Abstract. The authors classify and investigate the losses caused by the military conflict in the east of Ukraine and the annexation of Crimea, as well as the approaches to their assessment. The authors studied the results of scientific research, current legislation, and information-analytical materials and came to the conclusion that there are no common standards (approaches) or detailed approaches to loss assessment for different entities (state, individual enterprises, and citizens), and the mechanism of compensation for losses is undeveloped as well. This can cause many problems both for experts in substantiating the volume of damages and for courts in considering relevant cases for losses.

The authors considered the damage caused to Ukraine by the military conflict with Russia, which resulted in the annexation of the Crimean peninsula and the occupation of Luhansk and Donetsk regions, and interpreted this damage as assessed consequences of these events and classified them by place and time of manifestation on direct, indirect, complete and general, and by spheres of manifestation of consequences on medico-biological, military-political, socio-economic, external and internal political and ecological ones. To characterize each of these types of damage, the authors have identified certain components that can have quantitative and qualitative forms of expression. Taken into account that the qualitative assessment of the consequences of armed conflict is subjective to some extent and depends on the coverage of expert opinions, the authors focused on those components that can be quantified (in monetary terms). To assess them, in the article there were formed certain groups of indicators that have a quantitative form of expression. At the same time, first of all, the authors take into account indicators that make it possible to assess the direct damage from the armed conflict.

The authors, based on the analysis and generalization of the values of these indicators in the dynamics, determine the estimated amount of direct damage caused to Ukraine during the conflict (2014-2019), and give a forecast of its growth if this conflict continues. Also, we propose the option of calculating the lost benefit from the impossibility of using a part of the country’s territory (currently uncontrolled) based on its potential.

Keywords: Loss; Military Conflict; Crimea; Donbas; Temporarily Uncontrolled Territories; Damage Assessment; Lost Benefit
JEL Classification: E62; E65; H56; H72

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Іванов С. В.
член-кореспондент НАН України, доктор економічних наук, професор, Заслужений діяч науки і техніки України, завідувач, кафедра аналітичної економіки та менеджменту, Дніпропетровський державний університет внутрішніх справ, Дніпро, Україна

Юдіна С. В.
доктор економічних наук, професор, завідувач, кафедра фінансів та обліку, Дніпропетровський державний технічний університет, Каменське, Україна

Лыса О. В.
кандидат економічних наук, доцент, кафедра фінансів, банківської справи та страхування, Дніпропетровський національний університет імені Олесь Гончара, Дніпро, Україна

Драгун А. О.
аспірант, кафедра маркетингу та логістики, Український державний хіміко-технологічний університет, Дніпро, Україна

Класифікація та оцінка збитку від збройного конфлікту на Донбасі й анексії Криму

Анотація. У статті представлено класифікацію збитків, заподіяних військовим конфліктом на сході України та анексією Криму, а також підходи до їх оцінки. Ознайомлення з результатами наукових досліджень, чинним законодавством й інформаційно-аналітичними матеріалами дозволило авторам зробити висновок про відсутність у цьому питанні единих стандартів (підходів), деталізації підходів до оцінки збитку для різних суб’єктів (держави, окремих підприємств і громадян), нерозроблених механізму відшкодування збитку. Це може викликати багато проблем як для експертів при обґрунтуванні розміру збитків, так і при розгляді відповідних справ щодо відшкодування збитків у судах. Розглядаючи тут, спричиненого Україні військовим конфліктом із Росією, наслідком чого стали анексія Кримського півострова та окупація частини Луганської й Донецької областей, дозволив трактувати його як оцінену наслідки цих подій та класифікувати за місцем і часом прояву збитку. На підставі аналізу та узагальнення значень даних показників у динаміці був визначений орієнтовний обсяг прямих збитків, спричинених Росією на території України (2014–2019 рр.), та наведений прогноз його наростання, якщо цей конфлікт триватиме й надалі. Таким чином, вивчення збитків може допомогти відповідним відомствам підприємствам, органам влади, а також громадянам у прийнятті відповідних рішень.

Ключові слова: збиток; військовий конфлікт; Крим; Донбас; тимчасово неконтрольовані території; оцінка збитку; упущена вигода.

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ущерба, причиненного Украине военным конфликтом с Россией, следствием чего стали аннексия Крымского полуострова и оккупация части Луганской и Донецкой областей, позволило трактовать его как оцененные последствия этих событий и классифицировать в соответствие с местом и временем проявления как прямой, непрямой, полный и общий, а по сферам проявления последствий разделить на медико-биологические, военно-политические, социально-экономические, внешне- и внутриполитические, экологические риски. Для характеристики каждого из этих видов ущерба авторами определены составляющие, которые могут иметь количественную и качественную формы выражения. Приемным во внимание тот факт, что качественная оценка последствий вооруженного конфликта является в определенной степени субъективной и зависит от степени охвата экспертных мнений, авторы акцентировали свое внимание на тех составляющих, для которых возможна количественная оценка (в денежном измерении). Для их оценки были сформированы определенные группы показателей, имеющих количественную форму выражения. При этом во внимание, прежде всего, принимались показатели, позволяющие оценить прямой ущерб от вооруженного конфликта. На основании анализа и обобщения значений данных показателей в динамике был определен ориентировочный объем прямого ущерба, причиненного Украине за период конфликта (2014–2019 гг.), и приведен прогноз его нарастания, если этот конфликт будет продолжаться. Также рассмотрен вариант расчета упущенной выгоды от невозможности использования части территории страны (сейчас неконтролируемой), исходя из ее потенциала.

Ключевые слова: ущерб; военный конфликт; Крым; Донбасс; временно неконтролируемые территории; оценка ущерба; упущенная выгода.

1. Introduction

In the world, there is a negative tendency of the increase of number and scale of the consequen-
tes of armed conflicts, which have begun to affect the efficiency of economies and security of states.

The consequences of war (armed conflict), its’ devastating, and other factors have an impact
on all spheres of life in the state. Thus, the consequences of war unite all kinds of changes in
the socio-economic, political, scientific, technical, and other spheres of human life, enterprises,
state, which have occurred, initiated, or enforced by armed conflicts (wars).

Macroeconomic analysis of the consequences of armed conflicts provides a systematic ap-
proach based on both direct and indirect consequences, including long-term ones.

As you know, an armed conflict between Ukraine and Russia is currently continuing, which arose
as a result of Russian aggression in Ukraine that lead to the annexation of the Crimean penin-
sula and the occupation of Luhansk and Donetsk regions. Of course, it is difficult to calculate exac-
tly how much Ukraine has lost due to the occupation of its territories without proper statistics and
registration of losses. To assess the real losses, there is a necessity to determine the value of as-
sets in the region and the volume of products produced there, as well as to assess systematically
all the losses and consequences for the state, enterprises, and the population.

