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WORLD EXPERIENCE ADAPTATION OF ANTI-CRISIS MANAGEMENT OF ENTERPRISES IN THE CONDITIONS OF NATIONAL ECONOMY'S TRANSFORMATION

Svitlana Khalatur[1], Lesia Kriuchko[2], Anna Sirko[3]

Abstract. *The purpose* of the article is to systematize and generalize the experience of leading countries to form and implement an effective crisis management system; to clarify the role of the state in the formation and implementation of anti-crisis regulation strategy of the real sector of the economy, as well as to substantiate the main methodological provisions of its formation. *The subject-matter* of the study is the methodological and conceptual foundations of the process of the effective crisis management system of the USA, China, Japan, the EU and Ukraine. *Methodology*. The research is based on the set of well-known general scientific and special methods of research in economics. In particular, the dialectical method, the method of scientific abstraction, the method of systematic analysis, economic and mathematical modeling has been used in the article. *Conclusion*. The world experience of solving the problems of enterprise bankruptcy is generalized. The experience of the USA, Japan, China, the countries of the European Union is considered. The econometric model taking into account the heteroskedasticity of the residues shows that an increase of 1% Central government debt, bank capital to assets ratio, expense, exports of goods and services, foreign direct investment, net inflows will increase GDP by 2.41%, 1.53%, 1.23%, 2.03%, and 1.19% respectively in the studied countries. Examining the experience in the field of crisis management, it should be noted that in Europe there is a selective approach aimed at stimulating the activities of specific companies; public sector priorities are education, health care, pensions, and the labor market. In addition, in some countries in order to find innovative structures of enterprises, increase their competitiveness and efficiency, out of the crisis, the development of privatization programs is used, which in each country have their own characteristics. World experience shows that the models of anti-crisis management constructed in different countries of the world provide various potential opportunities for progressive socio-economic changes. However, none of them can be used in its pure form in the formation of anti-crisis management policy in Ukraine. This is due to the conditions of accumulation of this experience by countries, the formation of mechanisms and institutions in a balanced economy, differences in the construction of financial and credit mechanisms, and so on. The use of positive experience should be the first step towards reforming the crisis management system.

Key words: anti-crisis management, financial and economic problems, state anti-crisis management, crisis, cooperatives, international experience, financial security.

JEL Classification: C51, F43, O11

1. Introduction

Every country must ensure sustainable economic development. To maintain stability in the economy, various instruments of monetary regulation are used, the choice of which is a complex process. The anti-crisis management has a special role in ensuring the economic growth of the state. Ukraine, in its efforts and aspiration to be a market economy country, is facing problems related to the crises inherent in countries operating within a market model of development. Therefore, the paper examines the anti-crisis management of other countries and

Corresponding author:
[1] Dnipro State Agrarian and Economic University, Ukraine.
E-mail: skhalatur@gmail.com
ORCID: https://orcid.org/0000-0001-8331-3341
ResearcherID: T-7645-2019
[2] Dnipro State Agrarian and Economic University, Ukraine.
E-mail: Stim2007@ukr.net
ORCID: https://orcid.org/0000-0002-7490-3523
[3] Dnipro State Agrarian and Economic University, Ukraine.
E-mail: masterbilding80@gmail.com
ORCID: https://orcid.org/0000-0003-3791-9435

the experience that Ukraine can learn to improve governance in times of crisis.

The dynamics of overcoming the crisis and further economic growth depend on the sovereignty of the state, its ability to encourage the development of institutional forms, adequate time. Anti-crisis regulation can be considered both at the macro, meso, and micro level. The implementation of anti-crisis procedures in relation to the functioning of the industry is called the anti-crisis process. World experience shows that this process is manageable and includes two blocks of procedures: crisis management and crisis management, which serve a common purpose at different (micro-, meso- and macroeconomic) levels. At the micro level, anti-crisis regulation in the economic literature is considered as anti-crisis management in relation to a particular business entity. At the meso level, crisis management provides a system of measures for groups of enterprises in a particular industry. The goals of crisis management can be achieved by solving the following tasks: diagnosing the financial condition and assessing the prospects for the development of potential production of enterprises in the industry; development of a plan for financial recovery of enterprises; assessment of the depth of the financial and economic crisis of enterprises and the effectiveness of measures for their financial recovery; selection and implementation of anti-crisis procedures.

However, effective anti-crisis management of the industry should be facilitated by government regulation. The content of anti-crisis regulation – the category of macroeconomic – is the measures of state organizational and economic and regulatory action on enterprises and industries at the stages of prevention, response and study of crises.

2. Literature review

Both domestic economists and foreign scientists are interested in the problems of theory and practice of crisis management and crisis regulation. Today, the world has accumulated considerable experience in implementing crisis management and forecasting of crisis phenomena of economic entities.

Thus, Bohdan Danylyshyn, Ivan Bohdan (2020) study the global nature of restrictive measures and declining aggregate demand during a coronavirus pandemic, affecting both multinational corporations and small businesses operating exclusively in the domestic market. The synchronous economic downturn in many countries, the imbalance of commodity and financial markets in response to the spread of the epidemic again after the global crisis of 2008-2009, revealed systemic shortcomings in the model of economic liberalism and minimizing state influence on social processes.

Kseniia Kotliarevska (2019) argues that the European course opens up a unique opportunity for Ukraine to reach a qualitatively higher level of development of society and the state, giving each of its citizens a chance to unleash their own potential. To reap the benefits of joining the United Europe, Ukraine needs to master modern models of economic growth, aimed at ensuring stable and high indicators of socio-economic development in the long run.

Mykhailo Bril (2018) writes that at the present stage in Ukraine the study of the causes of uneven economic development and factors stabilizing further economic development have become widespread. Ukraine's economy faces significant structural imbalances in the production and economic systems.

