

MASTER'S THESIS

Course code: **BE300E**

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OPTIMISATION OF STATE BUDGET EXPENDITURES IN CRISIS: THE CASE OF UKRAINE

Date:16.05.2023

Total number of pages: 75

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PREFACE

This master's thesis is one of the most essential in my life. It ends my studies in Public Sector Finance at Nord University in Bodo (Norway) and Taras Shevchenko National University in Kyiv (Ukraine). My knowledge was acquired over two years and was examined and highlighted in the last months of my studies.

My research is related to the challenging situation — the war in Ukraine, and I am lucky to be surrounded by people who supported and inspired me. That is why I want to express my deepest gratitude to those who have contributed substantially and significantly to my research project.

First and foremost, I'd like to express my gratitude to my supervisors, Veronika Vakulenko and Olexandr Rozhko. They not only read every line of my work carefully and made competent scientific advice, but they also became true motivators and inspirers for me.

I want to thank all of my respondents for devoting their time and making a substantial contribution to the scientific advancement of the field by sharing their experiences. You could reveal the actual image, which was buried in textbooks.

Next, I'd like to thank the coordinators of this double degree program, Anatoli Bourmistrov, Igor Lyutiy, and all the professors and staff members at the universities listed. Such an educational program is unique, and you have created attractive prospects for everyone who wants to advance in the field of public finance. This program became an excellent motivator for me to grow in various areas.

Last but not least, I want to thank my family members, who have always been by my side and supported me in all my ambitions, mirrored in this work's outcomes.

Sviatoslav Liutyi

09.05.2023

ABSTRACT

The year of Russia's full-scale invasion of Ukraine proved to be the most difficult for Ukraine since regaining independence in the early 1990s. It was the most difficult in all areas, including the public finance system. The economy contracted rapidly while defense financing needs soared. Social spending was also a government priority for which funding had to be found. In overcoming the devastating consequences of the war and creating conditions for sustainable development of Ukraine, one should rely on a balanced and justified public spending policy.

This research looks at the process of optimizing state spending and the effects of crises on budget management. This work complements prior research efforts on crisis-related public spending optimization. The need for optimizing public expenditures and different strategies in both normal and crisis conditions was investigated by Manliev (2013), Schick (2009), Curristine (2020). D.-K. Kraan (2004), T. Bohdan (2016), and B. Anderson (2021) investigated techniques for optimizing state budget expenditures during a crisis. At the same time, little study has been undertaken on the conflict's influence on optimizing public expenditures.

Much of my research is devoted to mechanisms (including methods, instruments, etc.) for optimizing state budget expenditures during crises. During my study, I realized that methods for optimizing state budget expenditures during crises should be separated into two categories: first, optimizing budget expenditures during wartime, and second, budgetary measures for post-crisis recovery.

The interview was chosen as the data collection approach to fulfill the research goal. This qualitative study is based on nine interviews with professionals in Public Sector Finance. The study period was taken as the time of war in Ukraine from 2014 to 2023.

At the same time, the emphasis is on Russia's full-scale invasion of Ukraine in 2022. In a crisis, attaining better results through optimizing state budget spending is inhibited by various factors, the most important of which is uncertainty. To study the case, Uncertainty theory was used as the conceptual framework.

The study of optimization of state expenditures demonstrated (1) the results under uncertainty and (2) features for optimizing state expenditures under crisis conditions caused by the war in Ukraine. The study reveals ideas about optimizing state expenditures under uncertainty caused by the war, which led to ambiguous results. Therefore, the study complements the debate on optimizing state expenditures under crisis conditions.

Key words: state budget, expenditures, optimization, budget strategy, Uncertainty theory

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INTRODUCTION

1.1 Relevance of research and problem statement

The public budgeting process relies heavily on state expenditures aimed at the implementation of programs and activities provided for by the relevant budget. As a result, a well-managed program for public expenditures has a significant impact on the government's efforts to attract investors by providing a high-quality infrastructure and efficient public expenditure programs. These investments help the country's economic growth and increase the private sector's contribution to GDP (Gaspar & Mauro, 2020). In order for high-quality institutions to facilitate and assist in the proper management of the allocations of the public budget, government policies and programs require efficient public spending (Mandl et al., 2008).

Large-scale public expenditures are common in industrialized economies; in many European nations, general government spending ranged from 38% to 50% (OECD, 2021). Redistributive, allocative, and regulatory purposes are served by the extensive government involvement in market economies, which effectively reduce income inequality, provide public goods and services, and encourage sustainable development (Ostry, 2014). For instance, it is generally believed that the Nordic model, which combines socialist principles with free market capitalism, has succeeded in increasing efficiency, equity, and well-being (Pestieau & Lefebvre, 2018; Stiglitz, 2015).

From time to time, countries face crises of a different nature. Therefore, the causes of crises can also be a natural phenomenon — reflecting climate phenomena, earthquakes, floods, and other natural disasters. And they can be technogenic reflections associated with human activities (Deloitte, 2015).