At the same time, we would like to notice that specialized assessment organizations should
perform the real damage assessment by agreed methods, which will ensure compliance with
the laws and economic interests of individuals and legal entities involved in this process. But
the scientific researches in this field will help to determine the methodology, approaches, and
methods of such assessment.

2. Brief Literature Review

The annexation of Crimea and further armed conflict in eastern Ukraine have attracted the at-
tention of numerous native and foreign scholars and researchers. Both information-analytical and
research publications cover various aspects of this conflict (political, military, socio-economic)
and its development. Most foreign and native authors (S. Fischer (2019), T. Ash, J. Gunn, J. Lough,
O. Lutsevych, J. Nixey, J. Sherr, & K. Wolczuk (2017), J. Biersack, & S. O’Lear (2014), C. Buckley,
R. Clem, J. Fox, & E. Herron (2018), T. Iwański (2015), T. Kużio (2015), G. M. Hahn (2018), M. Ritchey
(2018), J. Röpcke (2016), O. Chaly, & O. Malinovsky (2015), O. Kramar (2014), etc.) in their
publications tried to cover the general political and legal aspects of the armed conflict in Ukraine
and the annexation of Crimea, to formulate its causes and consequences, both in the regional,
and the global context), to identify the parties of the conflict and their interests. Some authors
(T. Coupé & M. Obirian (2016), E. Giuliano (2015), etc.) have considered the socio-humanitarian
aspects of the conflict, focusing on human rights violations and crimes against humanity that took
place during the armed conflict. in the east of Ukraine. And only some authors (J. Lasocki (2019),
T. Coupé (2016), K. Raik (2019), V. Mykhnenko (2020), D. Prokaza (2019), A. Polchanov (2017),
G. Chabaray (2018), Ya. Vinokurov (2019), etc.) devoted their publications to the characterization
and assessment of the economic consequences of this conflict for Ukraine. Simultaneously, the article pays attention that there are studies on the calculation and payment of reparations, but they are concretized in the context of individual regions and military conflicts (for example, studies of such authors (the group of authors) as T. J. Feighery, C. S. Gibson, & T. M. Rajah (2015), C. R. Payne, & P. H. Sand (2011), etc.).

At the same time, we pay attention that the theoretical and methodological approaches to the assessment of the consequences of the armed conflict presented in the relevant scientific studies, are quite diverse and not systematized. This is especially true for the assessment of losses of particular entities (state, legal entities, and individuals) and the mechanism of their compensation. There is a need to develop a unified theoretical and methodological tools for assessment of the damage caused by the armed conflict in Ukraine and annexation of Crimea, taking into account the practical need for an objective assessment of the losses of entities in order to protect their property rights and obtain appropriate compensation.

3. The purpose of the paper is the determination of the consequences of the armed conflict in Ukraine and the annexation of Crimea, their systematization, and further development of approaches to loss assessment caused to the state of Ukraine and other entities as a result of these events.

4. Results

Armed conflicts (wars) involve damage to various subjects and objects (individuals, enterprises, organizations, the state, the environment) by various components and scales.

The consequences can manifest themselves in various spheres of life, both directly during the conflict and for a long time after it. Generally, the impact of war (armed conflict) can lead to the following chain: consequences - damage (economic assessment of damage) - compensation. But in order to begin the process of compensation, it is necessary to determine objectively the losses and damages caused by the armed conflict.

The concept of the consequences of war (armed conflict) has a generalized, non-economic character, while the concept of damage is an economic, quantitative value that must be represented in monetary terms. In other words, the damage is assessed consequences. Damage assessment is the determination of its value in physical or monetary terms (economic assessment of damage) (Mazur & Shapiro, 2001).

Thus, the consequences of war have generalized, non-economic character, while the concept of damage allows us to quantify and compare these consequences. In other words, the damage is estimated consequences of the war.

Therefore, we can clarify the definition of war damage. War damage is a quantitative value, which in monetary terms is the result of changes in the state of objects, which is expressed in the violation of their integrity or deterioration of other qualities, actual or possible economic and social losses resulted from any events during wars (armed conflicts) and annexations.

On the whole, the components of damage can be estimated in physical units, and some of them - in monetary terms. In addition, the damage must include moral damages. As an experience of developed countries shows, the amount of moral damage can sometimes exceed compensation payments from direct damage.

It is known that all armed conflicts have the consequences of loss related to the condition of property and state of a certain person. Therefore, we propose the following classification of the main types (spheres) of such losses (Figure 1):

- medical and biological (loss of health and life, injury or disease followed by total or partial temporary or permanent disability, reduction of life expectancy, etc.);
- military-political losses and consequences (an increase of budget expenditures on defense due to reduction of other expenditures, loss of military equipment and weapons, etc.);
- socio-economic (loss of a certain type of property (asset), loss (full or partial) of movable and immovable property of legal entities and individuals, loss of agricultural or other products, etc.);
- external and internal political losses and consequences (reduction of trust in state institutions, growth of social tension in society, growth of external influence on decision-making in the field of public administration, state security, etc.);
- ecological (deterioration of the environment and the cost of its restoration, loss of economic value of the territories, the vanishing of terrestrial and aquatic animals and plants, etc.);
- others.

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We propose to consider all the above-mentioned losses and damages as direct losses, that is to say, those caused by the consequences, actions, and factors of war (armed conflict). They consist of irreparable losses and valued losses. We would like to specify that direct economic loss is primarily documented economic loss.

Indirect losses include losses, damages, and additional costs incurred by entities that did not fall directly into the zone of destructive action during the war, including in the long run. Total damage is the sum of direct and indirect losses by all types of costs, as well as the cost of war effects elimination. It is determined in a certain moment of time and is intermediate compared to general damage, which is quantified in the long run.

This study takes as the basis the above-mentioned classification of losses by spheres of manifestation from the war in eastern Ukraine and the annexation of Crimea to propose approaches to their definition.

Thus, in assessing the damage by the sphere of medical and biological losses, we used some indicators of the negative impact of hazards on humans. In our opinion in the system of losses from armed conflict (war), medical and biological losses, should be calculated the most accurately. But, we have discovered that this is not the case. In Ukraine, statistical data on some types of losses are classified, in particular statistics on non-combat losses. Thus, Table 1, which was compiled based on information from various sources, shows the corresponding losses in the dynamics for 2014-2020.

Statistics of loss show that 13,115 people died in 2014-2020; 23,444 people were wounded, among them 10,716 received non-combat injuries and illnesses, that is almost equal to...
the combat losses during the war at the front. This states low discipline and order in the Armed Forces of Ukraine. At the same time, we should note that the real figures of losses can be much higher because the system of their registration is imperfect and there are facts of deliberate underestimation.

The statistics that we have processed and grouped are almost identical to those released by the United Nations, which has officially increased its estimation of war casualties in eastern Ukraine to 13,000, a quarter of them - civilians, and more than 30,000 people are wounded. The estimated number of killed civilians is about 3,300 people, including 298 passengers of the downed «Boeing» (Miller, 2019).

