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INVESTMENT CLIMATE AS A FACTOR OF INDUSTRIAL DEVELOPMENT IN UKRAINE

The article deals with the provision of industrial development based the attraction of investment depending on the changing characteristics of the investment climate. Since the problems of stagnation of the industrial production, its low productivity, excessive financial vulnerability (in view of high debt dependence and low solvency of the sector's companies), capital losses, and the level of profitability, which is insufficient for reproduction, all remain relevant, the study offers those means of their solution that are related to attracting investments and improving the investment climate.

The author highlights essential aspects of the investment climate and its impact on attracting investment in the industrial development. Conducted a comparative analysis of the indicators of industrial activities depending on the characteristics of the investment climate on the example of reference groups of foreign countries and Ukraine, which revealed various problematic aspects of the conditions of investment in Ukrainian industry. A set of econometric models was developed with whose help the author substantiates the effect of the system of factors of the investment climate (namely: macroeconomic stability, development level of the goods, financial and labor markets, innovative activities and technological transfer) on the industrial development and assesses the changes caused by the long term shifts in the parameters of the industrial system.

The author shows the feasibility of implementing a comprehensive approach to improving investment conditions with the use of various public policy instruments that determine the investment climate (including macroeconomic, monetary, and scientific and innovation policies as well as policies of the expansion of product inlets and regulation of the labor market) to ensure industrial development. In particular, in the context of the support of innovation, the article proposes the application of smart specialization strategies, which envisages modernization and diversification of regional industrial potential, and enhancing their entrepreneurial capabilities based on the introduction of technological innovations.

Keywords*: investment climate, industrial development, attraction of investment, macroeconomic stability, financial market, credit resources, domestic market, exports, imports, innovation, technological transfer, labor market, wages*

Evaluating the readiness of 100 countries for the new industrial revolution, the World Economic Forum recognizes as its engines: technology and innovation pro-

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gress, human capital, global investment and trade, institutional environment, sustainable manufacture and demand [1]. The countries that are recognized as better prepared for the future (namely Japan, South Korea, Germany, China, the Czech Republic, and the USA), are leading the world in terms of their industrial potential. The quality of business environment in these countries differs from that of the other ones with a high level of economic productivity and long-term growth and consequently an increasing competitiveness [2].

In terms of readiness for the new industrial revolution, Ukraine was included in a group of countries with small volumes and a simplified structure of production, where de-industrialization has not been overcome and opportunities for industrial restructuring are only emerging. The report rates this country's current production base as limited, unfavorable for development and at risk in the future. Production technologies are inefficient and they slow down labor productivity: the output produced by a Ukrainian worker during a year, is produced by a German worker during just 17 days [3]. The weak ability of Ukraine's economy to increase productivity and grow does not allow the country to rise from the 81st position to at least the middle of the world classification of competitiveness. A $600 billion investment in Ukraine's economy could change the situation for better [4], while the actual amount of capital investment did not exceed $16-21 billion a year in 2017-2018 [5]. The large gap in investment support of the Ukrainian economy is caused by numerous problems that hinder doing business and increase inventors' risks [6]. Therefore, the issue of improving investment climate to provide investment for the development of national industry and the economy in general needs urgent solution.

The purpose of this article is to identify the impact of the system of investment climate factors on industrial development and to evaluate possible changes in industrial output depending on changes in the parameters of this system, as well as to justify the feasibility of implementing a comprehensive approach using various instruments of state economic policy to promote industrial development through the recovery of investment climate.

Investment climate: approaches to studying and evaluating

The topic of investment climate is considered globally and nationally in the context of ensuring inclusive sustainable development based on long-term investment. Due to the necessity to meet the investment needs arising from the new industrial revolution and changing manufacturing structure in the world, many investment climate studies are conducted under the auspices of international organizations (UN [7, 8], World Bank [9], International Monetary Fund [10], OECD [11]) and national government agencies (for example, government departments in various countries monitor the investment climate in the interests of national businesses, analyze opportunities for investment and market expansion for domestic producers [12]. Based on observations from over 150 countries, it was proved that the government's investment promoting activities significantly increase capital investment in national economy [13]. These observations are targeted at the request of private investors, including foreign direct investors, as well as investment recipient countries, especially those countries that are undergoing market transformations. Studying and generalizing global and regional investment trends and international and national investment policies enables to diagnose the investment climate, to identify barriers to business

activity, to forecast prospects for investment processes, to provide important information to business community and national governments, and to formulate comprehensive reform proposals and application of appropriate tools for improving conditions for private investment.

Investigations of investment climate within national borders are often focused on detecting the effects of changing its characteristics and are conducted from the perspective of promoting investment to provide the economy with dynamism, support for industrial development, technological modernization and structural diversification, and increase public welfare. Particular attention is paid to developing countries, as it is more difficult for them to withstand the pressure of ever-increasing globalization. Thus, a comprehensive study of investment climate in Latin America and the Caribbean [14] revealed a direct link between companies' economic productivity and innovative activities. Also, this comprehensive study substantiated the need for financial sector development, as well as the necessity to support export activities of national manufacturers, implement effective innovation policy, improve state regulation and strengthen the judicial system. Such surveys referring to different regions of the world, namely in Africa, have shown a link between the unfavorable investment climate and the weakness of private business, and low productivity, which is slowing down the diversification and technological modernization of the economy [15, 16].

In addition to examining the impact of the investment climate on economic development, scientific exploration of industrial development shifts is also being made. In particular, researchers in Middle Eastern and North African countries have shown that low levels of labor productivity, total factor productivity and technical productivity of basic industries are due to unfavorable investment climate [17]. Surveys in other countries yielded similar results. Thus, analytical calculations of manufacturing industries productivity in Nigeria proved the significance of the factors influencing the investment climate [18]. The results of such studies put on the agenda a wide range of reforms across worldwide. These reforms increase the confidence of private investors, and then respond with a strengthening of industrial potential of economy.

Systematic impact of the investment climate on the productivity of manufacturing factors, return on capital, employment growth and production, which was revealed in the early 2000s [19], is confirmed by new data from countries and productive industries. Recent studies have identified a close dependence of productivity and competitiveness of economy, as well as technical efficiency of major processing industries on the factors of investment climate in rapidly industrializing countries (Vietnam [20], China [21], and India [22]). Observations of business situation in India show a risk of industry instability caused by distortions in investment climate due to the rigidity of government policy to regulate labor and land markets [23]. The reform actions of the states, which pursue decentralized governance, helped to adjust economic policy and to facilitate investment conditions. This makes India an attractive place for business, increases investment in product innovation and is transforming the country into a center of advanced technology [24; 25]. The research on decentralized governance mechanisms in other countries has shown their ability to create a favorable climate for attracting investment in regional industrial development [26] and enhancing the total potential of national economy.

OECD Investment Policy Reviews: Ukraine 2016 [27] gave a positive assessment of reforms aimed at enhancing the country's investment attractiveness. The invest-

ment climate in Ukraine is diagnosed as in a country that participates in OECD Declaration International Investment and Multinational Enterprises. Challenges facing Ukraine include maintaining economic stability, developing infrastructure and financial sector, enhancing the innovation component in investment-attractive sectors with high potential for increasing competitiveness, protecting competition, reforming the judicial system, and minimizing corruption. A threatening external challenge is that the aggressor country controls Ukraine's economy (remaining a leading trading partner), manipulates its image (conducting warfare in Donetsk and Luhansk regions since 2014) and thereby deterring investors [28]. The presence of unresolved issues related to external and internal challenges worsens investment climate and reduces the return on investment in Ukraine. Therefore, the Government's ambitious plans to raise $ 50 billion investments in order to achieve a 40% economic growth over the next five years [29] will require the recovery of all elements of investment climate.

Investment climate: impact on attracting foreign investments in industrial development

Investment climate is shaped by the combined influence of a wide range of political, economic, financial and institutional conditions where markets operate, and defines incentives and opportunities for businesses to invest effectively, create jobs and expand activities [30, 31]. The impetus for the growth of individual businesses is transmitted through economic chains and is aggregated in the country's GDP. In the context of unfavorable investment climate, it is difficult for enterprises to invest and work, and to update fixed assets, which results in a slowdown. These dependencies are especially evident in developing countries, in economies where technological progress is connected to the import of technology and means of production from developed countries [14].

In general, the impact of investment climate is reflected in the ability to attract investment, thereby achieving a long-term economic growth and development. Increasing investment in one industry creates a multiplier effect, boosting consumption and revenue in the related sectors so that the total increase in the size of national income is much higher than the initial amount of investment that initiated these changes.

Ensuring a favorable investment climate is not only a national governmental concern, but also an international one. Considering this, in the Addis Ababa Agreement the governments of the UN member states committed themselves to creating a transparent, stable and predictable investment climate with due respect for contracts and property rights enshrined in prudent macroeconomic policies and institutions and stable rules for free and fair competition [32]. The acceptance of such commitments is dictated by the concern for securing inclusive and sustainable economic development through the attraction of private investment.

Globalization of the world economy and investment flows have led to a demand for investment climate assessments in countries around the world. The results of comprehensive studies on business conditions and investment across countries are now available to investors. The investment climate is valued by many parameters that vary in degree of importance to investors. In particular, recent studies of global investment competitiveness [10], conducted via a survey of directors of international companies from around the world, have shown that investment decisions are made

on the basis of weighing expected risks and returns. At the same time, the range of factors that investors take into account when choosing a country for investing is ranked in terms of importance in the following order: political stability and security, legislative and regulatory environment, size of internal market, macroeconomic stability and favorable exchange rates, skilled and talented workers, extended physical infrastructure, level of tax burden, labor costs, financial market development, etc.