The pandemic crisis threatened to undo the progress made in two decades in combating poverty and gender inequality. One should note that the COVID-19 pandemic has led to the worst economic crisis since World War II (Ledere, 2020). Thus, in accordance with the study provided by researchers from the World Bank, since 1870, there have been 14 worldwide recessions, with the most recent being in 2020. These recessions occurred in 1876, 1885, 1893, 1908, 1914, 1917-21, 1930-32, 1938, and 1945-46. The COVID-19 recession will be the worst since 1945–1946 and more than twice as severe as the one brought on by the global financial crisis in 2007–2009 (Kose & Sugawara, 2020).

Since the beginning of a full-scale war, Ukraine's economy is in a severe crisis. Ukraine, still reeling from the coronavirus pandemic, is facing a new crisis — Russia's full-scale invasion of Ukraine, which raises the question of reform of budget expenditures. Otherwise, the state will depend only on international assistance and will not be able to exist independently in the future, while realizing the interests of citizens.

In this situation, government expenditure must be appropriately optimised, not just for economic recovery. What is more vital, though, is to initially focus on the socioeconomic structure of people's lives (Prasetyo, 2020).

The *Progressive Theory of Public Expenditures* was described by Beckett, J. (2002). Works of some scientists devoted to public expenditure management in normal circumstances (Schick, 1998) and during the crisis (Tandberg and Allen, 2020). In turn, the need and way to optimize public expenditures were also considered in normal circumstances (Paientko, 2016) and under crisis (Manliev,2013; Schick, 2009; Curristine, 2020).

Mechanisms for optimization of the state budget expenditures even during a crisis were considered by Kraan, D.-K. (2004), Bohdan (2016), and Anderson (2021). They considered budgeting for loans and guarantees, off-budget funds, and fiscal rules as essential components of advanced fiscal institutions.

At the same time, not enough research has been done in the context of the war' optimizing budget expenditures. Moreover, the war affects the situation in Ukraine and other countries.

The global food, energy, and financial crises caused by the war in Ukraine in 2022 hit countries affected by the pandemic and the climate crisis. Maintaining an optimal level of government expenditures in Ukraine influence not only the financial and economic situation of Ukraine but also other countries. Most countries of the world understand this and provide financial support to Ukraine.

Restoring a strong and stable Ukrainian economy is a fundamental priority for the next generation. Here we need to focus on two things. *Firstly*, it is wise to think about the fiscal controls that should be put in place during the crisis. These are crisis-response fiscal mechanisms. They should also be prepared together with a set of policies and procedures for the immediate aftermath of the crisis. *Secondly*, today Ukraine cannot do without international aid, but the need for funding from foreign partners will be even after the end of the war — in the stage of restoration of Ukraine. While this is an effective post-war policy, dependence on aid has long-term repercussions. In essence, relying on help makes governments accountable to foreign donors rather than their own people.

If the Ukrainian government manages to implement fiscal consolidation by reviewing and optimizing public spending, this could help to reduce the budget deficit and the debt burden and improve the functioning of the public sector and the quality of public and social services funded by taxpayers. An intriguing question arises as to how government spending can be optimally divided between the various categories because of the competition for resources caused by the fiscal budget constraint.

The contradictions of the government in the implementation of the budget process in Ukraine can be traced to the last decade. Thus, the underestimation of the risks and challenges associated with Russian aggression in 2014 manifested itself in insufficient funding for the defense and the Armed Forces of Ukraine, which became visible already in the first months of the full-scale invasion of Russian troops into Ukraine on February 24, 2022 (Golovakha & Makeiev, 2022).

Thus, the current economic crisis in Ukraine requires the government to change its approach to the management of government expenditures. The aim of my master's thesis is to study the optimal structure of government expenditures needed in the economy of Ukraine and determine the economic sectors where government expenditures will be the most effective.

Based on previous ideas, the research questions of my master thesis are as follows:

1. How are state expenditures optimized under uncertainty?
2. What are the features for optimizing state expenditures under crisis conditions caused by the war in Ukraine?

1.2 Structure of research

This master's thesis is divided into nine sections, including a preface, abstract, contents, bibliography, and appendices. The introduction emphasizes the importance of studying the optimization of state budget expenditures in general and in the context of Ukraine, as well as the research issues that served as a general concept for this master thesis.

The literature review illuminates the management of state budget expenditures and reasons for their optimization; the effects of crises on the management of budget expenditures; mechanisms for optimization of the state budget expenditures during crises. This component of the master thesis is reinforced by the selection of conceptual and theoretical frameworks for future study, which will aid in the theoretical explanation of the processes occurring in the research object.

The theoretical framework describes the Uncertainty theory and its main theoretical assumptions, what is uncertainty, its types and features, and the models of decision-making under uncertainty.