Valeria Dykan and Oleksandr Pakharenko (2019) write that the rapid development of information technology, internationalization of economic processes, increasing the level of unpredictability of the world economic space require business structures maximum concentration on management processes, implementation of innovative principles in all areas, rapid adaptation to economic change .

The study Elok Sri Utami (2017) aims to examine the impact of the financial crisis of 2008 on the performance of companies in the field of ownership listed on the Indonesian Stock Exchange. The property sector is an attractive and promising business sector for many investors because as the population grows, the demand for housing grows.

George Drogalas, Iordanis Eleftheriadis, Michail Pazarskis and Evgenia Anagnostopoulou (2017) study risk management, which is widely recognized as an important tool for identifying, assessing and overcoming various risks of enterprises. Today, the fact that companies operate in an uncertain environment makes it extremely important to implement procedures that allow them to manage risks in a timely and effective manner.

Rostyslav Slaviuk and Nataliia Slaviuk (2018) write that the financial crisis of 2008-2009 has caused a rapid increase in public debt around the world. This is a common element of the economic crisis: the economic slowdown is causing budget deficits and countries are forced to borrow in domestic and foreign markets.

Oleksii Liulov (2017) examines the impact of public finances on the country's macroeconomic stability indicators, which is based on an assessment of the time series of instability of four economic variables: inflation, the ratio of budget deficit to GDP growth, external debt and exchange rate deviations.

Vitalina Babenko, Maryna Pasmor, Yuliia Pankova, Mykhailo Sidorov (2017) study the socio-economic and political processes taking place in Ukraine, the implementation of approaches to integration into the world economic space, in particular on the basis of international integration processes of scenario forecasting.

Liudmyla Tranchenko, Nataliia Petrenko, Liliia Kustrich, Nataliia Parubok and Oleksandr Tranchenko

(2018) believe that the current stage of transition to another model of national economy at the regional level should be characterized by the formation of long-term development priorities aimed at overcoming modern challenges and identifying promising directions. The remoteness and universality of a long-term forecast and the limited ability to take into account the impact of a variety of economic factors require detailed and accurate forecast results.

However, despite the significant amount of research on the nature and tools of crisis management, as well as the increasing relevance and practical significance of this problem in recent times, it still remains unresolved. A set of questions concerning the possibility of using crisis management tools used in the leading countries of the world needs thorough research. This determines the relevance and need for further study of this problem.

3. The purpose and objectives of the study

Based on the scientific and practical relevance of the topic and based on the results of studying some aspects of it in the world and national economic literature, the aim of the article is to systematize and generalize the experience of leading countries to form and implement an effective crisis management system.

The purpose of the article is to clarify the role of the state in the formation and implementation of anti-crisis regulation strategy of the real sector of the economy, as well as to substantiate the main methodological provisions of its formation.

To achieve this goal, the following tasks are outlined:
1) to consider the approaches and priorities of the world in the implementation of anti-crisis measures;
2) to develop an economic and mathematical model

4. Research of world experience of anti-crisis management and analysis of macroeconomic indicators influencing anti-crisis activity of countries

Stable state and crisis are constant antagonisms in the development of any system. Based on this, crisis management can be considered as a system of measures to diagnose, prevent, neutralize and overcome crisis phenomena and their causes at all levels of the economy. Anti-crisis public administration in countries with developed market economies is expressed in various forms.

Thus, in particular, the development of agricultural cooperation allows taking advantage of large-scale commodity production and taking into account the interests of rural producers, contributing to the revival of the peasant as the owner of production, the real owner of means of production and products.

The cooperative movement is the most massive in the world. It unites almost 800 million people. And this is not accidental, because cooperation performs a number of much-needed economic and social functions. It widely uses small forms of management, actively supports small and medium-sized enterprises, it is the basis for the formation and operation of appropriate organizational and legal structures of vertical and horizontal types. Due to the social use of technical and economic resources of individual owners, cooperation makes production large-scale and on the basis of joint work and combination of efforts and resources of all its participants provides a maximum cost per unit of final product. All this makes cooperation a significant phenomenon and determines its objective necessity in the field of agribusiness.

Cooperation as a form of cooperation is inherent in almost every country, regardless of its existing socio-economic formation. It arose from the needs of various producers (especially small ones) and received large-scale development in almost all countries, regardless of their social structure. At the same time, the level of development of cooperation is to some extent determined by the mechanism of economic laws, the state of the economy of enterprises, the legal framework of each individual country and so on.

In times of economic instability, economic downturn or crisis, the governments of the United States and Western European countries are trying to change the situation by increasing government intervention in the economy. This is not typical of a country in normal economic conditions, because, usually, public policy is aimed only at broad government support for private enterprise and the market.

Intervention in the economy leads to increased government spending and an increase in the share of GNP that is redistributed through the budget. This concept certainly leads to increased costs of economic management, accompanied by the formation of budget deficits and public debt. But the government resorted to such anti-crisis measures only as a last resort.

Japan is a country with a long tradition of state intervention in the economy, including through indicative planning. Analyzing the directions of state intervention in Japan today, we note that it is observed in many areas: economic growth and its rate; structure of industrial production; education and science; employment; credit and money circulation; pricing; foreign economic relations; industry structure; location of productions; investment incentives. However, despite the active state intervention in the economy, the country is developing both large and small businesses. This is due to the fact that economic difficulties are overcome with the active support of the state. It is the state, through fiscal and credit and financial policy, as well as measures of direct administrative influence, contributes to solving the problems of economic entities.

Examining the experience of the European Union in the field of crisis management, it should be noted that it is

dominated by a selective approach aimed at stimulating the activities of specific companies. It is believed that only private business can effectively address the rise of depressed regions and businesses by creating small and medium-sized enterprises in advanced industries. However, each country of the European Union has its own characteristics.

