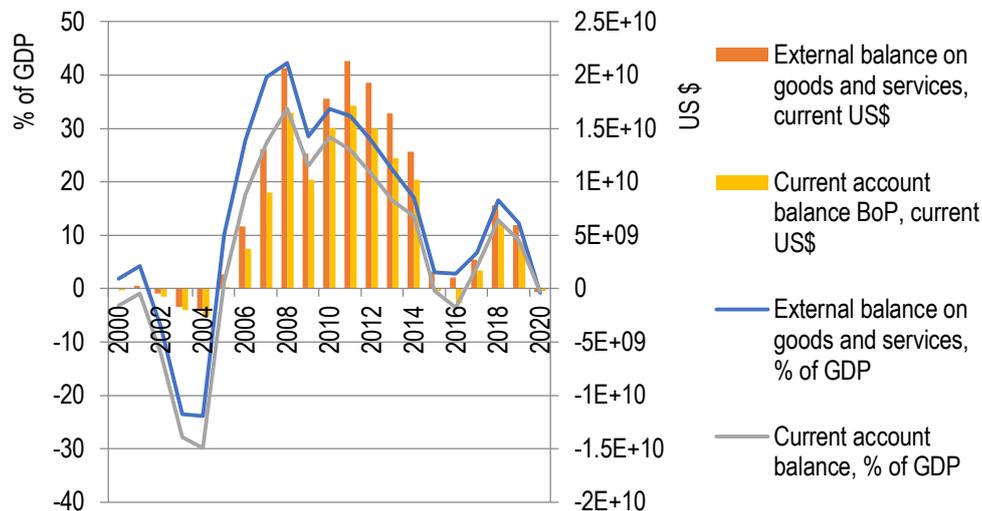
Figure 6. Dynamics of indicators of international trade of Azerbaijan's economy during 2000-2020
Sources: developed by the authors' on the World Bank's data.

Another important indicator that characterizes the economic consequences of change and transformation is the level of inflation. Figure 7 presents the main indicators of the characteristics of inflationary processes that have taken place in the economy of Azerbaijan over the past 20 years.
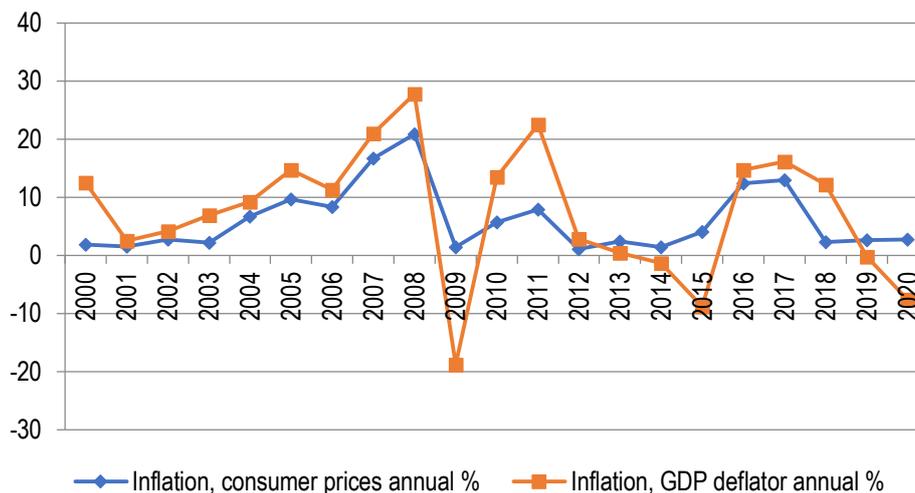
Figure 7. Dynamics of inflation level in Azerbaijan's economy during 2000-2020
Sources: developed by the authors' on the World Bank's data.

Thus, the economy of Azerbaijan over the past 20 years has been characterized by three periods of inflationary fluctuations. The first period of 2000-2008 saw a gradual increase in inflation in the economy. It is important that it is during these years that the period of the oil boom begins. The second wave is typical for 2008-2014 and is accompanied by the greatest volatility within this period. The third wave occurs in the post-oil period. There was a decrease in inflation at the beginning of this period. Then, it was accompanied by a gradual increase in inflation and a certain decrease by the end of the analyzed period.