The next part discusses the approach used to perform this investigation at a high scientific level, revealing what procedures were involved and what resources were used for the project. The plan for future research is agreed at this point, including which stages it will take and which ethical standards should be observed during the investigation.

It was also determined to highlight the study's broad context in the fifth chapter, which aided in gaining a comprehensive awareness of the context, or environment, in which the object of study

resided. This stage of the research may be referred to as the preparation for the major section of the study, which created a general grasp of the processes that exist in Ukraine. The primary demand in the future will be the verification and inclusion of this information during the research.

The findings of an extensive investigation are reported in the sixth chapter of the text, titled "Empirical Findings." In this section, I attempted to provide as much information as possible so that the reader has a comprehensive image of optimizing state budget expenditures in Ukraine, which will assist in further addressing the work's primary problems, which were stated in the first part of this master thesis.

The following section discusses the contributions and answers to the work's main question, provides a clear understanding of the issue of state budget expenditure optimization that exists in Ukrainian practice, intertwines with the theoretical foundations already covered by previous scholars, and makes new proposals for theoretical additions and practical improvements for the process of optimizing state budget expenditures in Ukraine.

The last component of this master thesis offers study results as well as current constraints that may serve as ideas for future research.

II. LITERATURE REVIEW

2.1 Management of state budget expenditures and reasons for optimization

Public expenditure management is an important tool in economic and development policy (ADB, 2004). The issue of optimal and efficient use of public spending has been one of the key issues for many centuries in the evolution of the state and society. For the first time, A. Smit thoroughly investigated the essence of public spending. In his work "The Welfare of Nations. Studies on the Nature and Causes of the Welfare of Nations" (1776) he clearly distinguished the state expenditures and divided them into general (defense and maintenance of royal power) and expenditures in which individuals are interested. At the same time, he emphasized the unproductive nature of the expenditures of providing for the royal court (Smit, 2001). The transition from an absolute monarchy to a democratic republic is an objective historical process that makes it possible to ensure the stability and balance of the economic system and adequately respond to economic and global threats. This problem is primarily based on the processes of democratization of society and the realization of the economic interests of certain social groups and directly related to the socio-economic development of the country and the growth of the welfare of its citizens. The development of each society is based on the unity and at the same time the contradiction of the authorities and citizens. The state assumes the functions of accumulation and use of common goods, and the government, using the current legislation, the administrative resource has an impact on the economic system and society through the appropriate budget policy.

In the 60s of the twentieth century, the trend of democratization of the state system intensified and manifested in the growth of the share of the budgetary redistribution of GDP and the growth of social spending of the state budget, so-called Swedish model of socialism. The strengthening of the social component of state budget expenditures had both positive and negative consequences. The positive ones include the diversification of incomes, strengthening of social justice and equalization of incomes of citizens, and the growth of aggregate consumption levels. The negative side was the intensification of inflationary processes and the constant dependence of governments on the growing needs of citizens in increasing the social spending of the state budget. Thus far, the state budget socialization process has become a separate challenge for developed countries. The socialization of the state budget is understood as an increase in the share of its expenditures on social payments and benefits to certain segments of the population and the definition of social programs. Such a policy began to focus on external borrowing to finance the budget deficit, as well as an increase in the fiscal burden on businesses and the incomes of working citizens. At the same time, a steady upward trend in the share of GDP redistributed through the budget remains (Liutyi, 2020).

The consequences of such a policy were the economic crises of Great Britain in the 80s and other countries in Western Europe. Today we can see this in the example of the “umbrella revolution” in France. In this situation, governments are forced to finance the state budget deficit, its social component of spending, either through money emission or borrowing, and as a result, we can observe the growth of inflationary processes and the rise in the cost of living, which has negative consequences in the future and will require unpopular measures to leveling out the situation.

A separate issue of changing priorities in the structure of state budget expenditures may be crisis situations in which this or that country finds itself. Crisis situations can have both objective and subjective backgrounds. Undoubtedly, they can be associated with the cyclical nature of economic development and the passage of the economy through certain phases of the economic cycle. But, as a rule, they are subjective in nature and are associated with the subjective activities of the government, which determines the need for an adequate response from the standpoint, first of all, the optimization of state budget expenditures. In this context of crisis situations, a special place is occupied by the threat or direct participation of the state in a military conflict. At the same time, the government and the state budget assign the primary task of ensuring the priorities of budgetary financing of the defense and security of the country, and its armed forces.