The importance of each factor may vary depending on the specifics of local factors that affect the opportunities and incentives to invest in a particular country in a particular period. The complex connections between the factors of investment climate and investment in industry are evident as exemplified by the UK, where the economic landscape is changing due to Brexit. Almost 78% of surveyed chief financial officers (CFOs) of local businesses doing business in Europe consider Brexit to be the biggest threat to their businesses [33]. Corporate circles realize that Britain's business environment will deteriorate with the country's exit from the EU.

Against the backdrop of difficult business conditions in the UK, there are new trends to production curtailment and workplace closures. According to the Statistical Office, by the end of September 2019, industrial output had been reducing for six months in a row [34]. Output declined to a minimum since 2012, with industrial employment falling rapidly [35]. The Confederation of British Industry reported about a reduction in exports and overstocking of unsold produce [36]. Customers from the EU (which is the main outlet for industrial goods, accounting for 44% of exports) are avoiding British manufacturers, fearing deterioration in price and customs requirements due to the Brexit.

The dismissal of employees in different sectors worsens consumer sentiment and reverses the impact of consumption as a major driver of the country's economic growth. Demand volatility in domestic and foreign markets, and currency volatility complicate the prospects for industry. Investment decisions are hindered, resulting in reduced investment volumes and tighter investment conditions. Thus, the value of loans in 2019 rose to the highest level in the last six years, and their accessibility for companies fell to the lowest level in the last two years [37].

We can observe a new outflow of foreign direct investment. In particular, the Nissan management refuses to create new sport off-road X-Trail at its subsidiary in Sunderland [38]. The management of another TNC - Honda announces plans to close its Swindon car plant in 2021, which will mean for the country a loss of 7,000 jobs [39]. Another Japanese company, Toyota prepared a plan to cease production on its plant in Bernaston (Derbyshire). British economic shocks signal that unresolved political issues are pushing for corporate sentiment, weakening investment prospects.

The uncertainty of a protracted Brexit has upset European stock markets. In particular, investors are concerned about the inability to trade large companies shares registered in London if Britain leaves the EU without a deal [40]. For example, it is the case with the multinational companies Unilever (one of the world leaders in food and household chemicals market), Royal Dutch Shell (multi-sector activities in oil and gas, chemical and green energy industries), etc. European investors demand regulators to protect their rights to buy shares of international companies registered in London. Asset management concerns relate to dozens of companies whose shares are traded both in London, which is usually a larger and more liquid market and on other stock markets in EU countries. Leaving the EU without a deal would limit investors' access to relevant assets and mean that European fund managers will no

longer be able to buy and sell shares of international companies registered in London. This is forcing institutional investors to lobby their interests in the European Securities and Markets Authority, to find ways to give London equity trading an "equivalent" status compared to the EU. Otherwise, the transaction costs of investors in the share purchase and sale operations will rise in price, which will negatively affect the volume of investments. The likely refusal of these companies to be registered on EU stock markets will also affect investments.

The outlined situation clearly demonstrates how sensitive investment climate is to political and economic decisions, and to a shift in the status of the country in a globalized world. At the same time, the variation of each factor of investment climate gives impulses to changes in the system of economic relations, which cause shifts in the resource provision of economic processes and affect the implementation of these processes. In particular, the influence of investment climate factors on industrial development is due to the former's impact on the latter's investment provision, investment risks and incentives, change of directions and movement of investment flows. The influence is transmitted through decisions of national and foreign investors, stock markets, credit institutions, consumers and customers of industrial products, etc. Any such change is eventually fully reflected in the industry's investments and determines its development, since industrial business is characterized by relatively high capital intensity, a need for large amounts of investments and their long-term payback. Given this, government decisions should be aimed at improving the conditions for business and investing, implementing policies for the benefit of domestic players, who act as the drivers of the country's economic and geopolitical weight.

Therefore, investment climate really influences various spheres, determining the economic development. Investment climate is affected by many factors – political and macroeconomic stability; the size of internal market; efficiency of legal system and regulatory quality; the ability of economy to accumulate capital; financial market development and availability of financial resources; labor costs; technological advances and innovative activities; tax burden on corporations; availability of production infrastructure services, etc. [10]. At the same time, these factors serve as drivers of industrial competitiveness [41], so it is only natural that countries with a more favorable investment climate hold high positions in the global industrial competitiveness index.

Current state of industry and investment into its development in Ukraine

The quality of the investment climate in the Ukrainian economy can also be estimated in terms of the state of industrial development and investment in the industry. The growing tendency towards deindustrialization of the Ukrainian economy (Fig. 1) indicates unfavorable conditions for the functioning of the industrial sector. In particular, the industrial output index declined to 71,2% during 2007–2018, and the share of industry in GDP decreased to 21,0%, including that of manufacturing – to 11,5%. A dramatic decline in manufacturing began in 2009 (due to the global financial crisis) and in 2015 the industry experienced another deep decline. The deterioration of external environment and strengthening of the hryvnia resulted in another output decrease in 2019 (by 1,7% in manufacturing in January-November), which leaves no hope for a rapid return to pre-crisis level and weakens the national economy. Continuous de-industrialization of the economy, which is open to foreign

competition, is caused by the loss of competitiveness against the backdrop of unfavorable investment climate [42, 43]. This process has become a new normality [44], which is now a common thing.

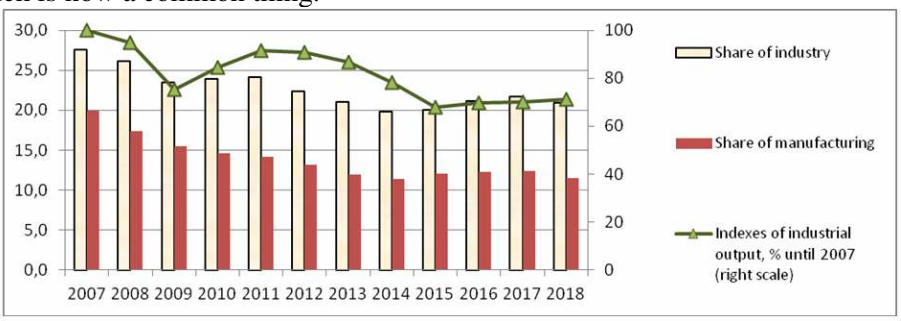

Fig. 1. Indexes of industrial production, the share of industry and processing industry in Ukraine's GDP in 2007–2018, *%*

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

Lack of investment and financial resources is holding back industrial modernization. Although the volume of investments in industry has been increasing recently (Fig. 2), they were not sufficient to significantly upgrade the production potential (in 2018 the wear and tear of fixed assets in industry was 66,4%, including in processing industry – 64,3%). The modernization of industry requires state encouragement, which is absent.

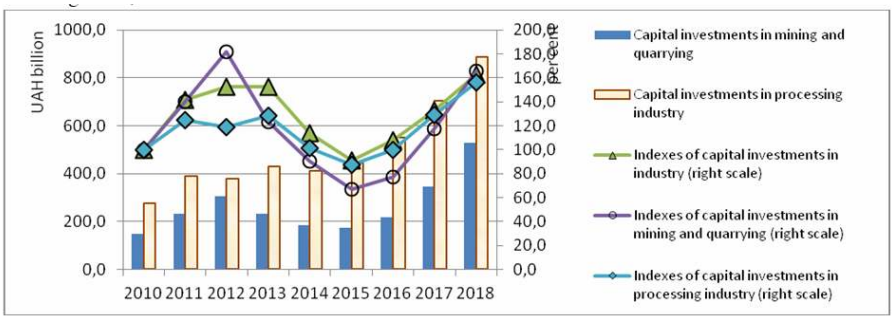

Fig. 2. Capital investments (*UAH billion***) and capital investment rate indexes (***% to 2010***) in main industrial activities for 2010-2018**

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

FDI net inflows into the Ukrainian industry declined sharply since 2014 (Fig. 3). This actualized the risks of technological backwardness of national industry and the reduction of its participation in global supply chains. Foreign policy reasons that led to destabilization of the economy, increased investment risks and weakening investment competitiveness had a significant impact on FDI withdrawal. No wonder that the Minister of Finance of Ukraine agrees to mobilize $ 10 billion investments annually to accelerate economic growth (in other words, 4-5 times more than before), which in turn requires a dramatic improvement in business climate [45].

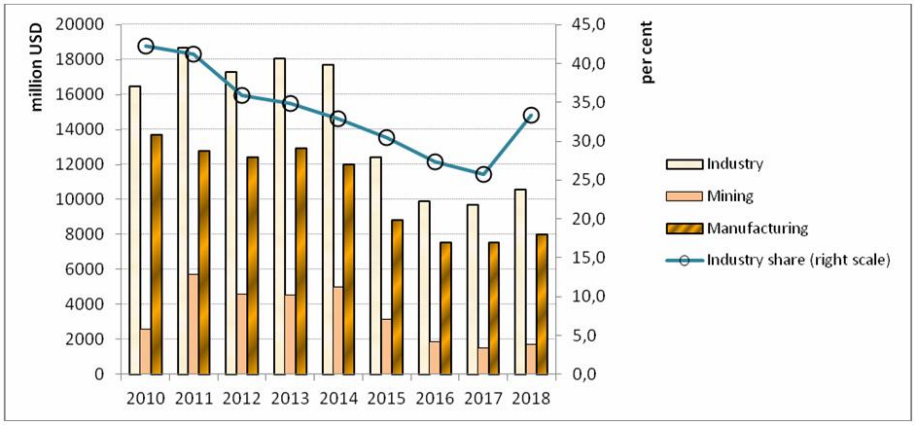

Fig. 3. Foreign direct investment (stock capital) by industrial economic activity and their share in the total amount of FDI in Ukraine's economy in 2010-2018 (as of the beginning of the year)

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

A source of investment is industry's own funds, but they are very limited. Self-financing provides 89% (2018) of investments into industry fixed assets and 94% – in processing industry. Investment sources are decreasing, namely loan ratio, foreign investment funds, investment institutions, and state and local government budgets. The lack of the companies' own investment resources and inability to attract resources from financial markets condemns the industry to further loss of technological competitiveness.