Thus, the main feature of the economy of industrialized France is that the public sector dominates in the basic industries, although the degree of state participation in them may vary. State-owned companies operate mainly in the automotive, aerospace, chemical and oil and gas industries, and ferrous metallurgy.

When considering issues of state regulation in the Scandinavian countries, it is necessary to pay attention to two concepts. These are state property and the public sector. The share of state ownership is significant only in Finland, as the public sector is significant in all Scandinavian countries. Employment in the public sector of the Scandinavian economy is highest among developed countries: Sweden – 32%; Norway and Denmark – about 30%, Finland – 25%. The priorities of the Scandinavian public sector are education, health care, pensions, the labor market, etc. In addition to the direct participation of the state in the economy, there are indirect methods of regulation through measures of credit and financial policy.

Thus, in countries with developed market economies, rich experience has been accumulated in both preventing and overcoming crises at the macro and micro levels. Of course, the conditions for the emergence and development of different types of crises in Ukraine and other countries are different. But this fact does not detract from the need for careful study of experience and thoughtful, creative approach to its application in the process of crisis management. It should be noted that bankruptcy is one of the few institutions in the formation of which all countries of the world participate.

Crisis management measures are implemented at two levels. Carrying out of the state anti-crisis measures is caused by necessity of increase of a technological level and growth of competitiveness of production of the national commodity producer in the world market. At the level of economic entities, the solution of financial and economic problems is carried out within the framework of crisis management and bankruptcy procedures using organizational and managerial methods. In this study, the first level of crisis management is considered in more detail.

As part of anti-crisis policy, the United States used a tool to regulate the dollar exchange rate. In particular, they limited the growth of the national currency by stimulating exports and curbing inflation. In addition, certain measures were aimed at reducing borrowing. To this end, asset prices rose. As a result, income increased in the category of the population that had these assets at its disposal. This was aimed at stimulating aggregate demand, which in turn reduced inflationary pressures.

For a more detailed disclosure of the research topic, we will analyze some indicators of anti-crisis functioning of the United States, Japan, China, 27 countries of the European Union and Ukraine; and the impact of these indicators on the anti-crisis development of the national economy. Thus, we compare the indicators related to crisis management in the United States, Japan, the European Union and Ukraine, in particular, the following indicators will be analyzed: Bank capital to assets ratio (%); Bank liquid reserves to bank assets ratio (%); Profit tax (% of commercial profits); Central government debt, total (% of GDP); Claims on central government, etc. (% GDP); Claims on other sectors of the domestic economy (% of GDP); Current account balance (% of GDP); Depositors with commercial banks (per 1,000 adults); Domestic credit provided by financial sector (% of GDP); Expense (% of GDP); GINI index (the World Bank estimate); Exports of goods and services (% of GDP); Imports of goods and services (% of GDP); Foreign direct investment, net inflows (% of GDP); Foreign direct investment, net outflows (% of GDP); GDP growth (annual%); General government final consumption expenditure (% of GDP).

Analyzing Table 1, we can draw the following conclusions. Bank capital to assets ratio is the largest in Ireland (14.86%) and the smallest one is in Sweden (6.18%).

A country with a long tradition of state intervention in the economy is Japan. Analyzing the state intervention in Japan today, I would like to note that it is observed in many areas: economic growth and its rate; structure of industrial production; education and science; employment; credit and money circulation; pricing; foreign economic relations; industry structure; location of productions; investment incentives. However, despite the active state intervention in the economy, the country is developing both large and small businesses. This is due to the fact that economic difficulties are overcome with the active support of the state. It is the state, through fiscal, and credit, and financial policy, as well as measures of direct administrative influence, helps to solve the problems of economic entities.

Continuation of the analysis of indicators of anti-crisis functioning of the USA, Japan, China, the EU countries and Ukraine is shown in Table 2.

Analyzing the data of the Deposit interest rate, we can say that the more a country is economically resilient to crises, the lower its Deposit interest rate.

Examining the experience of the European Union in the direction of crisis management, we can say that it has a selective approach aimed at stimulating the activities of specific companies. It is believed that only private business can effectively address the rise of depressed regions and businesses by creating small and medium-sized enterprises in advanced industries.

Table 1

Average value of anti-crisis functioning indicators of the USA, Japan, China, EU countries and Ukraine for the period 2005-2019

Country Name	Bank capital to assets ratio (%)	Bank liquid reserves to bank assets ratio (%)	Profit tax (% of commercial profits)	Central government debt, total (% of GDP)	Claims on central government, etc. (% GDP)	Current account balance (% of GDP)
The USA	11.69	9.70	27.9	96.84	35.69	-2.38
Japan	---	31.57	24.7	194.43	141.92	3.51
China	9.07	----	10.9	----	24.96	1.61
Austria	7.71	----	16.86	----	12.22	1.74
Belgium	7.61	--	8.50	----	21.22	1.23
Bulgaria	10.82	18.11	5.19	----	1.05	3.29
Croatia	13.90	28.44	0.00	----	16.15	2.21
Cyprus	8.22	----	8.78	----	23.67	-4.27
Czech Republic	6.54	37.27	5.60	----	7.18	0.35
Denmark	6.97	3.83	20.84	----	-3.88	6.96
Estonia	12.08	---	8.58	----	-3.05	1.67
Finland	9.30	----	14.65	----	9.12	-1.39
France	6.52	----	4.37	----	17.65	-0.68
Germany	6.47	----	22.06	----	8.72	7.42
Greece	10.72	----	17.54	----	13.64	-2.86
Hungary	----	13.47	10.17	96.18	17.76	2.23
Ireland	14.86	-----	12.15	84.83	16.41	4.77
Italy	6.33	-----	23.06	----	48.42	2.58
Latvia	9.74	-----	6.27	----	2.49	1.43
Lithuania	9.61	----	6.47	----	2.64	1.53
Luxembourg	7.44	----	4.32	----	0.14	5.21
Malta	8.40	----	31.16	----	15.19	8.77
Netherlands	6.21	----	20.4	----	14.43	10.84
Poland	9.77	11.47	15.05	----	11.18	-0.52
Portugal	7.04	----	12.5	----	24.75	1.38
Romania	9.34	21.83	11.61	----	4.97	-4.38
Slovak Republic	10.45	-----	8.38	----	15.49	-2.61
Slovenia	10.69	-----	13.74	----	15.46	5.69
Spain	7.55	----	15.75	104.57	26.35	1.92
Sweden	6.18	3.89	15.07	----	3.24	3.86
Ukraine	13.51	11.16	11.17	71.81	20.26	-3.34
World	---	17.71	15.97	----	26.08	----