Situations similar to this have already occurred in recent history. Thus, the government of Margaret Thatcher during the Falklands War of 1982 changed the priorities of state budget expenditures, concentrating resources on the security and defense of the state, providing for the armed forces, while reducing social spending and creating conditions for investment in private business. Such a budgetary policy implemented national goals, and ultimately became a condition for the socio-economic growth of Great Britain. During the Cold War between the Soviet Union and the United States, President Ronald Reagan changed the priorities of government spending in the 1982 budget, redirecting budget spending from social programs to defense spending. The issue of balance and optimal use of state budget expenditures, based on the interests of the state, made it possible to ensure balance in the world global system and moderate the growth of the military threat. Although this policy led to an increase in government spending as a percentage of GDP and created a certain social tension in the country, at the same time it ensured the economic growth, which in the future became a condition for increasing the monetary incomes of citizens. These examples can serve as a methodological basis for developing a domestic budget policy for optimizing the structure of state budget expenditures during the war on the territory of Ukraine.

Public education, consumption of public goods and services, and social protection are all examples of socioeconomic uses for government expenditures. People's well-being is directly improved when public goods and services are made available. Households want more public consumption, which is

complementary to their private consumption, as economic progress raises living standards (Ganelli & Tervala, 2009). According to the law of diminishing marginal utility (e.g., Boadway & Keen, 2000), transfers to the poor not only increase social welfare but also address public concerns about income inequality and long-term economic development (De la Croix & Doepke, 2004; Fleurbaey, 2009).

Managing the public budget is crucial for influencing the government and economic productivity. It also has an influence on people's well-being through introducing good public services like education and health care (Rayp & Van De Sijpe, 2007; United Nations, 2017). According to Schick (1998), it is simpler for many governments to increase spending in the hope of increasing efficiency than to decrease spending. Global budget allocations have therefore significantly increased in recent years. As a result, as part of their fiscal policy, governments use tools and methods to fund government projects and programmes, including borrowing from both local and international sources, particularly during times of crisis (Domar, 1944; Kamiguchi & Tamai, 2019; Thompson, 2014).

However, after COVID-19, the question is whether Thatcherism and Reaganomics will be successful. The problem is that an aging population also slows economic expansion. During its demographic burden phase, no major developed nation has been able to achieve higher per capita economic growth. Compared to the demographic dividend phase, when working age to population ratios are rising, this phase sees a decline in working age to population ratios. In addition, the demographic burden phase has entered all developed nations and will continue for at least the next 20 years.

As fertility rates remain significantly below replacement levels, the majority of the female population is past childbearing age, and anti-immigration attitudes prevail, governments in the developed world will continue to face the prospect of even greater levels of population aging following the COVID-19 recession. It will be completely different from Thatcher's and Reagan's environments.

One of the most important lessons from the crisis is that governments will need to respond to future crises quickly and on a large scale while maintaining trust, transparency, and even the foundations of democracy. This applies to lockdowns as well as a gradual loosening of restrictions as vaccinations spread. In light of the severe restrictions on movement, the pandemic has demonstrated how crucial trust and transparency are to maintaining public health. For people to comprehend and comply with extraordinary measures in extraordinary times, trust and transparency are essential. Additionally, they are essential to a society's capacity to absorb and recover from shocks.

Governments must improve their spending habits. During this crisis, OECD nations are supporting citizens and businesses in great numbers, contributing up to 10.5% of GDP via other measures and 16.4% of GDP via additional spending or revenues lost. Governments are likely to face spending constraints at some point. In order to improve the quality of public services, increase efficiency and

ensure that spending priorities match people's needs, governments must make sure they know how different groups in society are affected by policy and work to make sure no one is "left behind" (OECD, 2021).

2.2. Effect of crises on the management of budget expenditures

Four interconnected aspects of traditional public expenditure management are changed when state budget expenditures are optimized under crisis conditions. To speed up the action, *first* special procedures are created that supersede the budgeting process' ingrained procedures. *Second*, actual budget power shifts from established players to others, generally from specialized power holders overseeing the process or protecting their specific interests to political leaders with a wider range of policy priorities. *Third*, budget optimization during a crisis deviates from incremental patterns and results in far bigger changes to the spending outcome than would be the case under normal budgeting procedures. *Fourthly*, the optimization of budget expenditures during a crisis changes how the process handles conflict as a result of the aforementioned deviations. The mechanisms for controlling conflict are weakened when budgeting enters crisis mode, thus new ones must be created (fig.2.1).