Human life is priceless, so it is very difficult to assess its value. At the same time, based on the existing methods given in the publications of T. Davidyuk (Davidyuk, 2012), O. Sakhnenko (Sakhnenko, 2017), US Environmental Protection Agency (EPA) (Blyznyuk, 2014, p. 104), V. Blyznyuk (Blyznyuk, 2014, p. 107), O. Garkushenko (Garkushenko, 2010) and others (Pavlyuchenko, 2008), we made dynamic calculations of the cost of human life. Based on these researches we can estimate the cost of human life in an interval of 1.0 - 4.8 - 6.0 million USD, where 1.0 million USD can be attributed to the minimum option and 6.0 million USD - to the maximum. Based on this, the amount of medical and biological losses for 6 years of war in the Donbas by different options: 13.115 billions of US dollars - 62.952 billions of US dollars - 78.690 billions of US dollars.

The second component of medical and biological losses is the cost of treatment of the wounded. Such losses we can determine based on statistics of the average cost per patient in a hospital in Ukraine or the average cost of insurance companies' coverage of injuries.

According to the Law «On Amendments to Certain Legislative Acts of Ukraine to Improve Legislation on the Activities of Health Care Institutions» (Law of Ukraine of April 6, 2017), the order of the Ministry of Health of Ukraine and the National Academy of Medical Sciences of Ukraine of September 9, 2017, No. 1123/64 «On approval of the calculation of tariffs for tertiary (highly specialized) medical care to the participants of the pilot project», the project of Resolution of the Cabinet of Ministers of Ukraine «Some issues of improving the implementation of the program of state guarantees of medical care in 2020» (ZN.UA, 2020), we have determined the average tariff for the treatment of the wounded.

Based on the tariffs listed in the foregoing documents, we have determined the average value, which is equal to 13299.13 UAH:

\[
(4563.64 \text{ hryvnias} + 19332.31 \text{ hryvnias} + 16001.43 \text{ hryvnias}) / 3 = 13299.13 \text{ hryvnias.}
\]

To calculate the cost of treatment of the wounded, the value of the service package was increased by 60% (to take into account the cost of medicines, medical devices, and consumables) and came

| Table 1: Medical and biological losses in the dynamics for 2014-2020 |
|---------------------------------------------------------------|
| **Medical and biological losses** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Combat losses                   | 1790    | 1203    | 530     | 355     | 225     | 189     | 59      | 4351    |
| Non-combat losses               | 850     | 920     | 455     | 549     | 104     | 85      | 26      | 2989    |
| Injured, including:             |         |         |         |         |         |         |         |         |
| - combat                        | 3626    | 5170    | 1556    | 1474    | -       | -       | -       | 11964   |
| - non-combat                    | -       | -       | -       | -       | -       | -       | -       | 10718   |
| Died & demobilized participants |         |         |         |         |         |         |         |         |
| of anti-terror operation/point  |         |         |         |         |         |         |         |         |
| forces operation                | -       | 18      | 92      | 168     | 234     | 259     | 70      | 841     |
| Missing                         | 408     | 10      | 72      | -       | -       | -       | -       | 490     |
| Remained in captivity           | 703     | 2266    | 131     | 157     | 112     | 102     | 185     | 300     |
| Released                        | 822     | 2135    | 16      | 165     | 106     | 111     | -       | 3355    |
| Total losses (deaths) among      | 2084    | 954     | 112     | 117     | 55      | 27      | 4       | 3353    |
| civilians associated with the    |         |         |         |         |         |         |         |         |
| conflict                        |         |         |         |         |         |         |         |         |
| Losses among civilians due to    |         |         |         |         |         |         |         |         |
| mine incidents and handling of   |         |         |         |         |         |         |         |         |
| explosive remnants of war,      |         |         |         |         |         |         |         |         |
| including:                      |         |         |         |         |         |         |         |         |
| - dead                          | 40      | 113     | 56      | 65      | 36      | 17      | 2       | 329     |
| - wounded                       | 34      | 231     | 179     | 176     | 88      | 42      | 12      | 762     |

Source: Compiled by the authors based on data of Miller (2019); «Non-combat losses of all power structures in Donbas for 5 years exceed combat losses - Matios», Defense-industrial courier: news agency (2020); Coalition «Justice for Peace in Donbas» (2020); Memorybook (2020); «The sixth anniversary of the beginning of anti-terrorist operation: figures and facts», Slovo i Dilo: Research portal (2020) and other collections of statistical data formed by local activists and agencies available
to 21278.606 UAH. It is clear that we cannot determine precisely the severity of injuries, especially since such statistics are not available. Therefore, an approach we propose to the assessment makes it possible to calculate the corresponding losses approximately. Based on the number of wounded, the amount of losses reaches almost 500 million UAH (21278.606 \times 23444 = 498.8 million hryvnias). However, in our opinion, this amount is the minimum, the maximum can be 2-3 times more, about 1.5 billion UAH because operations of injuries are complicated, so many victims are treated abroad, also have a long period of rehabilitation, and so on.

The next group of damages is military-political losses and consequences.

Over the past 20 years, all countries without exception have increased military expenditures. The growth of military expenditures is directly due to the objective need to defend their territories from the invasions of the aggressor countries. In addition, this trend is associated with the gradual devaluation of money and, as a consequence, the rise of prices for military machinery and equipment.

Unlike most countries in the world, where the increase of military expenditures ranges from 50% to 100%, over the past 7 years, Russian Federation has increased military expenditures by 2158%, while Ukraine almost by 700%-800% (Stockholm International Peace Research Institute, 2020).

That is, the very fact of the war in Donbas causes real damage to Ukraine. Ukraine maintains an army of 160,000, not saying about the National Guard, which reports to the Ministry of Internal Affairs. In addition, there is a significant component of corruption expenditures, as the anti-terrorist operation (ATO) / joint forces operation (JFO) allows the government to write off funds and internal problems on Russian aggression.

At the same time, we should note that according to the current People’s Deputy I. Gerashchenko, the force operation in eastern Ukraine in 2014, cost to the country almost 5 billion USD. At the same time, the former Prime Minister of Ukraine A. Yatsenyuk noted that every day of the war costs the state 80 million hryvnias (6 million US dollars). Thus, for 6 years of war, this amount under invariable consequences should be 13.14 billion US dollars.

Stockholm International Peace Research Institute (SIPRI) recorded a significant increase in defense expenditures of Ukraine: in 2013, it was spent 35 billion UAH on the maintenance of the Armed Forces, in 2014 - 47.9 billion UAH, in 2015 - 79.0 billion UAH, in 2016 - 87.5 billion UAH (Stockholm International Peace Research Institute, 2020; Voice of America, 2019). That is, according to SIPRI, there was an increase in defense expenditures by 2.5 times.

Ukraine’s statistics slightly differs from SIPRI data. Thus, Table 2 shows the expenditures of the State budget of Ukraine for defense in the dynamics for 2012-2019.