Source: compiled by authors based on World Bank data

World experience shows that the models of anti-crisis management constructed in different countries of the world provide various potential opportunities for progressive socio-economic changes. However, none of them can be used in its pure form in the formation of anti-crisis management policy in Ukraine. This is due to the conditions of accumulation of this experience by countries, the formation of mechanisms and institutions in a balanced economy, differences in the construction of financial and credit mechanisms. The use of positive experience should be the first step towards reforming the crisis management system in Ukraine.

Next, we analyze the value of exports of goods and services in the studied countries.

Table 3 shows that the largest exports during the study period were observed in Belgium, Ireland, Luxembourg, Malta and the Netherlands. For countries with the largest exports, we analyze the dynamics of Foreign direct investment, net inflows (Figure 1).

Analyzing the dynamics of Foreign direct investment, net inflows, we can observe a significant decrease in this indicator in 2009, i.e., after the crisis of 2008. In 2018, there is a slight increase in this indicator.

Figure 2 analyzes the dynamics of GDP growth by selected countries.

Analysis of Figure 2 also shows the significant impact of the 2008 crisis on GDP growth, as in 2008 and 2009 this indicator was negative.

After conducting this study, we can conclude that the most resilient to macroeconomic crises among the EU is the Netherlands. So, let us compare five countries in more detail: the United States, Japan, China, the Netherlands and Ukraine.

Table 2
Average value of anti-crisis functioning indicators of the USA, Japan, China, the EU countries and Ukraine for the period 2005-2019

Country Name	Deposit interest rate (%)	Imports of goods and services (% of GDP)	Domestic credit provided by financial sector (% of GDP)	Expense (% of GDP)	GINI index (World Bank estimate)
The USA	----	15.32	106.83	22.33	41.40
Japan	0.42	18.19	271.73	17.77	32.90
China	1.50	18.73	194.27	----	39.70
Austria	----	49.33	128.37	45.04	30.27
Belgium	---	80.92	134.04	40.97	28.43
Bulgaria	0.61	63.57	60.29	32.61	35.47
Croatia	1.52	46.52	87.29	39.91	32.14
Cyprus	----	67.70	255.57	42.65	32.62
Czech Republic	0.52	72.20	66.82	32.96	26.42
Denmark	----	48.14	213.60	40.44	26.70
Estonia	----	72.86	74.34	36.34	33.25
Finland	----	37.57	155.49	39.55	27.56
France	0.89	30.85	147.41	47.78	32.09
Germany	---	40.29	134.19	28.22	30.85
Greece	----	34.01	134.50	47.76	34.64
Hungary	0.58	80.56	60.28	43.49	29.79
Ireland	----	84.85	160.68	34.86	32.62
Italy	----	26.70	169.19	43.27	34.40
Latvia	----	61.48	57.17	43.46	36.03
Lithuania	----	71.22	51.91	32.79	35.50
Luxembourg	----	175.54	190.11	38.22	31.61
Malta	----	128.55	143.92	36.91	29.11
Netherlands	2,44	69.33	207.17	40.95	28.21
Poland	----	48.16	73.44	34.26	33.88
Portugal	----	43.44	173.76	43.76	35.51
Romania	3.02	43.59	37.89	33.21	36.58
Slovak Republic	----	90.78	72.88	40.63	26.73
Slovenia	---	69.42	68.54	43.35	24.95
Spain	----	29.89	194.27	19.79	34.54
Sweden	----	41.23	154.13	33.14	27.42
Ukraine	11.77	53.81	74.35	37.37	26.50
World	----	29.35	132.43	27.32	----

Source: compiled by authors based on World Bank data

Table 3
Exports of goods and services,% of GDP

Country Name	2005	2014	2015	2016	2017	2018	2019	Ratio 2019 to 2005
The USA	10.01	13.54	12.44	11.87	12.09	12.22	13.54	135.28
Japan	14.01	17.54	17.61	16.25	17.77	18.45	15.92	113.58
China	33.83	23.59	21.44	19.75	19.96	19.51	24.60	72.71
Austria	48.62	53.39	53.09	52.45	54.04	55.76	53.44	109.92
Belgium	74.28	79.80	77.81	79.38	82.31	82.58	79.32	106.79
Bulgaria	42.86	64.90	64.54	64.73	68.15	66.94	64.88	151.36
Croatia	36.73	43.30	46.38	47.63	50.03	50.52	40.43	110.09
Cyprus	55.69	66.11	70.33	70.75	73.02	73.07	61.36	110.18
Czech Republic	62.18	82.55	81.05	79.56	79.73	78.39	76.87	123.62
Denmark	47.45	54.61	55.42	53.43	55.14	55.64	54.83	115.55
Estonia	65.47	81.33	76.87	77.45	76.14	74.26	84.02	128.33
Finland	40.27	36.48	35.39	34.82	37.68	38.56	38.02	94.40
France	27.03	29.67	30.59	30.25	30.82	31.34	29.36	108.63