Industrial companies are almost completely separated from the financial market in their investment activities. For example, the share of borrowings in manufacturing investment was 5% in 2018, while in 2011 it was almost 13% (Fig. 4). A number of industries have ceased to use external funds in industrial investment. The unavailability of borrowed funds is caused by higher cost of credit resources and insolvency of many companies.

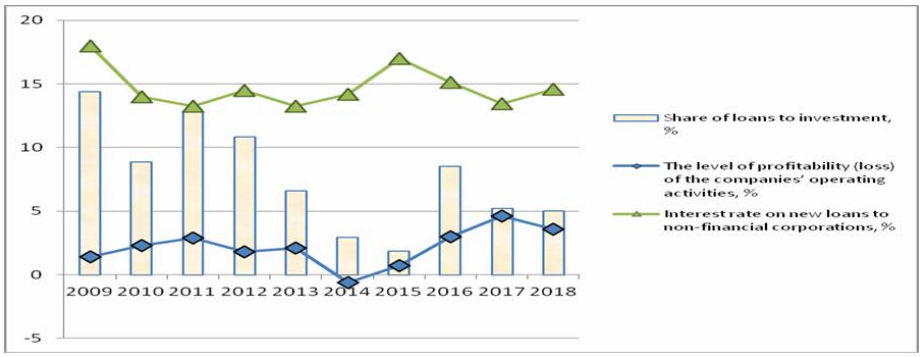

Fig. 4. Loans ratio in the sources of funding capital investments and profitability of operating activities in processing industry, interest rate on new loans to non-financial corporations in 2009–2018

Source: according to The National Bank of Ukraine (URL: http://www.bank.gov.ua/); according to the State Statistics Service of Ukraine. (URL: http://www.ukrstat.gov.ua/).

Rates on bank loans exceed the profitability of industrial activity several times (Fig. 4). The interest rate policy of central and commercial banks is regarded as a mechanism for building a wall between banks and production, which prevents the prospects for economic growth. Most industrial enterprises do not have "effective" demand for credit and remain scarcely supplied with investment resource. Also worth mentioning is the lack of the companies' confidence in the banking system, caused by the virtual confiscation of large amounts of their working capital (up to 20% of GDP [46, p. 7]) from the banks' balance sheets, which were "cleared" from the market, which seriously destabilized the companies' finances.

Analysis of the indicators characterizing the activities of the industrial companies shows a lack of available income and debt burden. The lack of income led to a rapid increase in debt in the industrial companies. The amount of accumulated debt increased almost 7 times during 2012–2018 (Fig. 5). At the same time, the producers' equity decreased by 23% as a result of losses, termination of operation, and loss of assets in the occupied territories. As a result of the combination of two opposite trends – debt escalation and decapitalization of enterprises – the level of debt dependence in industry exceeded 4,7 (times by which debt exceeds own capital), while the critically acceptable level is at least 1,5 [47]. The key industries – metallurgy, basic chemicals, and fertilizers – remain unprofitable for many years (2010-2018). In other words, the profits of companies are lower than the losses of the unprofitable ones. Despite the fact that losses in manufacturing (observed during 2012-2016) have been overcome, some financial problems still exist because the companies' profitability is too low (1,4% in 2018), which is not enough to cover the accumulated equity shortage and reduce debt dependency at least to a critically acceptable level.

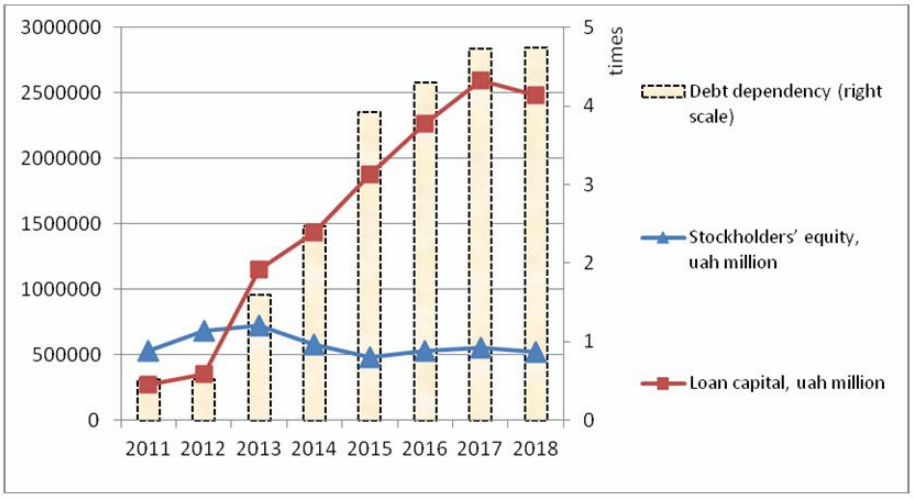

Fig. 5. Owned and loan capital ratio of Ukrainian industrial companies in 2011–2018

2011–2017 – as of 31 December;
2018 – as of 31 September;
Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

According to experts, such an abnormally high level of debt dependence of the companies is a manifestation of the extreme distortion of the financial model of doing business in Ukraine [48]. This model is characterized not only by the lack or

limitation of profits, and thus by the scarcity of investment resources and over-indebtedness, but also by the capital accumulation in the shadow sector and offshore jurisdictions. Shadow and offshore schemes are used to withdraw funds from businesses that are left with debt and losses, and profits are on private accounts abroad. Under such conditions, it is no wonder that industrial investors with long-term investments, technologies and individual working places are in no hurry to enter the country.

The negative sentiment regarding the prospects of manufacturing industry is quite realistic (Table 1). Negative expectations also prevail in the business environment with regard to future changes in capital investments volumes in this sector (Table 2). Due to the expected increase in capital investment in mining industry, we hope that the development of mining will meet the needs of processing industry for raw materials. For example, Ukrinian chemical industry has fallen into a trap of dependence on imports of raw materials (primarily natural gas) and their prices, which leads to price incompetitiveness of national producers' products [49]. Therefore, investments in the development of gas reserves on Ukraine's territory will allow to increase its production and in the long term to refuse its import, (which is stipulated by the government [50]) and thus to strengthen the positions of Ukrainian manufacturing companies.

Table 1

Ukrainian economic sentiment indicators (ESI) in 2017–2019, *%*

Indicator	2017				2018				2019			
	I quarter	II quarter	III quarter	IV quarter	I quarter	II quarter	III quarter	IV quarter	I quarter	II quarter	III quarter	IV quarter
Business Confidence Index in processing industry	-7,5	-5,4	-3,0	-4,4	-3,1	-3,6	-4,6	-4,1	-3,4	-5,1	-4,6	-5,1

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

Table 2

Expected changes in the amounts of investment capital of industrial companies in the coming year in comparison with current year

(level of expenses of the current year = 100%),% against the previous year

Productive industry	Code according to the Statistical Classification of Economic Activities-2010	2016	2017	2018	2019
Mining and quarrying	B	-6	89	16	17
Processing industry	C	-2	-4	-10	-10
Electricity, gas, steam and air conditioning supply	D	18	8	33	75

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

Financial and investment conditions in which Ukraine's industry is presently operating are characterized by the following features: financial degradation, increasing

debt dependency and decapitalization of industry enterprises, low profitability of industrial activities (some activities are loss-making); withdrawal of capital from industry, accumulation of capital in the shadow sector and offshore jurisdictions; acute shortage of disposable income in the companies due to the lack of effective demand for industrial products in the domestic market and loss of traditional foreign markets; and unavailability of credit resources. Everything mentioned above causes a shortage of investment resources.

The implementation of this country's industrial revival plans urgently calls for the creation of preconditions for an inflow of investments, especially given the rapid global advance of the industrial revolution 4.0, which deepens the division of countries around the world into leaders and outsiders according to the technological potential of the production. According to experts' reports, 25 countries (including Japan, South Korea, Germany, Switzerland, China, and USA) are ready for future technological transformations. They are already generating 75% of the value added of global industrial output and have established closed production chains [1]. The rest of the world will remain a raw-material appendage and workforce donor for the world's manufacturing centers over the next decade. Accelerated modernization of industrial production is necessary for Ukraine in order not to be stuck forever in the world periphery. Therefore, improving the investment climate will be the key to attracting investment to this country's industry.

Assessment of the impact of investment climate factors on the development of Ukrainian industry

Identification of the degree of sensitivity of the development of Ukrainian industry to the impact of investment climate was carried out taking into account the following factors: macroeconomic stability; development of financial markets; the size and attractiveness of the internal market; innovative activities, technological transfer; and state of the labor market. The impact of relevant factors was analyzed using econometric modeling and statistical comparisons based on the World Bank, State Statistics Service of Ukraine and the NBU. As the indicators reflecting industrial development, we selected the volume and growth dynamics of value-added created in Ukraine's industrial sector and its branches.

Statistical comparisons of industrial activity indicators and investment climate characteristics were carried out on the example of Ukraine and reference groups of the world countries. The reference groups were selected on the principle of positive example based on the criteria of the achieved level of industrial development and favorable conditions for such development. In particular, OECD, BRICS and countries of Global Manufacturing Competitiveness Ranking [41] (this group include the first thirty countries selected based on five-year observation period) are considered perfect examples. As a base, we selected those post-Soviet countries that currently do not belong to any of the above mentioned groups. This approach allows us to compare the parameters of the investment climate, and identify the general and specific factors of its impact on industrial development.