According to Table 2, the expenditures of the state budget of Ukraine 2013-2020 increased almost by 8 times and became almost 3% of GDP, which is one of the largest indicators in the world. Despite the fact that the situation is slightly different in dollar equivalent (defense expenditures in dollar equivalent increased only by 138%, but at the same time the volume of nominal GDP decreased by 16%), nevertheless, the share of defense expenditures in nominal GDP still indicates their growth (from 1% in 2013 to almost 3% in 2020).

### Table 2:

**Expenditures of the State budget of Ukraine on defense**

| Indices | 2012/2013 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 | 2019 (plan, forecast) |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------------|
| State budget expenditures on defense, including billion UAH / billion US dollars: | 14.5 / 1.82 | 14.8 / 1.85 | 27.4 / 1.74 | 52.0 / 2.17 | 59.4 / 2.18 | 74.3 / 2.65 | 97.0 / 3.50 |
| - share of current (consumer) expenditures, % | 97.4 | 98.4 | 98.2 | 96.9 | 97.2 | 95.5 | 94.3 | 93.8 | 92.7 |
| - share of capital expenditures (development expenditures), % | 2.6 | 1.6 | 1.8 | 3.1 | 2.8 | 4.5 | 5.7 | 6.2 | 7.3 |
| Growth rates of state budget expenditures on defense, % | - | +2.1 | +85.1 | +89.8 | +14.2 | +25.1 | +30.6 | +9.9 | +10.2 |
| Nominal GDP, billion UAH / billion US dollars | 1404.7 / 175.92 | 1465.2 / 183.31 | 1586.9 / 100.64 | 1988.5 / 82.85 | 2385.4 / 87.73 | 2983.9 / 106.31 | 3558.7 / 128.53 | 3974.6 / 170.64 | 4105.8 / 153.82 |
| Growth rates of nominal GDP, % | +7.0 | +3.3 | +7.7 | +26.3 | +20.4 | +25.2 | +19.3 | +11.7 | +3.3 |
| Share of defense expenditures in nominal GDP, % | 1.03 | 1.01 | 1.73 | 2.61 | 2.49 | 2.49 | 2.72 | 2.68 | 2.86 |

Source: Compiled by the authors based on data by State Treasury Service of Ukraine and State Statistics Service of Ukraine (2020)
It is clear that it is impossible to compare our 3% increase with the percentage of increase in defense expenditures of other countries due to the extremely low level of Ukraine’s GDP. However, such defense expenditures significantly reduce other budget expenditures, including social programs and other areas that are vital for a country in constant crisis.

There was a significant increase in defense expenditures in 2014-2015, when they annually grew by 85-90%. This was caused by the beginning of the armed conflict in the east of the country and the need to restore the combat effectiveness of the army. In 2016, Ukraine spent only 59.4 billion UAH on military needs, that is to say, the growth rate of these expenditures decreased significantly by 14.2%.

In 2017-2018, the growth of defense expenditures accelerated again (growth rates were 25.1% and 30.6%, respectively), although there were not observed active hostilities. In 2019, the growth rate of defense expenditures significantly decreased and was about 10%. Thus, as we can see, defense expenditures are constantly growing, but their growth rates do not have a certain trend and significantly vary by periods.

At the same time, starting from 2013, there is: a gradual increase in the share of capital expenditures on defense (from 1.6% in 2013 to 6.2% in 2019); decrease in the share of wages costs and charges on payroll expenditures (from 68.6% to 43.5%); increase in the share of goods and services expenditures (from 28.2% to 47.8%); increase in the share of social security expenditures (from 1.1% to 2.7%); increase in the share of acquisition of fixed capital assets expenditures (from 1.6% to 5.7%). Generally saying, this structure of expenditures hinders the development of the defense sector, prevents providing of investment and innovation in accordance with modern challenges and threats. We would like to specify that the classic defense budget in NATO countries supposes the allocation of 30% to 50% of funds - for the maintenance of personnel, 25% - for operating costs, up to 10% - for financing defense research and development, from 20% to 30% - for the purchase of new models of weapons and equipment (Gumenyuk, 2019, p. 42).

The main requirement as for total defense expenditures for all NATO member countries is to finance it at least by 2% of gross domestic product. According to world experts, the optimal distribution of defense expenditures should be as follows: current expenditures - 50%, among which: maintenance of personnel 25-40%; logistical support of troops and combat training 10-25%; capital expenditures - 50%, of which: purchase of weapons and military equipment 20-25%, capital construction 15-20%, R&D 5-10% (Gumenyuk, 2019, p. 40).

Given that the National security strategy of Ukraine, among other things, as one of the main directions of state national security policy has a course for a special partnership with NATO, we agree with some scholars (for example, (Chalyy & Malynowski, 2015, p. 120)), that funding residually the development of armaments and military equipment in current conditions is a serious problem for Ukraine. The structure of defense expenditures must be significantly revised, in particular with regard to the growth of the share of capital expenditures.

In 2020, the total amount of budget expenditures for defense financing will be 117.5 billion UAH or 4.4 billion US dollars. It is clear that such an increase in defense expenditures is due to armed conflict.

In addition to the aforesaid losses, it is possible to determine the socio-economic losses for the economy as a whole. Thus, in the regions of the armed conflict and the annexed Crimea, there were industrial complexes that ensured the creation of a corresponding share of the country’s GDP.

In Table 3, on the basis of statistical data, the authors calculated the short received gross regional product (GRP) as a result of the annexation of the Autonomous Republic of Crimea and part of the territories of Donetsk and Luhansk regions.

As can be seen from the table, since 2014, Ukraine’s economy has underproduced GDP of more than 2 trillion UAH, or 88.6 billion US dollars, as a result of the armed conflict in the east and the annexation of Crimea. Given the close interregional economic ties, the natural decline in economic activity in the neighboring regions, the actual shortfall in GDP far exceeds the given above values.

We would also like to emphasize that the restoration of the region after the end of the military conflict requires a significant amount of money. Some researchers note that the total damage to recovery from the conflict in the east could reach USD 20 billion. In recent years, remote sensing of the Earth from space has been used to identify areas with various degrees of objects’ damage, which can also be used in Ukraine to increase the objectivity of loss estimation.
As a result of the war in the eastern regions of Ukraine and the annexation of Crimea, there was preliminarily determined the amount of harm caused to Ukraine in 2014. It is known that as a result of the annexation more than 400 enterprises, 18 gas fields, seaports, and infrastructure were taken from Ukraine. According to the assessment of the Ministry of Justice of Ukraine, the amount of damage caused to Ukraine as a result of the Crimea annexation of, as of June 2014, was 1.08 trillion UAH (TSN, 2014).