(End of Table 3)

Country Name	2005	2014	2015	2016	2017	2018	2019	Ratio 2019 to 2005
Germany	38.06	45,62	46.85	46.02	47.40	47.42	45.42	119.34
Greece	21.31	32.37	31.55	30.06	32.99	36.13	30.35	142.42
Hungary	62.64	87.42	87.98	87.15	87.14	84.94	85.58	136.62
Ireland	79.58	110.03	121.97	120.82	121.04	122.33	103.66	130.26
Italy	24.60	29.11	29.72	29.33	30.84	31.45	28.63	116.39
Latvia	43.21	61.20	60.72	60.40	62.13	61.30	60.26	139.46
Lithuania	53.84	72.34	68.82	67.58	73.61	75.62	78.79	146.34
Luxembourg	161.68	212.61	221.20	213.04	217.62	211.56	190.63	117.91
Malta	104.37	148.85	153.77	151.90	149.77	144.87	156.98	150.41
Netherlands	65.63	80.58	82.66	79.54	83.39	84.32	79.88	121.71
Poland	34.61	47.57	49.50	52.19	54.35	55.59	46.32	133.83
Portugal	27.08	40.22	40.62	40.21	42.72	43.52	39.61	146.23
Romania	24.54	41.16	41.02	41.19	41.47	41.64	39.87	162.51
Slovak Republic	72.30	91.52	92.02	93.73	95.11	96.09	93.62	129.48
Slovenia	59.81	76.15	77.15	77.97	83.17	85.38	74.22	124.08
Spain	24.98	33.48	33.63	33.88	35.18	35.12	32.96	131.96
Sweden	45.05	43.57	44.29	43.26	44.43	45.79	42.80	95.01
Ukraine	48.75	48.59	52.60	49.30	48.01	45.21	42.96	88.12
World	28.64	30.18	29.31	28.46	29.43	30.11	30.40	106.14