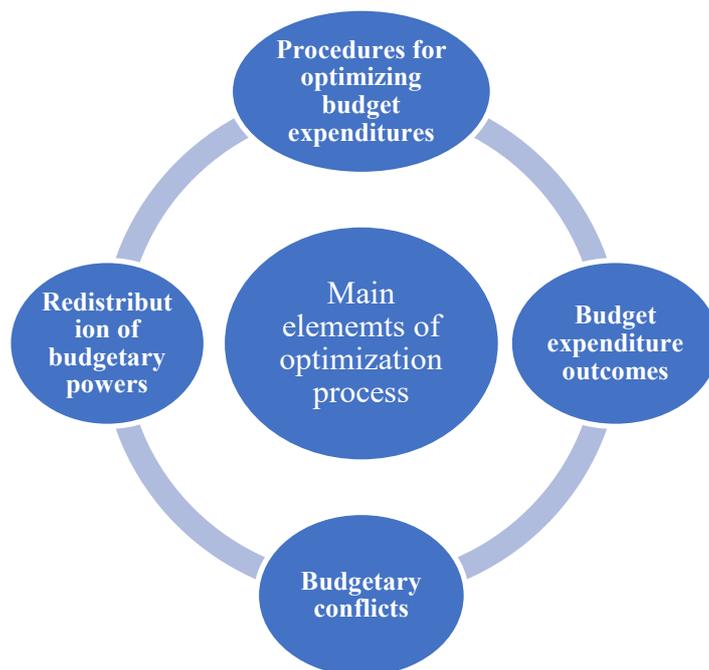


Figure 2.1 Components of management of budget expenditures in times of crisis

Source: compiled by the author's ideas based on Schick (2009)

Budget expenditures outcomes. The results of a budget are often gradual, and the procedures under the control of budget experts are designed to result in allocations that differ from past budgets only slightly.

Contrarily, crisis managing is non-incremental and can result in spending patterns that aren't necessarily tied to the past. The government's response to a crisis would probably be insufficient if it didn't. Nonetheless, it is very likely that managing will return to gradual patterns after the crisis has passed. After all, temporary measures to address economic distress won't have a lasting impact on this aspect of managing if more than 50 years of reform efforts to remove incrementalism from its main influence have failed (Schick, 2009, p.10).

Procedures for optimizing budget expenditures. Routineization of choice is the optimization of budget expenditures. Together with documents outlining the data to be provided and examined as well as dates for each stage along the road, it assigns roles and obligations to offices in both the government and the legislature as well as to various niches in the administrative hierarchy. Because budget methods are often carried over from the prior year with little to no modification, participants do not need to develop new routines every year. Routines stabilise expectations and relationships, offer budget makers advance warning of what they must do to navigate through the process, and simplify the tremendously intricate duties of preparing and implanting the budget (Schick, 1998).

Frequently, major budget process reform has the short-term effect of disorienting participants and delaying the implementation of new systems. New routines and accompanying behavioural adjustments need time to become incorporated in the process. When they do, ambitious reforms may have been toned down, and the reform process becomes more of a hybrid of old and new rather than a full departure from the past.

The crisis's biggest victim is the set budget calendar. Governments are under pressure to act now and cannot wait until the following cycle. One emergency package replaces or augments the previous one as the situation worsens, and it is put together even before the previous reaction has been fully implemented or its effects have been evaluated. A generation ago, Caiden and Wildavsky (1974) showed that the poorer a government is, the more budgets it has each year. In a similar vein, the government creates more budgets as the crisis worsens.

Budget optimization in times of crisis is naturally improvised. Rules and procedures are developed to meet the demands of the time, and changes are made frequently along the way. Optimization of budget expenditures under crisis cuts through the tangle of budget procedures in addition to avoiding the set calendar. Routine management of budget expenditures is a complex system for gathering and sorting data on expenditures, activities, spending units, responsibilities, constituencies, legal requirements, and other elements that result in defensible judgments.

The finance ministry or budget office receives the information from the spending agencies, who then compile it into the required form, present it, negotiate the spending amounts, and make choices that are subsequently formatted into budget statements.

In managing budget expenditures during a crisis, the process can be reversed, with central decision-makers determining the types and extent of action before examining proposals from expenditure units. Sometimes, after being told how much money they would receive, these units must determine how to use it.

The crisis may also have an impact on budget implementation procedures, particularly in nations whose expenditure units are subject to spending caps or have itemised budgets that must be adhered to. Certain restrictions are loosened during times of crisis, giving organisations more leeway when using emergency funding. In order to make sure that the stimulus is implemented on schedule, agencies may even be pushed to spend money more quickly than usual.

Redistribution of budgetary powers. Managing budget expenditures may become more accessible to certain participants through improvisation and less to others. As a result, it might redistribute fiscal authority. As previously said, established routines offer defined roles to people who create and review budgets; as a result, uprooting procedures is a crucial step in effectively handing power over to others. Managing budget expenditures is typically the domain of those who want to claim resources and protect public coffers.

Claimants and guardians generally maintain an ongoing, interdependent relationship despite their hostile responsibilities and frequent disputes over financial allocations. While guardians have control over the funds, claimants are more informed about the effects of government programmes and how well they are run.

During the budget cycle, each party fulfils its expected role: claimants seek more money, and guardians typically give them more—but not as much as they asked for. It's likely that outcomes won't change if the actors and their routines don't alter, which would be counterproductive to the goal of placing the process on a crisis footing.

According to Schick (2009), crisis budgeting is a brief deviation from traditional budgeting caused by circumstances that overwhelm established principles and practises. It is distinguished by specific processes, improvisations that redistribute budgetary power, and major changes in income or expenditure results.