In 2014, damage from destroyed industrial facilities, office buildings, schools, hospitals (a total of more than 500 facilities) was estimated at 4.8 billion UAH, road facilities - 2.2 billion UAH. Besides in 2014, it was reported that it was required at least 1.7 billion UAH to restore the housing (in the Donetsk region about 4740 houses were damaged, in Luhansk - more than 690). In addition, 693 million UAH are needed for the reconstruction of electricity facilities and 500 million UAH for gas supply, etc.

It is clear that over the next six years, the destruction of facilities was continuing. Nowadays, it is difficult to estimate these losses in monetary terms. But, we believe that these amounts should be increased at least several times, based on inflation level and exchange rate dynamics i.e. named losses and costs of recovery now are at least 34.8 billion US dollars. As well in our opinion, it is essential to take into account losses from lost profits, the cost of minerals, and the sea shelf in the final assessment.

**Table 4** shows the dynamics of damage from the annexation of Crimea in 2014-2020, determined using the method of extrapolation.

Source: Calculated by authors based on data posted on the official websites of State Statistics Service of Ukraine, the Main Department of Statistics in Donetsk region, and the Main Department of Statistics in Luhansk region (2020)
As we can see, the amount of damage monthly increased by 50-80 million UAH, i.e. 500-800 million UAH per year. Simple calculations for the next 6 years allow us to talk about losses of 4.68 (minimum option) ÷ 6.84 (maximum option) trillion UAH.

Crimea generated up to 15% of all harvest of grain in Ukraine. This is approximately 9-10 million tons per year. For six years it is almost 60 million tons. In monetary terms, if we take an average price per ton of wheat at 200 USD (Information and analytical portal of the AIC of Ukraine) the value of losses is 12 billion USD.

Simultaneously, a fixed amount of damage, according to lawyers O. Chaly and O. Malynowski, can say that it is calculated based on the value of assets lost by Ukraine (Chalyy & Malynowski, 2015).

In our opinion, the amount of damage should be calculated as a kind of «rent» until the Crimea and part of Donbas are returned to Ukraine. As one of the possible options, as the base for damage assessment can be taken potentially unearned income from the maximum possible efficient use of the lost asset, discounted to the present moment (Chalyy & Malynowski, 2015). We consider the approach proposed by O. Chalyy and O. Malynowski, a reasonable and acceptable, so we propose to calculate losses on its basis.

The research of analytical center Atlantic Council says that after the annexation of Crimea, Ukraine lost 1.4 million hectares of land, estimated at more than 1.8 billion USD (Ukraine Crisis Media Center, 2018). Based on the above study, the value of Ukrainian land was assumed as 1.285 thousand USD per 1 hectare. We would like to emphasize that the price of land per hectare in Europe is much higher. Thus, in Switzerland, a hectare of land costs 70 thousand dollars, in Holland - 63.7 thousand dollars, in the Czech Republic - 42 thousand dollars, in Austria - 42 thousand dollars, in Ireland - 39.3 thousand dollars, in Germany - 32.3 thousand dollars. (AgroPolit.com, 2019).

Thus, even such assessment is underestimated at least by 40-50 times. That is, only the loss of the territory of Crimea can be estimated at 72-90 billion USD.

In general, currently, Russia controls 7.2% of Ukraine’s territory. The total area of Ukraine is 60354.9 thousand hectares. The area of land is 57928.5 thousand hectares. That is, the occupied territories are 4.4 million hectares. Using the abovementioned estimations of 1 hectare of land in Europe, we can assess the losses at the minimum and maximum option at 176 ÷ 220 billion USD.

To justify better the amount of the lost benefit from the impossibility of using part of the country, we propose to consider the situation when these territories are leased out. We can calculate the approximate income from a land lease from the temporarily occupied territories of Crimea, Donetsk, and Luhansk regions, using the information published on the website of the State Service of Ukraine for geodesy, cartography, and cadaster on the average cost of land lease in the regions of Ukraine. It is known that the area of the Autonomous Republic of Crimea is 26,081 thousand km$^2$ (or 2608.1 thousand hectares), the area of the temporarily occupied territory of Donetsk region is 7.5 thousand km$^2$ (or 750 thousand hectares), and Luhansk region - 8.3 thousand km$^2$ (or 830 thousand hectares). Thus, if these territories were leased out, Ukraine could receive approximately 18.92 billion UAH in 2015-2019, or 750 million USD (Table 5).

According to another assessment, based on the modern land lease and experts’ evaluation on the functioning of the land market, starting from October 1, 2020, we can expect an increase in the cost of rent per hectare on average from 1700 hryvnia in 2018 to 4000 hryvnia in 2024 (Ekonomichna Pravda, 2019; Land Ukraine, 2020) (i.e. from 63 to 148 USD). Thus, we can calculate the income that the country loses annually: 263.85 million USD (occupied area of Ukraine - 4188.1 thousand hectares * 63 USD) at the minimum option or 619.84 million USD at

| Date       | In UAH         | In USD * |
|------------|----------------|----------|
| April 2014 | 950 billion UAH| 86.379 billion USD |
| May 2014   | 1 trillion UAH | 87.707 billion USD |
| June 2014  | 1.08 trillion UAH| 90.927 billion USD |
| June 2020  | 4.68 ÷ 6.84 trillion UAH| 174.51 ÷ 255.05 billion USD |

Table 4: Dynamics of damage from the annexation of Crimea cumulatively from April 2014 to June 2020

Note: * - by the official exchange rate of UAH to USD set by the NBU.

Source: Calculated by authors based on data given by TSN (2014)
Besides, the country has losses of 8 billion USD for lost assets of «Naftogaz» due to the annexation of Crimea, which was stated in The Permanent Court of Arbitration of The Hague while proceedings of Ukraine’s lawsuit against Russia as for compensation of losses to this Ukrainian company (Vinokurov, 2019). At the same time, The Permanent Court of Arbitration in The Hague ordered the Russian Federation to reimburse the amount of 159 million USD of losses for 18 Ukrainian companies and 1 individual due to the annexation of Crimea. Altogether, in the Crimea, banks had lost their assets, which remained in their branches (from 1.7 to 1.9 billion USD). In addition, Russia confiscated Krymenergo, i.e. Ukraine lost another 1 billion USD («Ukraine lost 100 billion US dollars due to Russian aggression in Crimea and in the East - Atlantic Council research», 2018). Thus, the losses due to the annexation of Crimea, which are satisfactorily demonstrated and certified, come to 10.859 ÷ 11.059 billion USD.

If we calculate the lost profit by the assessment of return on assets (all over Ukraine before conflict) by profit before taxation (return on assets in 2012 was 1.41%), then using the compound interest formula the amount of lost profit will be 11.81÷12.03 billion USD: 10.859 \( \times (1 + 0.0141)^6 \) = 11.81 billion USD or 11.059 \( \times (1 + 0.0141)^6 \) = 12.03 billion USD.