Gross value added volumes provide information about the current state of industry development in Ukraine and in reference groups. The initial comparison shows that Ukraine occupied the middle positions among the post-Soviet countries in terms of value added volumes created in the processing industry (2017), but Ukraine is far

below as compared even to the minimum indicators of the BRICS group and the countries selected based on the global competitiveness rating (Table 3).

The dynamics of value added change in the Ukrainian manufacturing was one of the most difficult, as the industry experienced two waves of crises during the 11-year period, during which negative rates were recorded during six years (2008-2009 and 2012-2015) (Table 4). Although the fall in industrial production occurred in all groups, each time it happened to another country and recession periods did not last so long and did not recur so often as in Ukraine. This demonstrates how serious and long-standing the problems in Ukraine's industry are.

Table 3

Value added in manufacturing in selected foreign countries and in Ukraine in 2007–2017 (current prices), *million USD*

Indicator	2007	2008	2014	2015	2016	2017
OECD countries						
Minimum value	1674	1953	1848	1687	1886	3213
Maximum value	1839907	1800098	2084860	2159809	2160559	759904
Average value	178861	184038	190674	183398	191909	117301
BRICS countries						
Minimum value	4149	4046	3596	3446	3458	41435
Maximum value	1149720	1475664	3184235	3250423	3225058	3590978
Average value	299766	368121	671750	662987	658360	883734
GMCR countries						
Minimum value	15003	18418	24540	26464	29284	34202
Maximum value	351277	368996	299382	263825	272428	284297
Average value	108518	119499	117933	107081	107942	121290
Post-Soviet countries						
Minimum value	188	233	178	166	165	163
Maximum value	37050	47257	41750	34839	38015	17826
Average value	6880	8419	7421	5974	5929	4512
Ukraine	29003	31276	16325	10835	11217	13891

Source: World Development Indicators. World Bank national accounts data, and OECD National Accounts data files. URL: http://data.worldbank.org/

Table 4

Growth rates of value added in processing industry in selected countries and in Ukraine in 2007-2017, *% to previous year*

Indicator	2008	2009	2010	2013	2014	2015	2016	2017
OECD countries								
Minimum value	-22,3	-23,2	-13,4	-3,4	-2,1	-5,5	-4,2	-1,8
Maximum value	8,4	1,3	26,8	12,8	15,6	93,9	10,9	9,2
Average value	-1,2	-11,5	8,1	1,0	3,5	4,8	2,2	4,1
BRICS countries								
Minimum value	-7,0	-14,6	3,3	0,1	-4,7	-8,5	-5,6	-0,2
Maximum value	4,3	11,3	9,2	5,0	7,9	12,8	7,9	5,1
Average value	0,3	-6,3	7,2	2,0	0,8	-0,4	0,8	1,7
GMCR countries								
Minimum value	-8,6	-23,2	-21,8	-3,4	-4,7	-8,5	-5,6	-1,8
Maximum value	16,1	2,8	22,8	9,3	7,9	93,9	11,9	14,4
Average value	1,8	-8,5	5,6	1,4	2,9	6,9	2,8	4,4
Post-Soviet countries								

End of Table 4

Minimum value	-8,8	-29,1	-5,9	-9,9	-8,6	-15,2	-4,1	-4,0
Maximum value	21,2	11,5	14,5	47,0	21,5	7,7	11,1	22,8
Average value	4,0	-7,6	5,6	6,8	3,5	1,5	3,6	6,0
Ukraine	-4,9	-20,9	14,5	-9,9	-8,6	-15,2	3,6	5,1

Source: World Development Indicators. World Bank national accounts data, and OECD National Accounts data files. URL: http://data.worldbank.org/

Macroeconomic stability is of great importance for industrial development. In general, the prospects for industrial development depend on the level of investment activities, which requires macro-financial stability and a sound financial sector. Weak investment activities are peculiar to the countries with fragile financial systems. High cost of attracting investment resources in these countries is a consequence of the existing systemic financial risks and an obstacle to capital cycle.

Gross savings serve as the basic investment resource of economy, on which gross capital generation directly depends. Macro-financial imbalances caused by low levels of gross savings and gross capital formation are recognized as key factors in Ukraine's problem of low investment activities [51]. The intensification of this problem in Ukraine occurred in 2014-2016 due to a coincidence of adverse macroeconomic and geopolitical factors. Earlier the level of gross savings fell (to 9–10% of GDP in 2013–2014 versus 39% in 2008), and later gross generation fell (to 13–14% of GDP in 2014–2015, in other words, to the lowest level since 2007 and almost half the world average). In this context, there was a deep decline in capital investment indexes in industry – from 152 to 91% in 2012–2015 (Fig. 2), which slowed down the upgrade of its productive apparatus.

In general, gross savings in Ukraine's economy remained insufficient. Comparisons show that its level in Ukraine was lower than the average in all reference groups in 2009–2017. For example, in Ukrainian economy gross savings varied within 10–20% of GDP during 2014–2017, while in the post-Soviet group the average gross savings were 20–22%, in OECD gross savings were 23–25%, in BRICS – 27%, and in GMCR countries - 24–25% of GDP. Particularly noticeable is the difference between Ukraine and the leader countries in modern industrialization: China (46–49% of GDP) and India (31–34%). The absolute amount of gross savings in Ukraine in dollar terms decreased by more than 76% in 2017 compared to 2008, and in 2014–2017 remained generally at 19–24% to previous level. Thus, the amount of savings is much reduced, which is the reason why the problem of the lack of investment resources in Ukraine's economy sharply aggravated.

In 2015, in Ukraine, the gap has been overcome between gross savings and gross fixed capital formation in Ukraine, which is covered by external investment resources. However, modest increase in gross savings in 2014–2017 had little effect on the trends in gross fixed capital formation, which remained insufficient. In particular, its level was 14–16% of GDP since 2014, which is significantly lower than the average in all reference groups. If we take into account the indicator's long-term negative dynamics and the fact that its volume, measured in dollar terms, during the period 2014–2017 was only 18–23% of that in 2008, we can conclude: the current regime of gross fixed capital formation carries a risk of deepening economic degradation due to narrowed reproduction. Low level of gross accumulation is associated with the slowdown in technological mo-

dernization and renewal of fixed capital. According to experts, if Ukraine intends to perform an economic boost, carry out a structural upgrade and modernization and continue industrial development, then the gross accumulation of fixed capital must be not less than 25% of this country's GDP [52].

An empirical test of the hypothesis about the existence of an impact of macroeconomic factors on the state of industrial development in the long run was conducted using econometric model (1)[2].

MVAD = – 0.411*INFT + 0.445* GFCD + 0.380*GSP + 0.032 (0.022) (0.0001) (0.080) (0.994)* R^2 =0.797; DW = 1.803; Prob(F-statistic) =0.000, where MVAD – annual increase in value added in manufacturing (%); INFT – GDP deflator (%); GSP – gross savings (% GDP); GFCD – annual increase in gross fixed capital formation (%). * in parentheses Prob. t-Statistic is given for every factor	(1)

Model (1) provides an empirical assessment of the impact of macroeconomic factors on the dynamics of value added in manufacturing. The model is adequate, formal tests confirm its correctness. Model based analysis shows that over the entire time period (2000–2017), with a 1% increase in gross fixed capital formation and a 1% increase in the share of gross savings in GDP, the dynamics of value added accelerated on average by 0,45 and 0,38%, respectively, while with a 1% rise in inflation the dynamics of value added slowed down by 0,41%. It should be noted that the obtained estimates of model parameters (1) were received "other factors being equal", in other words, without highlighting the influence of other important factors.

The presented model based estimates confirm the validity of the conclusion on the importance of macroeconomic policy measures to support industrial development in Ukraine. The crisis bailout plan based on the formation of sufficient gross savings to increase fixed capital generation at the expense of own sources, together with achieving price stability will allow to attain industrial growth and forget about the decline.

Financial market development is recognized a necessary component of a favorable investment climate for industrial development. Financial market is a central element of the investment mechanism, and the development of the national economy depends on it. An efficient financial sector accumulates the households' savings and cross-border funds in order to transfer them to profitable investment projects to be carried out by private business. The results of various studies show that private investment is a determinant of productivity gains and economic growth [14]. In order for private business investment to grow, it is necessary that the financial markets be able to provide the private investors with access to financial products from a variety

[2] The model is based on data: World Development Indicators. World Bank national accounts data, and OECD National Accounts data files. URL: http://data.worldbank.org/
The analysis of the statistical characteristics of regression equation (these and the following equations are built in the Eviews environment 7.0) and checking its quality using formal tests (Breusch-Godfrey Serial Correlation LM Test about the absence of autocorrelation, heteroscedasticity – Heteroskedasticity Test: White) confirms the adequacy of the model (1)).

of sources, such as loans from trusted banks, capital from well-organized stock exchanges, venture capital funds, etc. In addition, financial markets need to be properly regulated in order to safeguard investors' rights and guarantee investment security.