Source: compiled by authors based on World Bank data

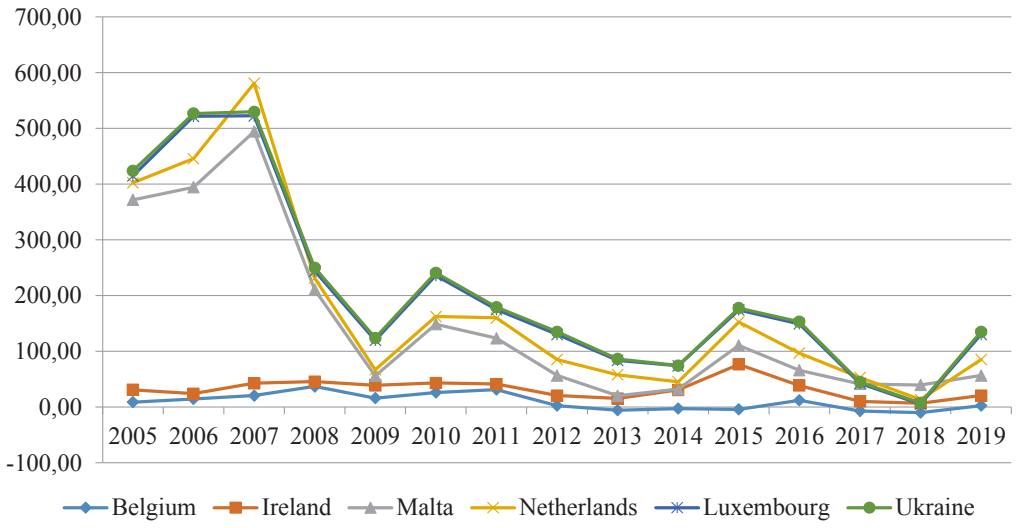

Figure 1. Foreign direct investment, net inflows, % of GDP

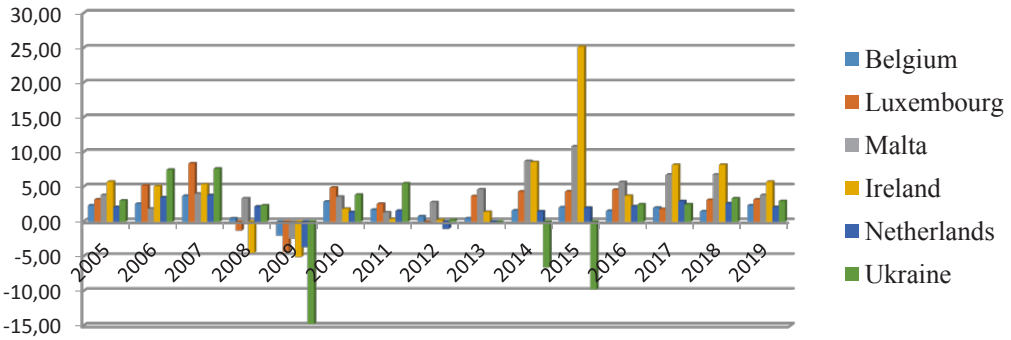

Figure 2. GDP growth, annual %

Table 4
General government final consumption expenditure, % of GDP

Country Name	2005	2014	2015	2016	2017	2018	2019	Ratio 2019 to 2005
The USA	15.06	14.64	14.36	14.28	14.15	14.14	15.53	103.18
Japan	18.12	20.15	19.82	19.88	19.67	19.75	20.25	111.79
China	14.00	13.38	14.04	14.39	14.52	14.68	13.48	96.29
Austria	19.35	19.80	19.76	19.67	19.49	19.32	19.86	102.66
Belgium	22.09	24.23	23.62	23.24	23.07	23.07	24.30	110.00
Bulgaria	18.30	16.91	16.27	15.79	15.84	16.72	15.91	86.94
Croatia	18.49	20.75	20.11	19.59	19.53	19.45	20.57	111.29
Cyprus	16.51	16.81	16.41	15.30	14.98	14.90	18.81	113.93
Czech Republic	20.68	19.68	19.22	19.27	19.19	19.97	19.81	95.77
Denmark	24.50	25.79	25.47	24.87	24.62	24.35	26.47	108.05
Estonia	16.96	19.09	19.98	20.36	19.87	19.62	18.52	109.19
Finland	21.41	24.51	24.37	23.66	22.81	22.66	24.10	112.54
France	23.07	24.13	23.81	23.73	23.68	23.41	23.95	103.83
Germany	18.78	19.59	19.56	19.78	19.86	19.90	19.28	102.67
Greece	20.02	20.28	20.30	20.06	19.81	19.14	21.74	108.58
Hungary	22.17	20.06	19.82	20.13	20.34	19.70	20.06	90.49
Ireland	16.03	16.05	12.25	12.31	11.98	11.90	17.68	110.28
Italy	19.61	19.54	19.11	19.03	18.82	19.02	19.81	100.99
Latvia	17.90	17.53	18.08	18.05	18.11	17.79	17.40	97.17
Lithuania	18.50	16.63	17.22	17.00	16.31	16.49	17.50	94.55
Luxembourg	17.15	16.74	16.50	15.92	16.43	16.66	17.41	101.52
Malta	18.11	18.86	17.49	16.11	15.37	16.27	20.21	111.59
Netherlands	22.28	25.68	24.98	24.68	24.32	24.24	26.03	116.82
Poland	18.30	18.18	18.04	17.90	17.69	17.80	17.93	97.99
Portugal	20.99	18.40	17.85	17.59	17.18	16.96	18.34	87.37
Romania	16.24	14.23	13.74	15.09	15.71	16.61	14.53	89.44
Slovak Republic	18.48	18,36	18.62	18.92	18.91	18.61	17.74	95.97
Slovenia	18.91	18.89	18.82	19.11	18.43	18.35	20.36	107.65
Spain	17.33	19.64	19.48	19.06	18.62	18.62	19.98	115.26
Sweden	25.05	26.16	25.81	26.38	26.07	26.02	25.82	103.07
Ukraine	17.36	18.67	18.92	18.60	20.67	20.76	18.65	107.40
World	16.43	17.01	17.06	17.06	16.92	16.94	17.17	104.49

Source: compiled by authors based on World Bank data

Table 5
General indicators of the national economies development of the studied countries on average for 2005-2019

Indicator	The USA	Japan	China	Netherlands	Ukraine
Population, total	326687501	126529100	1392730000	17231624	44622516
Land area (sq. km)	9147420	364560	9388210	33690	579290
Foreign direct investment, net inflows (% of GDP)	1.26	0.49	3.03	28.57	1.89
GDP growth (annual %)	2.22	1.92	6.76	1.95	3.34
Inflation, GDP deflator (annual %)	1.90	-0.22	2.93	1.26	15.41
Interest payments (% of expense)	11.77	9.35	----	3.56	9.78
Trade (% of GDP)	28.79	36.64	45.07	148.85	99.02
Net acquisition of financial assets (% of GDP)	0.98	0.69	----	----	2.89
Researchers in R&D (per million people)	4090.87	5304.13	1089.19	4776.84	994.08
Military expenditure (% of GDP)	3.81	0.95	1.92	1.33	3.02
Research and development expenditure (% of GDP)	2.78	3.21	2.06	1.92	0.76
Short-term debt (% of total external debt)	----	----	62.12	----	23.35
Total natural resources rents (% of GDP)	0.82	0.03	4.15	1.29	6.74
Unemployment, total (% of total labor force) (national estimate)	5.78	3.61	4.11	6.87	9.41

Source: compiled by authors based on World Bank data

Thus, the role of the state in the formation and implementation of anti-crisis management and economic regulation is not simply to expand the state's presence in the economy, but to increase the effectiveness of long-term public policy and concrete actions to improve the economy, improve social status. The goal of the anti-crisis strategy of Ukraine's economy should be to increase the technological structure of production to create a larger share of value added in the country.

The movement in this direction requires the inclusion in the anti-crisis strategy of three key points: it is necessary to consistently develop a system of market institutions; determining the role of the state in the economic process should be based on the fact that in all modern developed countries, the economy is mixed in nature, i.e. the state performs many coordination functions, as well as makes some direct regulatory decisions. In critical periods for the economy, the role of the state is growing. Removing the state from the management of a market economy is absolutely unacceptable.

For a more detailed disclosure of the research topic, the dependence of GDP growth (annual %) and central government debt, total (% of GDP) is further studied; Bank capital to assets ratio (%); Expense (% of GDP); Exports of goods and services (% of GDP); Foreign direct investment, net inflows (% of GDP)

The sign of heteroskedasticity in each case is difficult to detect, because it is necessary to know the values σ_{ε_i} for each fixed value $X = x_i$. In practice, as a rule, for each specific value $X = x_i$ we have only one value of the dependent variable $Y = y_i$, and not a number of distributions. This does not allow us to estimate the variance of a random variable Y at a fixed value $X = x_i$.

There are proven tests that can detect heteroskedasticity. And, as practice shows, their use has positive consequences. These are the Glaser and Goldfeld-Quandt tests.

Glaser and Goldfeldt-Quandt tests can detect the presence of a sign of heteroskedasticity in the model only in the case of violation of the condition $\sigma^2_{\varepsilon_i} = const$, ie, when the variances of the residues ε_i are not constant values. When the condition $\sigma^2_{\varepsilon_i} = const$ is fulfilled, and at the same time $\text{cov}(\varepsilon_i, \varepsilon_j) \neq 0$, it is impossible to detect this violation of the condition of homoskedasticity by the above tests.