Certain transformations indicate the inevitability of changes in Azerbaijan's economic policy in the post-oil period. At the same time, to determine the current priorities of economic policy, it is necessary to assess the features of the relationship between economic processes under the influence of structural transformations. In order to conduct the assessment, modeling of regression relationships between indicators of oil industry development, parameters of inflation, production, and social sectors was performed. Table 1 presents the results of modeling the impact of oil production and sales on inflation in the economy of Azerbaijan during the oil boom and post-oil period. The table contains the coefficients of influence of three independent variables of the oil industry development on three parameters that characterize the inflationary processes obtained by constructing 18 independent regression one-factor equations.

Table 1. Results of the assessment of the impact of oil industry development on the country's inflation level in Azerbaijan for 2005–2020

Variable	2005-2014			2015-2020		
	OilProd	OilPrice	OilExport	OilProd	OilPrice	OilExport
CPI	0.073***	0.766*	0.000***	-0.225**	-0.042	-0.000**
	(0.0063)	(0.0599)	(0.0022)	(0.0308)	(0.9515)	(0.0382)
Infl_CP	-0.004	0.091	-6.43e-06	0.035	-0.085	0.000
	(0.6039)	(0.5660)	(0.2837)	(0.2307)	(0.709)	(0.2315)
Deflator	-0.0181	0.366	-0.000	0.061	0.426	0.000
	(0.4872)	(0.2726)	(0.4362)	(0.5107)	(0.1801)	(0.515)

Notes: *** – statistical significance at the 99 % (Wald criterion); ** – statistical significance at the 95 %; * – statistical significance at the 90 %; values of Prob > F are presented in parentheses.

Sources: developed by the authors.

Evaluations performed at different time intervals indicate some differences in causation. Thus, in particular, during periods of the oil boom, there is an increase in the consumer price index due to rising oil production and exports and in response to rising crude oil prices. On the other hand, slightly different results are observed in the post-oil period. Thus, in particular, the response to oil production and export growth is a reduction in inflation in the economy, measured by the consumer price index. At the same time, the relationship between oil prices and consumer prices was statistically insignificant. It is also important that the direct relationship between the parameters of the oil sector and inflation, as measured by annual consumer price inflation and GDP deflator growth, was not confirmed in the models – adequacy criteria were insufficient to draw definitive conclusions.

The next stage of the study, conducted to identify the dependence of the parameters of Azerbaijan's economic development on the oil sector's performance, revealed the results presented in Table 2. At this stage, 33 independent one-factor regression equations were constructed for each study period. Table 2 contains the coefficients of influence of the parameters of the oil industry on the indicators of Azerbaijan's economic development. Thus, the first generalizing indicator of economic development is national income growth. Importantly, its dependence on oil production and exports has been reversed during the oil boom and post-oil period.

On the other hand, it is important that the increase in oil prices had a positive impact on the growth of Azerbaijan's national income in the post-oil period, while the period of the oil boom did not have a significant impact on the studied indicator. The next studied parameter was GDP in its absolute measure and terms of annual growth. Thus, during the oil boom, the growth of price and quantitative indicators of the oil sector had a positive effect on the size of gross domestic product in absolute terms. In contrast, the rapid development of the oil sector was a limiting factor for annual GDP growth. At the same time, in the post-oil period, the only relevant indicator of the impact on the country's GDP was the level of crude oil prices, and its role was stimulating both the growth of absolute GDP and ensuring its annual growth.

Table 2. Results of the assessment of the impact of oil industry development on the economic indicators in Azerbaijan (2005–2020)

Variable	2005-2014			2015-2020		
	OilProd	OilPrice	OilExport	OilProd	OilPrice	OilExport
Income_growth	-0.0506*	-0.0702	-0.000*	-0.372*	1.851*	-0.001**
	(0.0552)	(0.8011)	(0.0522)	(0.0595)	(0.0607)	(0.0168)
GDP	7.22e+07**	9.48e+08**	79869.83**	1.43e+07	2.28e+08*	18241.33
	(0.0368)	(0.0359)	(0.0150)	(0.7386)	(0.0926)	(0.7413)
GDP_growth	-0.047***	-0.449*	-0.000***	0.014	0.223**	0.000
	(0.0069)	(0.0682)	(0.0055)	(0.5358)	(0.0165)	(0.522)
GVA	4.12e+07***	3.25e+08	43687.18***	3257567	4.55e+07	5302.772
	(0.0013)	(0.1374)	(0.0003)	(0.6021)	(0.1190)	(0.4465)
Agr_VA	-0.006**	-0.057**	-6.12e-06***	-0.005	-0.048**	-6.64e-06
	(0.0108)	(0.0504)	(0.0050)	(0.3049)	(0.0174)	(0.2639)
In_VA	-0.001	0.055	-1.87e-06	0.023	0.320***	0.000
	(0.9079)	(0.4544)	(0.7814)	(0.4706)	(0.0012)	(0.4554)
Serv_VA	0.007	0.009	7.84e-06*	-0.011	-0.223***	-0.000
	(0.1172)	(0.9092)	(0.0653)	(0.6250)	(0.0001)	(0.5835)
FDI_infl	-0.049***	-0.360	-0.000***	0.0050**	-0.023	0.000**
	(0.0004)	(0.1402)	(0.0002)	(0.0244)	(0.9168)	(0.0256)
FDI_outfl	-0.047***	-0.396	-0.000***	0.024***	0.043	0.000***
	(0.0001)	(0.1013)	(0.0001)	(0.0092)	(0.7103)	(0.0022)
New_Bus	-10.195*	29.945	-0.013**	-28.578	145.979	-0.0318
	(0.0838)	(0.2185)	(0.0278)	(0.3815)	(0.1630)	(0.4092)
New_Bus_D	-0.001	0.005	-1.73e-06**	-0.004	0.0209	-4.38e-06
	(0.1256)	(0.2582)	(0.0423)	(0.3938)	(0.1530)	(0.4224)