Managing budget expenditures during a crisis is typically more top-down and centralised than normal managing budget expenditures. Power agents in the centre must carefully consider the extent of the stimulus before examining sectoral demands.

Thus, innovations in budgetary powers were implemented in Ukraine during the war. They include the following:

1. The Cabinet of Ministers of Ukraine has been given the authority to make decisions on additional provisions regulating the process of state budget execution.
2. The list of priority expenditures for the social sphere, medicine, and business support has been expanded by amending the Procedure for the exercise of powers by the State Treasury Service in a special regime under martial law (Decentralization, 2023).

The process is sped up by centralization, which also invests political resources and urgency in rallying support and marginalizes individuals who get in the way. Political leaders must exert their own pressure to keep the process moving as there are no action-forcing deadlines built into the crisis budget schedule.

The balance of power between claimants and guardians is altered by the crisis. Processing the budget in crisis mode enhances guardians when deficit reduction is the goal. In addition to blocking new claims, they can also cut existing programs, which is extremely tough to do under normal circumstances. But, when a crisis forces the government to increase spending, the opposite happens and claimants' benefit.

This propensity to say "it depends" is an example of budgeting's ongoing quality of being flexible enough to accommodate whatever outcomes politicians' desire. Even in times of prosperity, the budget process serves its political masters, but times of crisis make it simpler for them to include their preferences in the budget.

Budgetary conflicts. Every crisis response option has the potential to exacerbate existing budgetary tensions. By setting its own action-forcing deadlines that give disagreement a temporal limit, crisis management reduces conflict. Even without a clear deadline, the urgency of the situation compels quick action that subverts particularistic concerns. By establishing predetermined procedures that do not need to be renegotiated, stabilizing responsibilities and expectations, and establishing civil principles for controlling and resolving budget problems, cyclical routines deaden conflict in regular budgeting.

Even while they may continue to disagree about what decisions should be made, participants do not have to argue over how those decisions should be made. Routine budgeting allows those with stakes

in decisions to take part in decision-making. The process may undoubtedly become more acrimonious with widespread involvement that allows every spending unit to compete for funding, but incremental standards require that nearly all claimants receive a share of the budget and of rising spending.

Crisis management has the potential to engender conflict since significant changes are being made, and not every claimant will have a part. Normal budgeting calms the process by limiting almost all outcomes to a relatively narrow, gradual band. More conflict is unavoidable when a crisis results in negative outcomes, as it occurred in some OECD nations in the 1980s. But, when the stimulus is in effect, the primary points of contention are the size of the increases and who should receive them.

When budgeting enters crisis mode, established conflict-resolution mechanisms are weakened, and new ones must be devised (Schick, 2009). As noted earlier, crises can be caused by human and inhuman factors. In both cases, the state will optimize spending in such a way as to support the victims. Foreign experience shows that social support was provided not only in the case of COVID-19 and the war. Under the financial and economic crisis of 2008-2009, governments also supported businesses that created/retained jobs. But in the case of war, the state, first of all, increases the defence expenditures.

2.3. Mechanisms for optimization of the state budget expenditures during crises

I. Optimization of budget expenditures in war conditions.

The budgets of the majority of European nations are designed with built-in stabilizers that automatically alter income, expenditures, and the fiscal balance in response to changes in economic conditions. In every nation, the response to the budget is substantially stronger on the revenue side than on the spending side. The size of the response varies between nations and is influenced by factors such as the structure of the tax system, the kinds of income assistance programs, and other circumstances.

In relatively mild recessions, a government might only use automatic stabilizers to boost economic activity, or it might use discretionary measures that change established budget policy by increasing or decreasing spending or revenue.

A modest adjustment to revenues and expenditures is not deemed sufficient when major financial institutions are on the verge of collapse and both consumers and business owners have lost faith in the ability of markets to self-correct, as evidenced by the massive stimulus programs promoted to deal with the significant crisis. Furthermore, governments may favour to rely on extrabudgetary measures that conceal a portion of the liabilities they are accruing due to skyrocketing budget deficits. Despite the fact that all stimulus plans included tax reductions and spending increases that were stated

in budget statements, several sizable plans also *loans, guarantees, extrabudgetary entities and central bank operations* that are often not covered by the budget (fig.2.2).

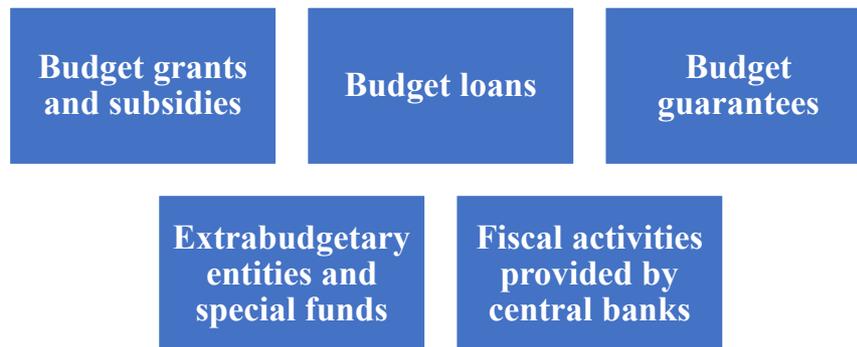


Figure 2.2 Mechanisms to be implemented during the crisis

Source: compiled by the author

1. Budget Grants and Subsidies. Governments frequently give stimulation through handouts to people and businesses when the economy is in bad shape. Governments may also provide funding to running companies and financial institutions in times of crisis to keep them afloat.