In this case, we are dealing with a linear model with a violation of the sign of homoskedasticity, which belongs to the second group. This situation arises when studying models with a sign of autocorrelation.

Thus, consider the relationship between GDP growth (Y, annual%) and Central government debt, total (X1,% of GDP); Bank capital to assets ratio (X2,%); Expense (X3,% of GDP); Exports of goods and services (X4,% of GDP); Foreign direct investment, net inflows (X5,% of GDP).

It is required:

1) to calculate the estimates of the parameters of the model by the method of least squares, check the significance of the relationship in the model and the statistical significance of the calculated estimates of the parameters of the model;

2) to analyze the feasibility of applying the method of least squares, checking the tests of Goldfeld-Quandt and Glaser the presence of heteroskedastic residues;

3) to calculate estimates of the model parameters taking into account the results of tests for the presence of heteroskedastic residues.

1. Construction of the model for MNC, verification of the model and its parameters for statistical significance.

The linear econometric model, the parameters of which are found by the method of least squares for sample data, has the form:

$$y_i^* = -2{,}366 + 0{,}219x1 + 0{,}12X2 + 0{,}23X3 + 0{,}23X4 + 0{,}19X5$$

The coefficient of determination of this model R2 = 0.854, between the resulting variable Y and the regressor X, the pairwise correlation coefficient rxy = 0.924. Let us check the statistical significance of the pairwise correlation coefficient according to Student's criterion:

$$t_{cn}^* = \sqrt{\frac{0{,}854 \cdot (30 - 1 - 1)}{1 - 0{,}854}} = 12{,}779 .$$

At the significance level α=0.05 and the degrees of freedom k=n-m-1=28 the tabular value of the Student's criterion $t''_{kp}(\frac{\alpha}{2}, k)$ =2,048, therefore, $t_{cn}^* > t''_{kp}(\frac{\alpha}{2}, k)$, the relationship in the model between Y and X is significant. The standard errors of parameter estimates and the corresponding values of the t-test are equal to:

$$s_{\beta_0^*} = 0{,}848; \qquad s_{\beta_1^*} = 0{,}017;$$
$$t_{\beta_0^*} = -2{,}789; \qquad t_{\beta_1^*} = 12{,}779.$$

$t_{\beta_0^*}, t_{\beta_1^*} \notin [-2{,}048; 2{,}048]$, this allows us to conclude that the calculated estimates of the model parameters differ significantly from zero.

2. Check for the presence of heteroskedastic residues.

We use the Goldfeld-Quandt test to check the presence of heteroskedastic residues. The test tests the basic hypothesis H0 $\sigma^2_{\varepsilon_1} = \sigma^2_{\varepsilon 2} = \ldots = \sigma^2_{\varepsilon_m}$: according to Fisher's test: in the alternative hypothesis Hα: not H0. To do this, we arrange the input data in descending order of the values of the explanatory variable X_i.

We discard $c = \frac{4 \cdot n}{15} = 8$ ($i = \overline{12, 19}$) the average observations (second subsample), assuming that the variance of the residues for them is constant. By the method of least squares, we find the parameter estimates first for the first model (subsample 1) with $n_1 = \frac{n - c}{2} = \frac{30 - 8}{2} = 11$ the largest values of the regressor X_i, then for the second – with $n_3 = 11$ the lowest values X_i (third subsample). Find the values y_i^* and e_i for both the first and second models and check

the presence of heteroskedastic residues based on the Goldfeld-Quandt test.

To do this, calculate the sums of the squares of the residuals $S_1 = \sum_{i=1}^{n_1} e_i^2$ i $S_3 = \sum_{i=1}^{n_2} e_i^2$ and calculate the value F_{cn}^*:

$$F_{cn}^* = \begin{cases} \dfrac{S_3/n_3}{S_1/n_1}, & if\ S_3 > S_1; \\ \dfrac{S_1/n_1}{S_3/n_3}, & if\ S_1 > S_3. \end{cases}$$

The calculated value $F_{cn}^* = \dfrac{126,243}{2,285} = 55,253$ is compared with the tabular value $F_{kp}(\alpha, k_1, k_2)$ =3.18 with degrees of freedom k_1=11-1-1=9 and k_2=11-1-1=9 at a significance level of α=0.05. Since $F_{cn}^* > F_{kp}(\alpha, k_1, k_2)$, hypothesis H_0 about the lack of heteroskedasticity of the residues is rejected.

Let us analyze the presence of heteroskedasticity according to the Glaser test. For model (1), calculate the values of the residuals and write them down in absolute terms.

The coefficient of determination of the model R^2 = 0.628, between $|e_i|$ and X the coefficient of pair correlation r = 0.792. The standard errors of parameter estimates and the corresponding values of the t-test are equal to:

$$s_{\alpha_0^*} = 0,403; \qquad s_{\alpha_1^*} = 0,008;$$
$$t_{\alpha_0^*} = -2,604; \qquad t_{\alpha_1^*} = 6,874.$$

At the level of significance α=0.05 and degrees of freedom k=n-m-1=28 the tabular value of the Student's criterion $t''_{kp}(\frac{\alpha}{2}, k)$ $t_{\alpha/2,k}$=2,048. Compare the calculated values $t_{\alpha_j^*}$ with the table:

$t_{\alpha_0^*}, t_{\alpha_1^*} \notin [-2,048; 2,048]$.

Therefore, we accept the Glaser test hypothesis of the presence of heteroskedastic residues.

3. We apply the weighted least squares method to find estimates of the model parameters with heteroskedastic regression residues.