The financial characteristics of the investment climate are quite diverse. In particular, an important feature of the investment climate is the availability of getting credit for borrowers (Getting Credit). According to the World Bank methodology used in *Doing Business* rating, this characteristic reflects the legal compliance of borrowers and lenders to enforce secured transactions, as well as the exchange of credit information. The parameters by which the International Monetary Fund evaluates the degree of financial market development consist of two groups of indicators – efficiency and reliability [2]. In particular, the first group contains indicators such as the adequacy of financial services to the needs of business, the availability of financial services, the ability to attract resources in the local stock market, and the availability of credit and venture capital. The indicators of the second group reflect the reliability of the financial system and its credibility, the strength of banks, the regulation of stock exchanges and legal protection. In terms of financial market development, Ukraine occupies 120th place among 137 countries and has a score of 3,1 on a scale of 1 to 7 [6]. Rating estimates indicate that Ukrainian financial system is underperforming and underdeveloped.

Industrial investments, which involve the cost of new technologies, machines and equipment, are long-term and particularly sensitive to the business environment. Capital investment financing requires long-term bank loans, and stock market resources. So it is not accidental that the EU's industry renaissance policy has been identified as one of the key contributors to facilitating access to capital for productive business as a key factor of production [53]. The economic basis of capital availability for the real sector is a favorable ratio of domestic savings and investment that has been formed in the EU, supported by tax incentives for both.

The complexity for the industrial business to access financial market resources is one of the problematic aspects of Ukraine's investment environment. The origins of the problem include the low accumulation of gross savings, excessively tight monetary policy and insufficient supply of money in the economy [54] and the aggravation of this problem in recent years has been caused by the instability of the financial sector and the unreliability of real business entities [55]. Moreover, the dysfunction of all elements of the transmission mechanism that redistributes financial resources in the economy (the banking sector, non-banking financial institutions, budget) widens the gaps between those sectors where financial resources are concentrated and those with their acute shortage [56]. In particular, the financial sector fails to completely perform its primary function, that is, accumulating savings in other sectors, transforming them into productive capital through indirect (debt or equity) financing mechanisms, and promoting cross-sectoral redistribution of capital. The banks' roads to lending have been since long ago and securely blocked by a different temptation, that is, the NBU's and government's deposit certificates whose yield reaches 15% and higher [57]. When the NBU and Ministry of Finance encourage the financial sector to make money out of thin air by offering them lucrative and risk-free assets, they will not even look at the production. The crowding-out effect is in place causing the curtailment of the banks' relationship with productive business and contributing to further autonomy of the companies' finances [46].

Comparison of the volumes of the banks' lending of the private sector in Ukraine and in the reference groups testifies for limited availability of credit resources for Ukrai-nian borrowers. In particular, the volume of bank lending in Ukraine was 31% of GDP in 2017, while the average in post-Soviet countries was 37%, that in the GMCR group - 82%, in the OECD - 84%, and in the BRICS - 108%. Ukraine's two/three-fold lag behind in bank lending is a sign of the private sector's financial hunger.

Particularly difficult relations have been established between banks and industry. The share of manufacturing industry in the sectoral structure of bank lending in Ukraine increased from 19,6% to 24,2% during 2013–2018, but at the same time, the share of overdue loans increased from 9,8% to 45,7% [58]. The creditors consider a high portion of borrowings involved in the manufacturing as nonperforming loans or bad debts. The share of nonperforming loans in manufacturing reached 72% in the mechanical engineering (as of late 2018), 71% in the metallurgy, 68% in the chemical and pharmaceutical industries, 70% in the oil and fat industry, 58% in processing, 41% in the manufacture of building materials [59], etc. The financial position of the debtor companies is such that they have no resources to service the loans and their prospects to recovery are illusory.

Many insolvent companies unable to service credit debts appeared in the business environment after two deep crises of 2008–2009 and 2014–2016. Many of them are engaged in mechanical engineering (the amount of bank debt was UAH 34 billion), chemical (UAH 20 billion), food processing (UAH 30 billion), metallurgy (UAH 4 billion), mining (UAH 6 billion), and construction materials (3 billion UAH), etc. [59]. In particular, mechanical engineering suffered as a result of the loss of the Russian market, the chemical industry was affected by difficulties with raw materials and the loss of part of its facilities in uncontrolled territories, and problems in the food processing were caused by the default of debtors (especially dairy producers), which had oriented to the Russian market.

A major part of the borrowed credit serves the current activities of the industrial companies, while only a small portion serves the capital reproduction. Only 0,4–2,6% of the total amount of credit granted to manufacturing is used as a source of capital investment.

The group of solvent borrowers among the industrial companies is rather small, due to unsatisfactory financial results of their activities and high debt dependence (Figs. 4, 5). The risks of deterioration in borrowers' solvency are associated with a further increase in personnel costs, rising interest rates on new loans, and a decline in world prices for important exports of metallurgy and oil and fat industry. Therefore, deepening restrictions on the access to credit for industrial companies will hinder their development.

Given the tendencies to curtail the relationship between industrial borrowers and banks, the question arises whether lending to industrial companies affects the sector's development, which can be answered based on econometric modeling. In order to empirically test the hypothesis regarding the involvement of bank lending in long term output growth, models (2–4)[3] were constructed. As a result of model

[3] These and all the following models are constructed according to the relevant data of the State Statistics Service of Ukraine (URL: http://www.ukrstat.gov.ua/); NBU monetary statistics (URL: http://www.bank.gov.ua/).

based simulation, the coefficients of elasticity of the impact of changes in lending volumes on the dynamics of value added of the main industrial branches (mining, manufacturing, power industry) were obtained:

TDMVM = 0.37*TDLOM + 75.8 (0,00) (0.02)* R2 = 0.96; DW = 2.19; Prob(F-statistic) =0.00, where TDMVM – growth rate of the GVA of mining and quarrying in real terms** (2000 = 100%); TDLOM – growth rate of loans to non-financial corporations (end-of-period balances), engaged in mining and quarrying *** (2000 = 100%).	(2)
TDMVA = 0.09*TDLOA + 248.56 (0,00) (0.02)* R2 = 0.74; DW = 1,42; Prob(F-statistic) =0.00, where TDMVA – growth rate of the GVA of manufacturing in real terms ** (2000 p. = 100%); TDLOA – growth rate of loans to non-financial corporations (end-of-period balances), engaged in manufacturing*** (2000 = 100%).	(3)
TDMVE = 0.05*TDLOE + 104.9 (0,00) (0.00)* R2 = 0.96; DW = 1,73; Prob(F-statistic) =0.00, where TDMVE – increase in the GVA of electricity, gas, steam and air conditioning supply in real terms ** (2000 p. = 100%); TDLOE – growth rate of loans to non-financial corporations (end-of-period balances), engaged in electricity, gas, steam and air conditioning supply*** (2000 = 100%).	(4)

* The values of Prob. t-Statistic for each factor are given in brackets.
** Recalculated based on deflators of the corresponding industrial activity.
*** Recalculated based on deflators of financial and insurance activities.

The model based estimates (2–4)[4] with high levels of statistical significance (as evidenced by the Prob. t-Statistic of each factor) confirm that lending affects the dynamics of gross value added of each industrial branch over the entire time period (2001–2016 – for mining, 2006–2016 for manufacturing, and 2000–2018 for power industry). Analysis of the simulation results shows that with a 1% increase of lending, the value added of mining increased on average by 0,37% to basic period, that of manufacturing – by 0,09%, and that of power industry – by 0,05%. Considering the regression coefficients, it is obvious that lending is not a key factor, but it still contributes to accelerating the added value dynamics in each branch. It should be noted that the models presented are simplified because they estimate the impact of only one factor (other things being equal) and do not take into account other important factors. However, model based estimates serve as a valid argument in favor of promoting industry lending.

The size of the country's market is a significant ***factor in the investment climate***. It affects production capacity by allowing national companies to take advantage of the economies of scale within the country's primarily domestic market. In the age of

[4] The models' adequacy is confirmed by an analysis of statistical characteristics of regression equations and verification of their quality using formal tests (Breusch-Godfrey Serial Correlation LM Test for the absence of higher order autocorrelation).

globalization, entering foreign markets expands the producers' sales. Therefore, export opens additional demand for products abroad, expands market boundaries, and narrows imports, crowding out the domestic producers.

The scale economies arises upon condition that the expansion of production exceeds the growth of all production costs. This is manifested in the reduction of unit costs with an increase in output and sales. Observing this phenomenon, formulated as the concept of economies of scale, is progressively developing classical and neoclassical views on international economic relations at the present stage [60]. The increased importance of economies of scale is explained by the following reasons:

– deepening international division of labor, increasing specialization and concentration of production in individual companies and countries;

– intensification of competition in the field of research and development, acceleration of the introduction of technological innovations, rapid updating and expansion of the range of products in the markets.

Gaining market advantage through leadership in technological innovations that ensure the emergence of new product quality, cost savings and price preferences, allows squeezing competitors and occupying a larger market share, thereby changing the configuration of the market structure and forming trends for its monopolization. The technological aspect of the economies of scale is manifested in the modification of production function, and in saving unit costs of labor and capital. The concentration of production in a few companies creates the preconditions for realizing price effects in the markets of economic resources (labor, capital) and products. Large companies that are able to exercise a "price diktat" in the resource markets have the greatest financial gain from of the economies of scale.

A large domestic market favors national companies in achieving scale economies. Countries with a small domestic market are limited in their ability to build large-scale production and, accordingly, these countries need to enter the world market in order to gain comparative advantages in the production of certain items. Participation in international trade contributes to the consolidation of the country's comparative advantages in the manufacture of products, enhances the scale economies and its technological, price and financial implications. Competition in global markets determine the country's specialization in the areas with lower average costs, higher productivity and more economical use of resources.

The domestic market of Ukraine, whose capacity is determined by the number of consumers and their purchasing power, is characterized as open to imports and at the same time monopolized on various types of industrial products [6, 61]. Less than 64% of manufacturing products are sold on the country's market (2018), the rest are exported. Orientation to foreign markets is peculiar to the engineering industry (more than 59% of motor vehicles, trailers and semi-trailers, 61% of general-purpose machinery and equipment, 44% of other vehicles are exported), metallurgy (59% of all production), and woodworking industry (58% of wood products).