World experience in providing budget subsidies in times of crisis included: subsidies to create new jobs (Slovakia); subsidies for hiring workers unemployed for more than six months (UK); business subsidies to retain workers and expand jobs (Japan) (ILO, 2010).

These grants are documented as expenditures in the fiscal period in which they are made and identical to many other common grants that are part of public budgets. But occasionally, a government would trade grants for the acquisition of assets.

Governments occasionally take an equity interest when they recapitalize financial institutions and strategic companies, and they may take on legal or informal ownership when they rescue running businesses. The issue of how a government should conduct deals in which it obtains assets in exchange for grants is raised by this circumstance. Funds spent on asset acquisition are not expensed in commercial accounting, although they might be under governmental cash accounting procedures. If the corresponding operations are not directly reflected in the deficit indicators of the state budget, then, consequently, the government suffers less reputational losses.

Grants with the sole intent of acquiring public assets and emergency scenarios where the acquisition of assets results from efforts to aid private organizations in need have a significant difference. In the first circumstance, governments often keep ownership for the duration of the asset's existence; in the second, governments may sell acquired assets once the company has recovered.

2. Budget Loans. Budget (or direct) loans are those that are funded by taxes or levies. In general, the terms of direct loans are more beneficial to the borrower than those of private-sector bank loans, because there would be no motivation for public lending otherwise. It is also possible that the risk is so severe that no loan can be secured in the private sector (Kraan, 2004).

Loans, as opposed to grants, are frequently a more effective type of government support. But depending on how they are handled in the budget, loans present a number of concerns. As a result, in some countries with cash-based budgeting, loans are recorded as "below the line," meaning that the cash flows connected to them are not included in the budget's accounts of expenditures.

Therefore, it is quite challenging to predict potential future losses that may result from large loans made during the crises. These loans concentrate risk rather than pooling it, and real losses may be influenced by both the economy's future performance and the creditworthiness of specific borrowers.

But when very large loans are made to a small number of borrowers, pooled-risk models do not work. Instead, governments must assess the risk inherent in each type of loan. However, most of this risk is systemic, and estimates of future losses depend on economic trends and government policies which are hard to project (Schick, 2009).

The global financial crisis of 2008 actualized anti-crisis measures of the Western Keynesian type. The governments of the leading countries of the world carried out large-scale programs of budget support for the financial sector (due to direct transfers, budget loans, acquisition of shares, etc.) in order to prevent its collapse. Rising unemployment also calls for measures to prevent a sharp contraction in aggregate demand. Government loans have become the main source of financing for these measures. In other words, the budget deficit turned out to be the main instrument for achieving stabilization in the process of anti-crisis regulation (Hovorushko, 2014, p.49).

3. Budget guarantees. Budget guarantees are government guarantees given to non-governmental lenders in the event of debtor failure. Loans require an initial payout, whereas guarantees do not. Obviously, just like loans, guarantees shift risk to the government because there is a chance that it may be responsible for making payments in the event of a future default (Kraan, 2004).

Nonetheless, governments have also backed up large corporations and financial institutions' debt during times of crisis. The concentration of these hazards makes it challenging to calculate the government's exposure.

Governments typically make specific promises during crises that outline their financial responsibilities should certain unfavorable outcomes take place. Yet, implicit obligations arising from high expectations of how a government will behave in challenging conditions may also be incurred

by governments. As an illustration, some governments cap the number of individual bank deposits they will protect against loss while still paying the entire value of deposits in the event that banks collapse. Similar to this, certain OECD governments have offered assistance to financial organizations that have been judged "too big to fail" out of concern that doing nothing would leave the economy open to a systemic collapse.

Budget guarantees are usually provided on the terms of payment, urgency, property security and counter guarantees received from other enterprises. The provision of state guarantees leads to an increase in public debt and obligations, and in the event of the insolvency of the borrower itself, to an increase in budget expenditures. Private company guarantee programs operate in many countries, including the Netherlands, the UK, and Canada (Kraan, 2004).