Based on the Goldfeld-Quandt and Glaser test, we assume that $\sigma_{e_i}^2 = \sigma^2 x_i^2$. It is received

$$\vec{\beta}^* = \left(\left(X^*\right)' \cdot X^*\right)^{-1} \cdot \left(X^*\right)' \cdot \vec{y}^*,$$

where $\vec{y}^* = \begin{pmatrix} \frac{y_1}{x_1} \\ \frac{y_2}{x_2} \\ \dots \\ \frac{y_{30}}{x_{30}} \end{pmatrix}$; $X^* = \begin{pmatrix} 1 & \frac{1}{x_1} 1 \\ 1 & \frac{1}{x_2} \\ \dots & \dots \\ 1 & \frac{1}{x_{30}} \end{pmatrix}$, $\vec{\beta}^* = \begin{pmatrix} \beta_0^* \\ \beta_1^* \end{pmatrix}$.

Based on the data, we find that

$$\vec{\beta}^* = \begin{pmatrix} -3,194 \\ 0,241 \end{pmatrix}.$$

To determine s_{β_0} and s_{β_1} the formula is used:

$$\operatorname{cov}(\vec{\beta}^* \cdot (\vec{\beta}^*)') = s_\varepsilon^2((X^*)' \cdot X^*)^{-1},$$

where

$$s_\varepsilon^2 = \frac{\vec{e}' \cdot \vec{e}}{n-m-1} = \frac{\sum_{i=1}^{30}(y_i - (-3,194 + 0,241x_i))^2}{28} = \frac{0,02785}{28} = 0,00995$$

and $((X^*)' \cdot X^*)^{-1} = \begin{pmatrix} 0,131 & -3,063 \\ -3,063 & 96,328 \end{pmatrix}$.

Here n-m-1=30-1-1=28.

Thus, it is obtained $s_{\beta_0^*} = 0,310$; $s_{\beta_1^*} = 0,011$.

Let us check the statistical significance of parameter estimates based on the t-test:

$$t_{\beta_0^*} = 10,311; \qquad t_{\beta_1^*} = 21,146.$$

At the level of significance α=0,05 and degrees of freedom k=n-m-1=28 tabular value of the Student's criterion $t''_{kp}(\frac{\alpha}{2}, k)$=2,048. $t_{\beta_0^*}, t_{\beta_1^*} \notin [-2,048; 2,048]$, the calculated estimates of the model parameters differ significantly from zero.

Compared with the model, the root mean square errors of the parameter estimates decreased with a corresponding increase in the value $t_{\beta_j^*}$.

Therefore, the econometric model taking into account the heteroskedasticity of the residues has the following form:

$$y_i^* = -3,123 + 0,241x1 + 0,153X2 +$$
$$+ 0,123X3 + 0,203X4 + 0,119X5$$

i.e., an increase of 1% central government debt, Bank capital to assets ratio, Expense, Exports of goods and services, Foreign direct investment, net inflows will increase GDP by 2.41%, 1.53%, 1.23%, 2.03%, and 1.19% respectively.

5. Discussion

Rostyslav Slaviuk and Nataliia Slaviuk (2018) argue that government borrowing can be an important source of investment for economic development and increase their competitiveness, although in the event of recovery from the crisis and the existence of high levels of public debt, most public debt is used to current needs and to refinance existing debt.

Research by George Drogalas, Iordanis Eleftheriadis, Michail Pazarskis and Evgenia Anagnostopoulou (2017) suggests that the effective use of specific internal audit factors can increase the effectiveness of risk management. In particular, it provides a better understanding of how internal audit participation, management and risk-oriented internal audit can increase the effectiveness of risk management.

The study by Elok Sri Utami (2017) shows that there was no difference in the system of performance

of the current ratio of total assets and net income during the study period between and before the global financial crisis of 2008. The debt ratio and return on equity have a significant difference before and after the crisis.

Bohdan Danylyshyn, Ivan Bohdan (2020) note that the main task of economies during crises is to preserve economic potential, social capital and create on their basis the preconditions for further economic recovery and progressive socio-economic development.

Kseniia Kotliarevska (2019) argues that the best results in ensuring the sustainability of economic growth are achieved by countries that manage to combine economic efficiency with social performance through the establishment of economic mechanisms and optimization of social institutions that act as a way to reconcile interests and goals. Therefore, during strategic planning at the enterprise it is necessary to be guided by the principles of social responsibility.

Mykhailo Bril (2018) developed a simulation model for detecting macroeconomic imbalances, which allowed to identify existing problems, and the forecast made on its basis: to identify potential threats.

6. Conclusions

The results of the study indicate that anti-crisis public administration in countries with developed market economies is expressed in various forms. In most countries, it is implemented through improved employment legislation, increased jobs, especially for young people, coordination of the efforts of various government agencies to develop and conduct economic policy, by strengthening government intervention in the economy.

Examining the experience in the field of crisis management, it should be noted that in Europe there is a selective approach aimed at stimulating the activities of specific companies; public sector priorities are education, health care, pensions, and the labor market. In addition, in some countries in order to find innovative structures of enterprises, increase their competitiveness and efficiency, out of the crisis, the development of privatization programs is used, which in each country have their own characteristics.

Examining the world experience of solving the problem of corporate bankruptcy, we can distinguish two approaches to this problem. World experience shows that the models of anti-crisis management constructed in different countries of the world provide various potential opportunities for progressive socio-economic changes. However, none of them can be used in its pure form in the formation of anti-crisis management policy in Ukraine. This is due to the conditions of accumulation of this experience by countries, the formation of mechanisms and institutions in a balanced economy, differences in the construction of financial and credit mechanisms, and so on. The use of positive experience should be the first step towards reforming the crisis management system.

It is believed that based on world experience, the following measures of crisis management can be used, namely:

– implementation of anti-crisis management policy through the improvement of legislation;
– improvement of anti-crisis management methods;
– stimulation of the activities of companies;
– strengthening of the program of budgetary discipline and the program of support and development of competitiveness of businessmen;
– drawing up plans for crisis management.

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