The relative volumes of exports of goods and services from Ukraine are inferior to the average indicators of the main reference groups. Ukrainian exports accounted for 48% of GDP in 2017, while the average in OECD countries was 60%, in GMCR countries – 52%, and in BRICS – 49%. The reasons are the stagnation of the energy-intensive, low-tech structure of Ukraine's economy [62]. In addition, the structure of Ukrainian exports of goods is ineffective due to excessive product concentration and mineral orientation. In particular, one quarter of exports is accounted for by metals

and metal products (including ferrous metals – 21%), 21% by vegetable products, 9% for oil and fat products, and 9% for mineral products (2018). In other words, the total share of low-processed items in the structure of commodity exports exceeds 64%. Therefore, in the global division of labor, this country acts as a supplier of medium-low-tech products and mineral-raw material append of the world economy.

Machine-building products in the structure of commodity exports from Ukraine occupy less than 10%. Since mechanical engineering is focused on foreign markets and its products do not meet the structure of domestic demand and provide only a partial accumulation of fixed capital, the demand of domestic consumers is directed to imports. Imports in the market for machine building products dominate – their share has increased to 63,8% in recent years [62]. As a result of the expansion of imports, the potential of scientific, technical, industrial and technological development of national industry is lost and the scale economies narrows, which negatively affects the long-term development prospects.

The level of import dependence of the Ukrainian economy (54% of GDP) is comparable to the average in its reference group and in that of OECD countries (55%), but is significantly higher than in the groups of BRICS countries (48%) and GMCR countries (48%). Imports meet domestic demand, especially for high-tech products. In particular, the structure of imports is dominated by technologically sophisticated products that are more competitive than low-tech goods of Ukrainian exports, as well as by energy resources. The share of machinery and equipment in the goods imports is 21%, that of chemical products – 12%, vehicles – 8%, and energy – 24%. In addition, imports exceeds exports, and the resulting long-run trade deficit is a factor in economic instability.

Evaluation of the degree of dependence of Ukraine's industry dynamics on the market capacity (domestic and foreign markets of industrial items of Ukraine's produce) was carried out using econometric modeling. In order to test the hypothesis about the existence of the influence of scale economies on the dynamics of industry over the long-term time period in Ukraine, econometric models were constructed. The evaluations of these models are presented in Table 5. As a result of the model evaluation, the coefficients of the impact of the dynamics of GDP, imports and exports of industrial goods on the rates of the industry's value added were obtained.

Model based estimates with high levels of statistical significance (according to the Prob. T-Statistic of every factor) confirm that market capacity has an impact on industrial production dynamics. Based on the estimates presented (model 5), it can be said that during the period 2003–2018, the changes in the industrial value added depended on the dynamics of domestic market capacity (measured by GDP): they speeded up by an average of 1,3% (to the base period) with a GDP growth of 1% (all things being equal). In addition, during 2006–2015, the response to a 1% increase in exports of manufactured goods was a 0.63% on average increase in the industrial value added of industry (relative to base period, model 6).

According to the evaluations of model (7), the increase of manufactured goods imports did not have a negative effect on the dynamics of industry, probably due to the significant dependence of national production on imported goods for intermediate consumption, investment purposes and energy. Imports of goods of these groups have largely replaced the corresponding items of domestic production (especially machinery and equipment). Increasing imports of goods will continue to limit the market space of domestic demand for products of domestic producers, leading to

narrower range of industrial production (especially in high-tech segment), deterioration of national production structure, and deepening trade deficit. The proportions in which imports are presented in the domestic market need adjustment in order to support the domestic industry. The instrument of such regulation should be a systematic promotion of investments in the diversification of industrial production (implementation of measures for the localization of production in Ukraine [63]), which would help reduce the dependence of this country's economy on imports and strengthen its competitive position.

Table 5

Results of the evaluation of the linear models of paired regression on the influence of selected factors on the dynamics of Ukraine's industrial GVA[5]

Factor, indicator	Model 5	Model 6	Model 7
Index of GDP growth (up to 2000)	1,31 (0,00)*		
Constant	-0,48 (0,00)*		
Index of growth of industrial goods exports (up to 2000)		0,30 (0,02)*	
Constant		0,87 (0,00)*	
Index of growth of industrial goods imports (up to 2000)			0,40 (0,01)*
Constant			0,82 (0,00)*
Evaluation time length	2003 – 2018	2008-2015	2006-2015
R-squared	0,93	0,64	0,63
Durbin-Watson stat	1,23	1,3	1,45
Prob(F-statistic)	0,00	0,01	0,01

* In brackets, Prob. t-Statistic of every factor is given.

Source: author's own calculations.

Also, there should be a policy to expand domestic demand for domestic production and promote its export. An important aspect of export policy is the diversification of export geography, especially with regard to the products of those industries that have suffered from the Russian market foreclosure (engineering, food industry, etc.). It is reasonable to take care of the restructuring of export deliveries by reducing the share of low-tech raw materials whose markets are stable neither in terms of capacity nor of prices [64], and of promoting the development of high-tech industrial manufacturing in the country, because these segments of the world market are the most dynamic and significant.

Innovative activity and technological transfer as a factor in the investment climate determines the ability of the economy to adopt new technologies to increase production efficiency and competitiveness. Due to the limited availability of advanced technologies and projects, the ability of industrial companies to integrate and adapt exogenous technologies in their production is also limited. That is why companies are forced to design and develop their own products and technologies in order to maintain their competitive advantage and create greater added value. Technologi-

[5] Analyzing the statistical characteristics of the regression equations and checking their quality (regarding the absence of first- and higher-order autocorrelations, etc.) show the adequacy of the models.

cal progress requires an environment conducive to innovation, created by the combined efforts of the state and the private sector. In particular, this requires sufficient R&D funding, especially from the private sector, high-quality research institutions capable of generating fundamental knowledge for the development of new technologies, research and technological cooperation between science and industry, and protection of intellectual property.

The incentive for innovation and technological leadership is the high cost recovery that accompanies the introduction of new technologies, so that the large upfront costs are more than outweighed by revenues that increase together with output. For example, model based calculations of the effectiveness of key Industry 4.0 technologies have shown that leading companies in their implementation will increase their cash flow by 122%, while their followers – only by 10% [65]. A new feature of the modern world order is a fierce competition in the field of innovation, which took the form of a cold war between countries for leadership in production technologies [66], which is based on the rivalry for the distribution of income and the appropriation of technological rent. In addition to its own technological developments, foreign direct investment can become a source of new technologies. Such investments are especially important for countries, which are far from the first stages of technological development. FDI technological transfer usually provides for the modernization of local traditional manufacturing technologies, optimization of production processes, improvement of product quality and increase of overall efficiency.

The recovery of global economic growth in the post-crisis period is based on the strategies of the new industrial revolution, which implies the acceleration of innovation progress, and the growth of high-tech industries based on increased investments in research and development. Contrary to global trends, expenditure on science & technology activities (hereinafter STA) in Ukraine is declining. This is confirmed by a long decline in GDP research intensity from 1,24% in 2003 to 0,85% in 2008 and 0,45% in 2017, (out of that share, at the expense of the state budget – 0,16%) [67]. Comparison of the corresponding expenditures intensity in the reference groups shows that the average performance in OECD was 2,01% in 2015, in the GMCR countries – 1,73%, and BRICS – 1,15%. According to recent data, the EU is moving ahead with R&D spending, reaching 2,07% in 2017, out which 66% is business-funded (in some countries (Sweden, Austria, Denmark and Germany) - more than 3%) [68]. China's R&D expenditures increased by 18% annually during 2010–2015 or more than four times faster than in USA. According to world criteria, the level of GDP research intensity in Ukraine does not correspond to the needs of industrial economy. The fact that GDP intensity is lower than the critical level (0,9%) indicates a tendency to degradation of this country's economy and its transformation into a raw and underdeveloped one [69]. Inadequate financial support for scientific and technological progress, as well as a lack of attention to product innovation, exacerbates the threat of further de-industrialization of the economy and the loss of position in the world markets of industrial products.

The hypothesis of the influence of the factor of innovation and technological transfer from FDI on Ukraine's industrial development (sample 2000–2018) was tested using econometric models (8), (9). The models present an empirical assessment of the impact of innovation activity dynamics of industrial enterprises and the inflow of foreign direct investment into this country's industry on changes in the

growth rate of industrial value added. Models are adequate, formal tests confirm their correctness.

TMV = 0.45*TRDM + 0.44*TMM(-1) + 40.76
(0,005) (0,000) (0,224)*
R2 = 0.92; DW = 1,35; Prob(F-statistic) = 0.00,
where TMV – industry's GVA growth rate in real terms (2000 = 100%)**;
TRDM – growth rate of the expenditures in research and development in the industry in real terms (2000 = 100%);
TMM – growth rate of the expenditures for the acquisition of machinery and software in the industry in real terms (2000 = 100%). (8)

* In brackets Prob. t-Statistic of every factor is given.
** Recalculated based on the industrial deflators.

Model based estimates indicate that innovation and FDI have a positive and statistically significant effect on industrial development. In particular, the analysis of the whole observation period 2002–2017 shows that industrial value added increased by 0,45% with the increase in the companies' expenses on the execution of scientific and technological projects by 1%, and by 0,44% with a 1% (with a one year lag) increase in the spending on the acquisition and commissioning of machinery, equipment and software (model 8). The ratio of regression coefficients of factor variables indicates the importance of both directions of the companies' innovative activities on the development of Ukraine's industry. These positive effects show themselves even despite the fact that only few industrial companies were engaged in innovation activities (less than 19% of total) [67]. These observations are important in the context of justifying the feasibility of industrial enterprises to invest their own funds in the research and technological development that precedes the implementation of technological innovations, and to order their implementation in the applied and academic sectors of Ukraine's national science.