According to the parliamentary hearings held on September 22, 2016, in addition to the above listed, the losses of Ukraine due to the annexation of Crimea include: state-owned objects belonging to the Ministry of Energy and Coal Industry of Ukraine and are on the balance of 25 companies; nature reserve fund of the Autonomous Republic of Crimea and the city of Sevastopol, which includes 197 territories and objects with a total area of 220 thousand hectares; 20 water supply organizations that are subordinated to the State Agency of Water Resources of Ukraine; 69 facilities of the North Crimean Canal Department worth a total of 229.6 million UAH; 25 state-owned enterprises located on the territory of the Crimean Peninsula, subordinated to the Ministry of Agrarian Policy and Food of Ukraine; 40 museums and other objects (About the Recommendations of the parliamentary hearings on the topic: «Strategy of reintegration into Ukraine of the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol: problematic issues, methods and ways»: Resolution of VRU (The Parliament of Ukraine) of September 22, 2016, no. 1602-VIII).

In addition to the alienation and destruction of infrastructure facilities of life support of the population, the country’s financial system has significant losses as well, primarily due to decrease of enterprises’ financial performance, reduction of budgetary allocations, increase of arrears in wages, debts for energy consumption and housing utilities, reduction of foreign trade and, accordingly, foreign exchange earnings.

Table 5:
Calculation of the land lease cost within the temporarily occupied territories of the ARC, Donetsk, and Luhansk regions for 2015-2019

| Index | 2015  | 2016  | 2017  | 2018  | 2019  | Total |
|-------|-------|-------|-------|-------|-------|-------|
| Area of the region, thousand hectares | 2670.0 | 2670.0 | 2670.0 | 2670.0 | 2670.0 | —     |
| Area of lands of the region, which are temporarily occupied, thousand hectares | 830.0 | 830.0 | 830.0 | 830.0 | 830.0 | —     |
| The average annual cost of land lease, UAH / thousand hectares | 543.5 | 834.9 | 864.0 | 2904.8 | 4692.96 | —     |
| Estimated cost of lease of temporarily occupied lands, billion UAH / billion USD (at the cost of lease in 2015) | 0.02 | 0.02 | 0.03 | 0.09 | 0.17 | 0.33 |
| Total cost of lease of temporarily occupied lands, billion UAH / billion USD (at the cost of lease in 2015) | 1.85 | 2.29 | 2.39 | 4.65 | 7.72 | 18.92 |

Note: * - information is absent.

Source: Calculated by authors based on data of «Information and analytical portal of the AIC of Ukraine (2019)"
According to the National Security and Defense Council of Ukraine (NSDC) in 2014, uncollected taxes in 2014 came to at least 18 billion UAH (or 1.14 billion USD at the official exchange rate of the NBU on December 30, 2014).

If we take into account the term, inflation index, and GDP growth rate, tax losses (unearned benefit) for the next 6 years were:

- in hryvnia equivalent: \(18 \times (1 + 0.2058)^6 = 55.325 \text{ billion UAH}\);
- in US dollar equivalent: \(1.14 \times (1 + 0.0522)^6 = 1.547 \text{ billion USD}\).

In the study, we base the calculations on the indicators of the inflation index, exchange rate, dynamics of Ukraine’s GDP for 2014-2019.

Table 6 shows the calculation of tax losses to the consolidated budget of Ukraine for Donetsk and Luhansk regions for 2014-2019.

Taken into account the calculations we made, the consolidated budget of Ukraine didn’t receive from the taxpayers of the Donetsk region about 2 billion UAH in 2014-2019 or 83 million USD (if we take 2013 as the basis for calculation). In turn, the state didn’t receive from the taxpayers of the Luhansk region the amount of about 135 million UAH or 5 million USD. Thus, in general, Ukraine didn’t receive taxes of 2.2 billion UAH or 88.46 million USD.

Besides, during the winter of 2014, Ukraine supplied electricity and gas to the Donetsk region in the amount of 1 billion USD, which had not been fully paid.

Socio-political instability and the threat of large-scale armed aggression by the northern neighbor lead to the growth of mistrust in the banking system and worsen the investment climate in Ukraine, which in the short and medium-term may lead to significant indirect losses.

The volume of assimilation of capital investments in 2014 decreased by 24.1%, in 2015 - by another 1.7%, and this is already not taking into account part of the territory of Ukraine. Since 2016, there has been an increase in the volume of assimilation of capital investments, but the pace of such growth does not have a clear trend. In the first quarter of 2020, the volume of assimilation of capital investments in the economy of Ukraine decreased compared to the same period of 2019 by 35.5%.

The decrease in capital investment in 2014-2015 was observed in most economic activities, in particular in the industry (by 45.6%), construction (by 22.9%), wholesale and retail trade, repair of motor vehicles and motorcycles (by 50.4%) financial and insurance activities (by 29.1%), real estate operations (38.1%) and some other spheres.

In the regional aspect, during this period the reduction of investments was in most regions of Ukraine. For all that, the largest reductions in investments were in the Donetsk region (by 70.2% in hryvnia equivalent and by 90.09% in dollar equivalent) and in the Luhansk region.

### Table 6:
**Calculation of the tax losses to the consolidated budget of Ukraine in Donetsk and Luhansk regions for 2014-2019**