Notes: *** – statistical significance at the 99 % (Wald criterion); ** – statistical significance at the 95 %; * – statistical significance at the 90 %; values of Prob > F are presented in parentheses.

Sources: developed by the authors.

Attention should also be paid to the relationship between the parameters of the oil sector development and the indicators of value-added in the economy. Thus, in particular, oil production and exports naturally caused an increase in gross value added in the country during the oil boom while causing a reduction in value-added created in the agricultural sector. At the same time, in the post-oil period, only the impact of crude oil prices was relevant - its growth provided a reduction in value-added in the agricultural sector and services while causing an increase in value-added in industry.

The next important area of research was to study the impact of oil industry development on investment indicators. The identified patterns are interesting - in periods of the oil boom, the growth of oil production and exports was a restraining factor for the movement of investment flows. In contrast, in the post-oil period, the dependencies are opposite. During the oil boom, the development of the oil industry also had

a disincentive effect on starting a new business. In the post-oil period, indicators of the development of the oil sector have ceased to be determinants of the business environment.

Table 3 summarizes the coefficients of influence of the parameters of the oil industry development on the indicators of innovative development of Azerbaijan, obtained by building 30 one-factor regression models for each stage of the study. In contrast, it was in the post-oil period that the oil industry became an incentive to innovate. In particular, oil production and sales growth have become a significant incentive to increase spending on research and development, while rising prices have become a stimulus.

Table 3. Results of the assessment of the impact of oil industry development on the indicators of innovative development in Azerbaijan (2005–2020)

Variable	2005-2014			2015-2020		
	OilProd	OilPrice	OilExport	OilProd	OilPrice	OilExport
R&D	0.000	-0.001	3.50e-08	0.001***	-0.001*	6.17e-07**
	(0.6639)	(0.2567)	(0.5972)	(0.0066)	(0.0766)	(0.0442)
ICT_exp	-0.000**	-0.000	-8.55e-08**	-0.001*	-0.0035	-7.95e-07**
	(0.0273)	(0.3413)	(0.0125)	(0.0803)	(0.1405)	(0.0533)
ICT_imp	0.002	-0.044**	1.47e-06	-0.017***	-0.029	-0.000***
	(0.5962)	(0.0372)	(0.7186)	(0.0015)	(0.6797)	(0.0000)
Com_Imp	-0.012	-0.199	-0.000	-0.047	-0.748***	-0.000
	(0.6413)	(0.4426)	(0.2397)	(0.4909)	(0.0003)	(0.4354)
Com_Exp	0.056	-0.345	0.000	-0.071***	-0.124	-0.000***
	(0.1433)	(0.1131)	(0.1957)	(0.0012)	(0.5833)	(0.0005)
HT_Exp	-0.042**	0.077	-0.000**	-0.021**	-0.062	-0.000***
	(0.0136)	(0.5142)	(0.0127)	(0.0162)	(0.4334)	(0.0093)
MHT_exp	0.003	0.013	8.81e-06	-0.098	-0.077	-0.000
	(0.3239)	(0.7752)	(0.1574)	(0.1349)	(0.7202)	(0.3190)
MHT_VA	-0.032**	-0.117	-0.000**	0.154***	-0.569*	0.000***
	(0.011)	(0.3106)	(0.0014)	(0.0022)	(0.0723)	(0.0006)
Pat_nr	0.012	-0.0157**	0.000	0.005	-0.032	6.28e-06
	(0.4371)	(0.0393)	(0.4053)	(0.6433)	(0.7814)	(0.5489)
Pat_r	0.143	-2.073**	0.000	0.449**	2.131	0.001*
	(0.4252)	(0.051)	(0.5780)	(0.0429)	(0.2196)	(0.0790)

Notes: *** – statistical significance at the 99 % (Wald criterion); ** – statistical significance at the 95 %; * – statistical significance at the 90 %; values of Prob > F are presented in parentheses.