TMV = 0.02*TFDI + 0.03*TFDI(-1) – 2.35
(0,016) (0,002) (0,947)*
R2 = 0.89; DW = 1,48; Prob(F-statistic) = 0.00, (9)
where TMV – industrial GVA growth rate in real terms (2000 = 100%)**;
TFDI – growth rate of FDI in the industry (2000 = 100%).

The parameters of the distribution-lag model (9), estimated for the period 2000–2016, show the short- and long-term multipliers of the effect of the lag variable. In particular, with a 1% inflow of FDI into the industry, the value added growth of the industry accelerated by an average of 0,02% (the magnitude of the short-term multiplier) in the year of investment arrival and the positive momentum remained noticeable in the next period. The overall annual effect of FDI inflows was manifested in the increased rate of industrial value added by an average of 0,05% (long-term multiplier), since the cumulative effect of the previous period remained effective. If the Ukrainian industry had not lost foreign investment in recent years (Fig. 3), this effect would have been greater, because the start of the rapid industrial development of Asian countries was driven by the transfer of technology from foreign direct investment. Given that today technological innovation is the basis for rapid industrial development, it is necessary to apply a wide range of public policy measures to promote innovation and attract technology-intensive FDI.

The labor market, as a factor in the investment climate, plays an important role in industrial development. In line with current approaches, the workforce must be given the necessary incentives to best display its work skills, which is crucial for economic deve-

lopment. A flexible labor market enables workers to move quickly and at low cost from one type of economic activity to another, taking into account wage fluctuations and without social disruptions. An effective labor markets should provide clear incentives for employees to demonstrate skills, develop talent in the workplace, and ensure fairness in business relationships and pay. The combination of these factors has a positive effect on labor productivity and the country's attractiveness for skilled labor.

The two waves of crisis that Ukraine's economy experienced over the last decade have led to people's frustration with their internal economic situation and significantly increased labor migration. After several migration waves, about 2–3 million Ukrainians went to work abroad [70]. The loss of labor resources in Ukraine (estimated at almost 1,5% in 2019 [71]) is increasing under the influence of the policy of attracting foreign workers by the governments of neighboring countries. Thus, the Czech government regularly increases quotas for inviting Ukrainian workers under a long-term program implemented since 2016 [72]. The high demand for skilled workers existing in the labor market of this country is being met at the expense of skilled Ukrainian workers. Czech companies mostly expect metalworking specialists, welders, founders, locksmiths and mechanics, in other words, industrial workers. Governments of other EU countries (Poland, Germany) are taking similar measures. Obviously, the tendency towards migration of skilled population from Ukraine will continue, which will exert additional pressure on the domestic labor market.

The Ukrainian industry suffers from the loss of employees (Fig. 6) and the lack of qualified personnel. Dynamics of the reduction in the number of employed in the industry is far ahead of the rate of output decline: while the index of industrial output in 2018 compared to 2007 was 71%, the number of employees was 61%. In 2014–2018 the industry lost almost half a million workers (the number of employees reduced from 2,9 million to 2,4 million people). The industry lacks workers, even with increased productivity. Employment reductions are occurring in all sectors of the industry, and the industry's needs for skilled workers in various occupations are increasingly becoming unsatisfied.

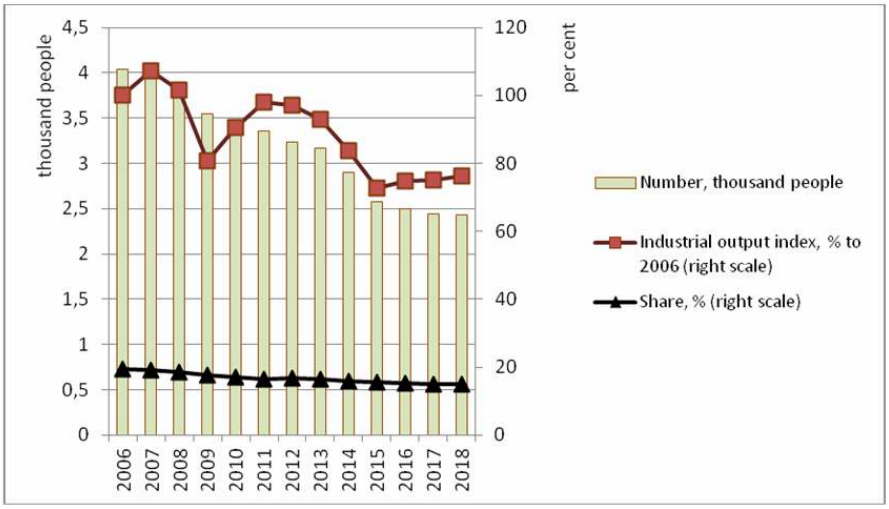

Fig. 6. Industrial production indexes, employment in industry and its share in total employment in 2007–2018

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

Structural mismatch of human resources to the needs of industry, and imbalance of the industrial segment of the labor market both limit the opportunities for industrial development.

The openness of the Ukrainian labor market and its involvement in the European market and in general world market exacerbates employers' competition for workers. Lagging behind in wages compared to neighboring countries increases the risks of labor emigration and the deepening of the labor market shortage, which forces Ukrainian employers to improve their working conditions. Data show a rapid increase in wages in Ukraine: its growth rates in nominal terms reached 25–37% in 2017–2018 (to previous year) and 13–19% in real terms. At the same time, the average wage in industry increased by 26–29%, and its level exceeded the average in the economy by 9%.

The shifts in the wages of industrial workers have been mostly in favor of more technologically complex activities. In particular, the average monthly salary in industry was 9633 UAH in 2018 (Table 6), including in manufacturing – 9196, mining – 12452, and power industry – 10790. Although the average wage in manufacturing was lower than in other sectors, the growth dynamics was higher. The leaders in the growth rate of the average monthly salary for the period 2013–2018 were the following activities: light industry, manufacture of computers, electronic and optical products, pharmaceutical production, and motor vehicle engineering. Increased wage growth rate in manufacturing branches contributes to reducing the income gaps in workers across industries and ensures social inclusion. Such trends also stimulate the flow of workers between industries towards technologically more complex types of production, which will help the population to return to work in production. At the same time, structural shifts in employment by types of industry influence the change in labor productivity, which causes the effect of labor flow from low- to high-productive activities and serves as a factor in improving the industrial efficiency [73].

In addition to increasing competition in the labor market, the following factors change the intersectoral proportions in Ukraine's industry:

– opening new businesses that generate technological jobs and increasing productivity in the manufacturing. Over the last few years, in the country, many new manufacturing facilities that use advanced technologies have been put into operation. These belong to various sectors, such as deep agro-food processing, production of construction materials from local fossil raw materials, biopharmaceuticals, electronics, instrumentation, mechanical engineering, light industry, renewable energy, etc.;

– the emergence of new sectors of production and the modernization of traditional industries, which occurs through the upgrade of imported technological components. The historically core industries are being supplied with modern technologies, which enhances their competitiveness in the markets;

– export potential of new productive facilities provides the companies with stable incomes and financial capacity to maintain a high remuneration.

It is evident that there will be a shift in labor resources towards innovative industrial activities from the stagnating sectors. In the future, the effect of these factors will determine the vector of change in the proportions of wages of the industrial workers, the relocation of labor in favor of high-productivity activities, increased labor mobility, and improved the system of vocational training and retraining.

Table 6

Average monthly salary per employee and its dynamics by industrial economic activities in Ukraine in 2013-2018

Economic activity	Average monthly wage, *UAH*				Growth rate in 2018 till 2013, *times*
	2013	2016	2017	2018	
Industry	3763	5902	7631	9633	2,56
Mining and quarrying	5266	7426	9704	12452	2,36
Manufacturing	3305	5543	7299	9196	2,78
textile manufacture, production of clothing, leather, leather goods and other materials	1868	3773	5414	6735	3,61
manufacture of computers, electronic and optical products	3083	6787	9000	10640	3,45
manufacture of basic pharmaceutical products and pharmaceutical preparations	5422	11028	13846	16754	3,09
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	3274	5441	7597	10008	3,06
manufacturing of rubber and plastic products; other non-metallic mineral products	2876	5144	6858	8667	3,01
manufacture of furniture, other products, repair and installation of machinery and equipment	3012	5290	7017	9003	2,99
manufacture of wood products, paper production and printing	2798	4800	6475	8241	2,95
manufacture of electrical equipment	3058	4803	6840	8731	2,86
beverages the manufacture of food, beverages and tobacco	3110	5182	6756	8338	2,68
metallurgical products, manufacture of fabricated metal products, except machinery and equipment	4132	6717	8423	11022	2,67
manufacture of machinery and equipment, not elsewhere classified	3282	5080	6923	8522	2,60
manufacture of coke and refined petroleum products	4370	6511	8106	10966	2,51
production of chemicals and chemical products	3630	5932	7552	8796	2,42
Supply of electricity, gas, steam and air conditioning	4500	6918	8493	10790	2,40
Water supply, sewerage waste management and remediation activities	2777	4039	5199	6549	2,36

Source: according to the State Statistics Service of Ukraine. URL: http://www.ukrstat.gov.ua/

The hypothesis of the impact of labor costs and remuneration level on industrial development was tested within linear paired regression models (Table 7). The dependent variable of the models is the GVA generated in industry using labor as a factor of production. The labor factor is represented by indexes of employment in industry and average salary.