| Regions of Ukraine | 2012       | 2013       | 2014       | 2015       | 2016       | 2017       | 2018       | 2019       |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Donetsk region:    |            |            |            |            |            |            |            |            |
| - volume of revenues, billion UAH / billion USD; | 16.7 / 2.09 | 17.0 / 2.13 | 12.5 / 0.79 | 9.7 / 0.40 | 13.5 / 0.50 | 16.3 / 0.58 | 22.7 / 0.82 | 9.7 / 0.42 |
| - growth rate,% | 1.80 - - | 26.47 - - | 22.40 - - | 39.18 - - | 20.74 - - | 39.26 - - | 57.27 - - |            |
| - share in total tax revenues,% | 4.63 / 4.80 | 3.40 / 1.91 | 1.66 / 2.50 | 2.30 / 3.91 | 3.01 / 4.91 | 2.67 / 3.91 | 2.45 / 3.91 | 3.01 / 4.91 |
| Tax losses (if we take as a base 2012 year), % | - - | - - | -1.23 / -2.72 | -1.57 / -2.13 | -2.33 / -3.72 | -3.50 / -4.22 | -3.57 / -4.22 | -3.57 / -4.22 |
| Tax losses, billion UAH / billion USD | - - | - - | -0.15 / -0.010 | -0.26 / -0.011 | -0.27 / -0.011 | -0.35 / -0.012 | -0.53 / -0.019 | -0.36 / -0.015 |
| Tax losses (if we take as a base 2013 year), % | - - | - - | -1.4 / -2.89 | -2.14 / -2.30 | -2.50 / -3.89 | -3.07 / -4.22 | -3.64 / -4.22 | -3.64 / -4.22 |
| Tax losses, billion UAH / billion USD | - - | - - | -1.40 / -0.011 | -2.89 / -0.012 | -2.14 / -0.011 | -2.30 / -0.012 | -2.50 / -0.013 | -2.95 / -0.016 |
| Luhansk region:    |            |            |            |            |            |            |            |            |
| - volume of revenues, billion UAH / billion USD; | 7.6 / 0.95 | 5.2 / 0.65 | 6.3 / 0.65 | 3.3 / 0.65 | 4.6 / 0.65 | 4.8 / 0.58 | 5.4 / 0.58 | 2.6 / 0.58 |
| - growth rate,% | -31.58 / 1.71 | 20.58 / 0.65 | 60.75 / 0.58 | 50.67 / 0.58 | 39.39 / 0.58 | 43.58 / 0.58 | 42.58 / 0.58 | 51.85 / 0.58 |
| - share in total tax revenues,% | 2.11 / 0.65 | -0.40 / -1.46 | -1.4 / -1.53 | -1.56 / -1.87 | - - / - - | - - / - - | - - / - - | - - / - - |
| Tax losses (if we take as a base 2012 year), % | - - | - - | -0.25 / -0.002 | -0.048 / -0.002 | -0.664 / -0.003 | -0.073 / -0.003 | -0.004 / -0.003 | -0.004 / -0.003 |
| Tax losses, billion UAH / billion USD | - - | - - | -0.025 / -0.002 | -0.048 / -0.002 | -0.664 / -0.003 | -0.073 / -0.003 | -0.004 / -0.003 | -0.004 / -0.003 |
| Tax losses (if we take as a base 2013 year), % | - - | - - | 0.27 / -0.002 | -0.038 / -0.002 | -0.043 / -0.002 | -0.050 / -0.002 | -0.032 / -0.002 | -0.032 / -0.002 |
| Tax losses, billion UAH / billion USD | - - | - - | -0.002 / -0.002 | -0.002 / -0.002 | -0.003 / -0.003 | -0.002 / -0.003 | -0.002 / -0.003 | -0.002 / -0.003 |

Source: Calculated by the authors based on data from the Main Department of the State Fiscal Service of Ukraine in Luhansk region, the Main Department of the State Fiscal Service of Ukraine in Donetsk region, and the National institute for strategic studies (2020)
(by 81.88% in hryvnia equivalent and by 93.95% in dollar equivalent). And although starting from 2016, the volume of capital investments in the economy of the Donetsk region began to grow again, losses in their volumes for 2013-2015 are still noticeable (Table 7). As for the Luhansk region, since 2016 the dynamics of capital investment has no clear tendency of change and is variable (the volume of capital investment is either growing or decreasing). Hence, it is impossible to talk about restoring the potential of the economic growth of these regions.

The country’s economy has suffered from the loss of industrial potential in eastern Ukraine. Table 8 shows the dynamics of intangible assets (IA) of enterprises in some regions of Ukraine for 2013-2018.

The number of enterprises (especially small and medium-sized enterprises) in both regions has significantly decreased (ZN.UA, 2020). At the same time, large and medium-sized enterprises that are still in business are gradually withdrawing their intangible assets (including fixed assets (State Statistics Service of Ukraine)) from Donetsk and Luhansk regions, which has a negative impact on the economies of these regions and production volumes. That is, there is a loss of industrial potential of the regions of Ukraine in general.

The next component of losses is external and internal political losses due to the consequences of armed conflict. In our opinion, the main negative consequence of this type of damages is the growth of external influence on decision-making in the field of public administration and the threat to national security.

The results of external influence are revealed in the increase of the country’s public debt, destruction of industrial potential, deterioration of the financial situation of a significant number of domestic enterprises, reduction of household incomes, increase in the number of unemployed, widespread poverty even among working and so on.

Armed hostilities in the east of the country, in addition to economic, as well have created a number of social and humanitarian problems. Thus, as of February 2017, almost 1.8 million people have become internally displaced persons. It is clear that the assessment of these consequences is associated with socio-economic losses which are difficult to assess monetarily. We propose to assess them as moral damage in the amount of 100% of the calculated losses in the socio-economic sphere.

The next type of losses is environmental losses. Damages in this area are also difficult to estimate, as a monetary evaluation is possible only when natural objects will be fully restored.

### Table 7: Dynamics of assimilation of capital investment in Donetsk and Luhansk regions for 2013-2019

| Indices | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2013-2019 |
|---------|-------|-------|-------|-------|-------|-------|-------|-----------|
| Donetsk region: |       |       |       |       |       |       |       |           |
| - volume of capital investments, billion UAH / billion USD | 27.912 / 3.492 | 13.155 / 0.834 | 8.304 / 0.346 | 11.902 / 0.438 | 17.269 / 0.615 | 26.979 / 0.974 | 30.595 / 1.313 | - |
| - growth rates of capital investments,% | -12.01 / -12.10 | -52.87 / -76.11 | -35.88 / -58.53 | 43.33 / 26.51 | 45.09 / 40.56 | 56.23 / 58.37 | 13.40 / 34.80 | 9.61 / 62.40 |
| Luhansk region: |       |       |       |       |       |       |       |           |
| - volume of capital investments, billion UAH / billion USD | 11.369 / 1.422 | 5.223 / 0.331 | 2.060 / 0.086 | 4.122 / 0.152 | 3.330 / 0.119 | 3.219 / 0.116 | 3.358 / 0.144 | - |
| - growth rates of capital investments,% | 38.26 / 38.12 | -54.06 / -76.71 | -60.56 / -74.09 | 100.10 / 76.62 | -19.21 / -21.74 | -3.33 / -2.01 | 4.32 / 24.00 | -70.46 / -89.87 |

Source: Compiled by the authors according to State Statistics Service of Ukraine (2020) (http://www.ukrstat.gov.ua/operativ/operativ2018/ibd/kinv_r_rik/kinv_r_rik_u.htm)

### Table 8: Dynamics of intangible assets (IA) of enterprises in some regions of Ukraine for 2013-2018

| Region of Ukraine | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   |
|-------------------|--------|--------|--------|--------|--------|--------|
| Donetsk region:   | 226280.1 | 256204.3 | 262180.0 | 264325.1 | 248754.0 | 248484.0 |
| - growth rates, % | -13.22 | 2.33 | 0.82 | -5.89 | -0.11 |
| Luhansk region:   | 34792.1 | 36904.0 | 34318.9 | 36234.2 | 31608.2 | 31353.4 |
| - growth rates, % | -6.07 | -7.00 | 5.58 | -12.77 | -0.81 |
| Total:            | 261072.2 | 293108.3 | 296498.9 | 300559.3 | 280363.0 | 279837.0 |
| - growth rates, % | -12.27 | 1.16 | 1.37 | -6.72 | -0.19 |

Source: Compiled by the authors according to the Main Department of Statistics in the Donetsk region and the Main Department of Statistics in the Luhansk region (2020)
A preliminary estimate of the amount of environmental damage was named by Deputy Minister of Ecology and Natural Resources V. Vakarash in the amount of 15 billion UAH. (0.55 billion USD) (News Agency «Vchasno», 2017).