Sources: developed by the authors.

The next important indicator of the degree of innovative development of the economy is the growth of high-tech exports. Table 3 shows that both in the period of the oil boom and in the post-oil period, the intensity of the oil industry was a disincentive for the high-tech export dynamics. On the other hand, in the post-oil period, the growth of oil production and exports also led to corresponding reductions in the indicators of imports of ICT goods. Exports and imports of computer and communication services did not depend on the development of the oil industry during the oil boom. At the same time, there was a partial disincentive effect in the post-oil period. It is also quite natural that the growth of oil production and exports limited high-tech exports from Azerbaijan. At the same time, it is interesting that during the oil boom, the increase in oil production and exports limited the value-added created in the technological production sector. Still, in the post-oil period, the increase in oil production and exports stimulated the technology industry. It should be noted that in the post-oil period, the growth of the scale of the oil industry was an incentive for the registration of patents by residents of the Azerbaijani economy.

The last block of the study includes the identification of the dependences of the oil industry development with the parameters of the social sector. Table 4 contains generalized data on the impact factors obtained from 48 constructed independent one-factor regression models.

Table 4. Results of the assessment of the impact of oil industry development on the social indicators in Azerbaijan (2005–2020)

Variable	2005-2014			2015-2020		
	OilProd	OilPrice	OilExport	OilProd	OilPrice	OilExport
Health_Exp	0.000*	-0.000	2.77e-07**	0.001	-0.011	1.71e-06
	(0.0796)	(0.9053)	(0.0482)	(0.8199)	(0.2035)	(0.5920)
Health_ExpPC	0.084**	0.950*	0.000***	0.056	-0.209	0.000
	(0.0217)	(0.0961)	(0.0077)	(0.7968)	(0.7839)	(0.6875)
Ed_Exp	-0.000	-0.015***	-9.75e-08	0.003	-0.022**	5.80e-06
	(0.9813)	(0.0075)	(0.9041)	(0.2364)	(0.0109)	(0.1044)
Ed_GovExp	-0.008*	-0.107**	-8.34e-06**	-0.015*	-0.094*	-0.000
	(0.0799)	(0.0198)	(0.0486)	(0.0877)	(0.0683)	(0.1042)
Unempl	-0.003**	-0.029*	-3.10e-06***	-0.007	-0.047	-9.67e-06*
	(0.0135)	(0.0859)	(0.005)	(0.1119)	(0.1103)	(0.0748)
Unempl_BE	-0.006	0.195	-0.000	-0.036**	-0.151	-0.000**
	(0.7002)	(0.1356)	(0.3553)	(0.0122)	(0.2956)	(0.0201)
Unempl_IE	-0.000	0.000	-2.42e-06	-0.012***	-0.058	-0.000**
	(0.9702)	(0.9979)	(0.6222)	(0.0089)	(0.1857)	(0.0198)
Unempl_AE	0.009**	-0.044	0.000***	-0.009*	-0.056*	-0.000*
	(0.0336)	(0.1798)	(0.0070)	(0.0748)	(0.0809)	(0.0922)

Notes: *** – statistical significance at the 99 % (Wald criterion); ** – statistical significance at the 95 %; * – statistical significance at the 90 %; values of Prob > F are presented in parentheses.
Sources: developed by the authors.

Thus, important indicators of social sector development are indicators of public spending on education and medicine. The findings showed that during the oil boom, the growth of oil production and exports positively impacted public spending on health both per capita and relative to the share of public spending in this area in the overall cost structure. At the same time, in the post-oil period, health care expenditures were not determined by the development of the oil industry. The impact of the intensity of the oil sector on the public funding parameters for education must be reversed in the oil boom and the post-oil periods.

The fact that the growth of all indicators of the development of the oil industry during the oil boom was an incentive to reduce overall unemployment was also positively assessed. In the post-oil period, only the growth of oil exports had such a positive effect. It should be noted that during the oil boom, oil production and export growth led to rising unemployment among workers with higher education. On the other hand, in the post-oil period, the increase in oil production and exports was an incentive to reduce the unemployment of people with different levels of education. In addition, the rise in crude oil prices was a determinant of the reduction in unemployment of the population with higher education in Azerbaijan in the post-oil period.