Models (10; 11) are adequate, formal tests confirm their correctness. The model estimates indicate that labor costs have an impact on the dynamics of industrial development. The results presented indicate the importance of implementing a policy of support for industrial production and increasing the motivation for high-productivity work and the gradual transition to European standards in labor remuneration.

Table 7

Results of the evaluation of linear models of paired regression on the influence of factors on the dynamics of industrial GVA[6]

Factor, indicator	Model 10	Model 11
Industry average annual wage index (per employee, 2000 = 1)	1,49 (0,00)*	
Constant	-0,39 (0,27)*	
Manufacturing employment index (up to 2000)		2,01 (0,00)*
Constant		-0,22 (0,55)*
Time interval estimation	2002- 2018 pp.	2005-2015 pp.
R-squared	0,64	0,67
Durbin-Watson stat	1,92	1,61
Prob(F-statistic)	0,00	0,00

* In brackets Prob. t-Statistic of every factor is given.
Source: author's calculation.

Conclusions

Ukrainian industry, whose weakness is due to its low productivity, excessive financial vulnerability (in view of high debt dependence and low solvency of industrial companies), loss of capital, low profitability (insufficient for reproduction), and low-tech production structure, requires investment to enhance its competitiveness and development. That can be handled via the improvement of the investment climate. A comparison of industrial performance indexes in different investment climate conducted based on data of the reference groups of selected foreign countries and Ukraine has revealed a number of problematic factors. The factors of investment climate that slow down this country's industrial development include the lack of companies' own investment resources, difficult access of industrial business to the resources of financial markets and the latter's inefficient work, limited capacity of the domestic market and narrow demand for domestic produce, low GDP and mismatch of STA expenditures to the needs of industrial economy, shortage of skilled labor and massive emigration.

It is possible to improve the conditions of investment in Ukraine's industry, to increase the effectiveness of incentives and to minimize the investors' risks by applying

[6]Analyzing the statistical characteristics of the regression equations and checking their quality (regarding the absence of first- and higher-order autocorrelations, etc.) show the adequacy of the models.

a comprehensive approach in economic policy. The feasibility of this approach is confirmed by the results of econometric modeling, which in this study substantiates the effect of a system of investment climate factors (including such components as macroeconomic stability, market development (commodity, financial and labor markets), innovation activity and technological transfer) on the development of industry. Another proof is the estimates of long changes in industrial development depending on changes in the parameters of the above mentioned system, which were also obtained in the present work.

Creating investment preconditions for the industrial development provides:

– formation of investment sources of development: accumulation of gross savings in volumes sufficient to ensure a necessary amount of fixed capital;

– stabilization of the national financial system and ensuring the confidence to it in economic entities, conducting an effective savings and investment policy, improimplemetation ving the incentives for reviving the savings process, providing guarantees for the return of the savings of economic entities (both households and companies) invested in financial institutions and tools;

– reforming the fiscal system in order to de-offshore the business, reducing the pressure of the budget deficit on the domestic financial market;

– changing the paradigm of monetary policy, expanding its area of responsibility towards maintaining the course for long-term economic growth, taking care of the national producer and domestic investor;

– improving the conditions for investment through the systematic improvement of the legal field, reducing the risks of investment activities in the domestic market by strengthening supremacy of law and consolidating the institutions of all levels in the field of legal protection and judicial authority.

Due to the dependence of the investment climate on many factors, the tools for its recovery are also complex and multilevel. To ensure industrial development, it is necessary to use a set of government policy elements that determine the investment climate. The priority steps to improve the prospects for investment and development of national production are the following:

– easing monetary policy, fiscal encouragement of investment in production, ensuring protection of creditors' rights; Implementation of accessible lending programs for business through the mediation of relevant institutions (commercial banks, the newly created Entrepreneurship Development Fund);

– expanding and improving the structure of domestic demand for industrial products by launching state programs for technical re-equipment and modernization of the entire infrastructure network of the country in order to eliminate "bottlenecks", improve technical and operational capabilities of the infrastructure facilities, including the modernization and upgrade of the rolling stock of Ukrzaliznytsia;

– facilitating the diversification of demand for industrial products and modification of the consumption through increased incomes and purchasing power of consumers [60] using income and employment policy instruments;

– reduction of barriers to export activities of industrial producers with the help of the instruments of international trade agreements, involving foreign economic institutions (to promote the flow of Ukrainian goods and services to consumers in other countries), in particular, export credit agency and Ukrainian banks;

– implementing measures to diversify the structure of production and its localization in the country, aimed at expanding the use of local resources instead of the

imported ones (raw materials, other intermediate and final consumption products made in Ukraine, as well as Ukrainian labor, scientific achievements etc.), and diversification of the supply of manufactured goods from domestic producers [63], together with balancing requirements and incentives for investors;

– implementing, within the framework of decentralization policy [26], strategies of regional and national smart specialization designed to create a favorable environment for innovation by joint efforts of the government and private sector, as well as diversifying this country's industrial potential through the revival of entrepreneurship, modernization of the existing production base, and starting new economic sectors.

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ІНВЕСТИЦІЙНИЙ КЛІМАТ ЯК ЧИННИК ПРОМИСЛОВОГО РОЗВИТКУ УКРАЇНИ

Розглядаються питання забезпечення промислового розвитку на основі залучення інвестицій залежно від зміни характеристик інвестиційного клімату. Оскільки проблеми стагнації промислового виробництва, його низької продук-

тивності, надмірної фінансової уразливості (з огляду на високу боргову залежність і низьку платоспроможність підприємств галузі), втрати капіталів, недостатнього для відтворення рівня рентабельності залишаються актуальними, то у цьому дослідженні представлено ті засоби до їх вирішення, які пов'язані із залученням інвестицій та оздоровленням інвестиційного клімату.

Висвітлена сутність інвестиційного клімату та його вплив на залучення інвестицій у промисловий розвиток. Проведено порівняльний аналіз показників діяльності промисловості залежно від характеристик інвестиційного клімату на прикладі референтних груп країн світу та України, що дозволило виявити проблемні аспекти умов інвестування у національну промисловість. Розроблено комплекс економетричних моделей, за допомогою яких обґрунтовано дію системи чинників інвестиційного клімату (а саме макроекономічної стабільності, розвиненості ринків – товарного, фінансового і ринку праці, інноваційної активності та технологічного трансферу) на розвиток промисловості, та оцінено його зміни залежно від зрушень у параметрах зазначеної системи у довгостроковому періоді.

Показано доцільність реалізації комплексного підходу до оздоровлення умов інвестування з використанням різних елементів державної політики, які визначають стан інвестиційного клімату (включно з макроекономічною політикою, грошово-кредитною, науковою та інноваційною, політикою розширення ринків збуту продукції та регулювання ринку праці) задля забезпечення промислового розвитку. Зокрема, для підтримки інноваційної діяльності пропонується застосування стратегій смарт-спеціалізації, що передбачають модернізацію та диверсифікацію індустріального потенціалу регіонів, посилення їх підприємницьких можливостей на основі впровадження технологічних новацій.

Ключові слова: інвестиційний клімат, промисловий розвиток, залучення інвестицій, макроекономічна стабільність, фінансовий ринок, кредитні ресурси, внутрішній ринок, експорт, імпорт, інноваційна діяльність, технологічний трансфер, ринок праці, заробітна плата

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ИНВЕСТИЦИОННЫЙ КЛИМАТ КАК ФАКТОР ПРОМЫШЛЕННОГО РАЗВИТИЯ УКРАИНЫ

Рассматриваются вопросы обеспечения промышленного развития на основе привлечения инвестиций в зависимости от изменения характеристик инвестиционного климата. Поскольку проблемы стагнации промышленного производства, его низкой производительности, чрезмерной финансовой уязвимости (учитывая высокую долговую зависимость и низкую платежеспо-

собность предприятий отрасли), потери капиталов, недостаточного для воспроизводства уровня рентабельности, не теряют актуальности, то в этом исследовании представлены те пути к их решению, которые связаны с привлечением инвестиций и оздоровлением инвестиционного климата.

Выявлены сущность инвестиционного климата и его влияние на привлечение инвестиций в промышленное развитие. Проведен сравнительный анализ показателей деятельности промышленности в зависимости от характеристик инвестиционного климата на примере референтных групп стран мира и Украины, что позволило выявить проблемные аспекты условий инвестирования в национальную промышленность. Разработан комплекс эконометрических моделей, с помощью которых обосновано действие системы факторов инвестиционного климата (а именно макроэкономической стабильности, развитости рынков – товарного, финансового и рынка труда, инновационной активности и технологического трансфера) на развитие промышленности, и оценены его изменения в зависимости от сдвигов в параметрах указанной системы в долгосрочном периоде.

Показана целесообразность реализации комплексного подхода к оздоровлению условий инвестирования с использованием различных элементов государственной политики, определяющих состояние инвестиционного климата (включая макроэкономическую политику, денежно-кредитную, научную и инновационную, политику расширения рынков сбыта продукции и регулирования рынка труда) для обеспечения промышленного развития. В частности, для поддержки инновационной деятельности предлагается применение стратегий смарт-специализации, предусматривающих модернизацию и диверсификацию промышленного потенциала регионов, усиление их предпринимательских возможностей на основе внедрения технологических новаций.

Ключевые слова: инвестиционный климат, промышленное развитие, привлечение инвестиций, макроэкономическая стабильность, финансовый рынок, кредитные ресурсы, внутренний рынок, экспорт, импорт, инновационная деятельность, технологический трансфер, рынок труда, заработная плата