Thus, on the basis of the conducted research, we can group losses by the above mentioned spheres of consequences (Table 9).

However, it should be noted that the amount of losses calculated above is indicative and intermediate (and also is not complete enough, due to lack of necessary information). It is clear that in the future it should be clarified and supplemented.

On the basis of the rough values of the amount of damage for certain periods (Table 9), we have made a forecast of damage, which will cause to Ukraine further temporary uncontrollability of the Crimea and part of the Donetsk and Luhansk regions (for the period from 2020 to 2023). Considering the time series values of the damage as a linear function depending

Table 9:
The main types of damages/losses (by consequences) for Ukraine from the war in the east and the annexation of Crimea

| Types of losses | Form of manifestation | The amount at the end of 2014 | The amount as of 01.01.2020 (cumulative total) |
|----------------|-----------------------|------------------------------|-----------------------------------------------|
| 1. Medical and biological losses | 1. Loss of health and life (by three variants of assessment) | 13.115 – 62.952 – 78.69 bln. USD | 0.5 – 1.5 bln. UAH / 0.02 – 0.06 bln. USD |
| 2. Military-political losses | 1. Necessity to finance hostilities | 5 bln. USD | 13.14 bln. USD |
| | 2. Growth of budget expenditures on defense | by 12.6 bln. UAH / 0.8 bln. USD | by 91.8 bln. UAH / 2.73 bln. USD |
| | 3. The growth of the share of budget expenditures on defense in the nominal GDP of the country | by 0.72% | by 1.67% |
| 3. Social and economic consequences | 1. Internally displaced persons | 275695 per | 1397 thous. per |
| | 2. Targeted financial assistance to internally displaced persons | 1.4 bln. UAH | 16.1 bln. UAH |
| | 3. Rising of social tension in society: (in dollar equivalent) | by 26% by 46.2% (by 64.04 USD) | by 13% by 42.61% (by 59.07 USD) |
| | - unemployment - reduction of the living wage - decrease in average wages | by 46.17% (by 66.26 USD) | |
| | (in dollar equivalent) | by 43.81% (by 198.34 USD) | |
| 3.2. Economic | 1. Temporary uncontrollability: | 4.68 ÷ 6.84 trln. UAH / 174.51 ÷ 255.05 bln. USD | 34.8 bln. USD |
| | - the territory of the Crimea - part of the territory of Donetsk and Luhansk regions | 1.08 trln. UAH / 90.93 bln. USD | 174.51 ÷ 255.05 bln. USD |
| | (Including): - destruction of industrial objects and social infrastructure - destruction of infrastructure - loss of access to the oil and gas industry of Crimea | 30 bln. UAH / 1.9 bln. USD | 34.8 bln. USD |
| | 2. Underproduced GRP as a result of the annexation of the Autonomous Republic of Crimea and armed conflict in Donetsk and Luhansk regions | 4.8 bln. UAH | 2.2 bln. UAH |
| | 3. Amount of tax payments that were not received by the consolidated budget of Ukraine | 40 bln. UAH | |
| | 4. Reduction of the number of operating enterprises | 155.42 bln. UAH / 13.075 bln. USD | 209.286 bln. UAH / 88.605 bln. USD |
| | (by 63.61% | 2.2 bln. UAH / 0.088 bln. USD | 65.02% |
| 4. External and internal political consequences | 1. Increase of public debt | 4.68 ÷ 6.84 trln. UAH / 174.51 ÷ 255.05 bln. USD | 34.8 bln. USD |
| | (by 188.2% (by 241.71% (by 1413.5 bln. UAH) (by 12.63 bln. USD) |
| | 2. Increase in costs for servicing and repayment of public debt (actually technical default of Ukraine) | by 64.93% (by 316.5% (by 42.92% (5.99 bln. USD) | |
| | (by 72.4 bln. UAH) | 0.32 bln. USD | 0.32 bln. USD |
| 5. Ecological consequences | 1. Deterioration of the environment and the cost of its restoration | 15 bln. UAH / 0.55 bln. USD | 424.94 bln. USD |

Source: Compiled and calculated by the authors
on time \( Y = f(t); \ Y = Y_0 + a \cdot t \), where \( a \) is the rate of increase (or average pure gain) of the time series), we have obtained the following equation: \( Y = 112.05 + 62.58 \cdot t \).

Using this equation to extrapolate the identified trend, we obtain that by the end of 2020 the amount of loss will be 487.53 billion USD, and by the end of 2021 - 550.11 billion USD (Figure 2). Thus, in addition to the total loss of 424.94 billion USD we have calculated for the period from 2014 to 2019, Ukraine may additionally lose the amount of 250.33 billion USD for 2020-2023 (according to the forecast). Thus, the sooner Ukraine has access to its territories, the less damage it will suffer.

As for the mechanism of compensation, in our opinion to assess the damage from the conflict in Donbas and the annexation of Crimea, it is advisable to create a special unit in the Ministry of Justice of Ukraine on the compensation of damage from the armed conflict in Donbas and annexation of Crimea.

Ukraine has started preparatory work to establish an open register of infrastructure damage in a zone of armed conflict in order to assess the damage caused to the infrastructure of Donbas. Thus, the initiative group headed by V. Omelchenko created the «Single register of infrastructure damage in a zone of ATO», that is now a file of destroyed objects of Donbas, and available online (Single register of damage to the Donbas infrastructure, 2020). Creators of this register emphasize, since the beginning of its work in September 2014, with the help of citizens and volunteers in the public access on the website of the Single Register was collected information about the destroyed objects. At the same time, the information base of the project is constantly updated due to the receipt of new data. As of June 2020, the site has information on 3387 objects. That is, the information of the created site does not reflect the full picture of losses. Among all objects on the site of Single Register (SR), more than 80% were added directly by citizens. Despite the incompleteness of the information, the creation of a such site allows the world community to have a real idea of what is happening in the Donbas (Single register of damage to the Donbas infrastructure, 2020).

5. Conclusions

An analysis of damage assessment approaches in Ukraine has shown that the absence of a unified approach to damage assessment can cause many problems both among experts and in the courts. Also, the mechanism of compensation for damage is practically not developed. And this, in turn, can have a negative impact on the term and amount of compensation.

Besides, approaches to damage assessment for different entities are no detailed. We have proposed an approach to assessing the damage to the country as a whole by the main types of losses. The total amount of damages and losses of Ukraine from the armed conflict in the Donbas and the annexation of Crimea by the cumulative total as of 01.01.2020 comes at 424.94 billion USD. The predicted amount of losses and damages for Ukraine, if the armed conflict is not stopped, as
the cumulative total for 2020-2023 will be $250.33 billion USD more, in addition to the amount calculated for today.

The problem of creating a mechanism for compensation of losses deserves special attention.

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