Conclusions and directions of further research. The study showed that the global energy sector's structural transformations significantly impacted the economies of countries rich in fuel resources. Thus, in particular, Azerbaijan's economy was characterized by significant economic and social transformations. At the same time, the development of the oil sector has significantly affected the functioning of other sectors of the national economy. It is important that during the oil boom, this impact was mostly positive - that is, the development of the oil industry was the driving force behind the functioning of the Azerbaijani economy. At the same time, in the post-oil period, structural transformations in the economy led to the

formation of new economic relationships. Thus, the growth of parameters of the oil industry led not only to a direct increase in economic indicators that depended on funds from oil sales but created incentives for innovative development of other areas of the national economy. Thus, in particular, it was found that in the post-oil period, the growth of oil production and exports had a proportional effect on the growth of value-added in the technology industry. At the same time, exports of technological goods in similar conditions continue to decline. It points to the fact that the country needs the support of high-tech industries in terms of financial incentives and in the context of organizational support. At the same time, the positive impact on the growth of research and development costs along with the growth of patents in the post-oil period under the influence of increased oil production and exports indicates a redistribution of financial flows that should be maintained, ensuring long-term transformation in the national economy.

On the other hand, the fact that exports and imports of high-tech goods and services are limited in Azerbaijan's economy is worrying. This restrains technological and innovation processes in the country and prevents other sectors of the economy from developing in line with global trends. Accordingly, the state policy of foreign trade priorities needs to be revised to increase the compliance of Azerbaijan's national economic standards with international requirements.

Future research is to conduct an inter-country analysis of the restructuring of the economy and the adaptation of national anti-inflationary policies in the post-oil period. It is also essential to identify the transmission links between the functioning of the oil industry and the opportunities for transition to an innovation-oriented economy.

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Післянафтовий період в Азербайджані: економічні трансформації, антиінфляційна політика та управління інноваціями

Для економіки Азербайджану притаманним є постійна значна залежність від нафтової індустрії. Так, саме доходи від видобутку та продажу нафти й нафтопродуктів забезпечували економічне зростання та фінансування всіх споживчих потреб. Однак, перехід від нафтового буму до поступового спаду нафтової промисловості обумовив досить серйозні економічні шоки та визначив необхідність значних структурних трансформацій в національній економіці. Мета статті полягає в дослідженні

потенціалу інноваційного розвитку економіки Азербайджану у пост нафтовий період та визначення пріоритетів антиінфляційної політики держави. Для перевірки гіпотези про необхідність зміни пріоритетів економічного регулювання та антиінфляційної політики було проведено динамічний та структурний аналіз основних показників розвитку економіки Азербайджану (виробництво, зайнятість, експорт, інфляція, платіжний баланс, державні витрати тощо) у період нафтового буму та постнафтовий період. Було ідентифіковано структурні трансформації в економіці Азербайджану, що відбувались протягом останніх 20 років, що дозволило висунути гіпотезу щодо впливу світового попиту на нафту на основні параметри національного господарства країни. За допомогою регресійного аналізу за методом Ньюї Веста (для даних часового ряду) виявлено специфіку взаємозв'язків ключових індикаторів розвитку нафтової промисловості (обсяги видобутку та реалізації нафти, ціни на нафту), інфляції (споживчі ціни, обмінний курс), виробництва (структура та додана вартість промисловості, інвестиції тощо), інноваційного розвитку (витрати на дослідження та розробки, виробництво та зовнішня торгівля високотехнологічними товарами та послугами) та соціального сектору (державні витрати, зайнятість, освіта) на двох часових проміжках: нафтового буму (2005–2014 рр.) та постнафтовому періоді (після 2014 р.). У ході дослідження доведено, що перехід від нафтового буму до постнафтового періоду пов'язаний зі зміною характеру причинно-наслідкових залежностей між показниками розвитку нафтової промисловості та рядом індикаторів економічного, інноваційного та соціального розвитку Азербайджану. На основі виявлених змін у специфіці причинно-наслідкових зв'язків обґрунтовано напрямки зміни пріоритетів державного регулювання економіки в контексті подолання інфляційних процесів та забезпечення переходу до інноваційно-керованої економіки.

Ключові слова: нафтовий бум, пост нафтовий період, інфляція, економіка, структурні трансформації, інновації, економічне регулювання.