If in Ukraine the provision of state guarantees for the private sector of the economy was introduced only in 2014, in the Netherlands government guarantee schemes have been stimulating the creation and growth of private companies for more than 30 years. It was during the period of economic decline that governments of countries created or expanded guarantee schemes: in Canada, up to 85% of loans for real estate were guaranteed in accordance with the existing Small Business Finance Program, and in the UK, there were programs for small and medium-sized enterprises that provided for the provision of guarantees for obtaining circulating assets, funds and loans (Green, 2023).

3. Creation of extrabudgetary entities and special funds. Extrabudgetary entities (or units) are institutions that conduct extrabudgetary transactions, employ extrabudgetary accounts, have their own governance structures, and, in many cases, have a legal existence distinct from government ministries and departments (Allen & Radev, 2010).

Governments may create separate entities for legitimate purposes, but they may also do so in order to offload expenditures, risks, or losses from the budget. Even if an organization is carrying out duties that are typically left to government agencies, the government has the authority to grant it extrabudgetary status. When extrabudgetary entities are founded, they frequently enjoy significantly greater operational freedom than conventional agencies, particularly if they make their own money through trade or through special accounts. They may be granted exemption from civil service and procurement laws, may avoid routine budgetary review, and may exercise a great deal of discretion in how they spend available cash.

In actuality, they serve as exclusive areas that are independent of the executive branch of government. Extrabudgetary organizations established to deal with crisis-related policies may continue to exist after the crisis is over, especially if they still have a portfolio of assets and designated revenue streams. Even if they cannot support themselves, these organizations may be successful in gaining political

support that enables them to maintain their off-budget status and use the special monies created to keep them operating. According to claims, they might assume additional duties that allow the government to gain from the experience gained in handling crisis-related measures. The government may at some point in the future begin a campaign to streamline public finances and eliminate some extrabudgetary organizations and special funds (Schick, 2009).

Russia's large-scale invasion of Ukraine prompted not only Ukraine but also other states to think about creating funds for the armament of the army, defense, and combating the consequences of the war. In particular, Germany, in order to protect its freedom and democracy, has set itself the goal of creating a combat-ready, well-equipped Federal Armed Forces. The government has set up a one-time €100 billion Special Fund to support the existing capabilities of the Federal Armed Forces and enable necessary investments in defense (Bundestag, 2022). This will help to procure the necessary equipment for the defense complex more quickly than is possible with a normal annual budget cycle.

In addition to the defense budget, the projects of the Federal Armed Forces are to be financed from this fund in close cooperation with the Bundestag. The goal of the foundation is to provide an efficient and progressive military force that will be equipped to carry out its primary task of defending the country. This special fund receives no allocations from the federal budget, is managed separately, operates for several years, and can be used when necessary.

In India, the National Defense Fund is set up to collect voluntary donations received to support national defense efforts. The fund is used to provide for the welfare of members of the armed forces (including paramilitaries) and their dependents. The fund is administered by an Executive Committee headed by the Prime Minister and the Ministers of Defence, Finance, and the Interior as members. The Fund's accounts are maintained at the Reserve Bank of India. The fund is completely dependent on voluntary contributions from the population and does not receive any budgetary support (India, 2021).

Estonia has a National Defense Assistance Fund, launched by the Estonian Chamber of Commerce and Industry and the Ministry of Defense together with the Association of Reserve Officers of Estonia. The fund aims to improve the training and information equipment of the Estonian Defense Forces and the Defense League, improve the level of general and managerial education, recognize outstanding members of the defense forces and defense allies, and provide comprehensive medical and humanitarian assistance.

It is important that with the outbreak of the war in Ukraine, this foundation began a charitable campaign to raise funds to support the treatment in Estonia of victims of the Russian-Ukrainian war or other allied countries (Estonia, 2022).

4. Fiscal activities provided by central banks. The financial operations of central banks are comparable to those of special funds and extrabudgetary institutions. The central bank's finances are extrabudgetary in the same way that extrabudgetary entities are, and the central bank also has its own funding source.

There are two significant variations. One is widespread support for the idea that central banks should be sufficiently independent to handle the nation's monetary situation without undue political interference; the other is the central bank's ability to create money. When central banks engage in quasi-fiscal operations, they undermine their claim to independence, and when they assume financial risks, they put future governments in danger (Schick, 2009).

Sometimes governments can resort to fiscal dominance —the subordination of monetary policy to the current goals and objectives of fiscal policy. Clearly, they often resort to increasing budget expenditures for some programs, especially social programs, on the eve of elections. In conditions of limited resources, there is a growing desire to resolve this issue due to emission financing of the budget deficit. However, both the increase in government borrowings and the use of the central bank's emission funds in the context of a high level of the budget deficit and public debt do not contribute to the achievement of the monetary goal of ensuring price stability and can lead to macroeconomic destabilization (Mihaljek, 2021).

Among the positive results is the example of Canada in the 1990s and 2000s, where prolonged cuts in public spending and coordination of fiscal and monetary policies contributed to a significant reduction in short-term interest rates on public debt: from 8% in 1995 to 3.2% in 2005. At the same time, medium and even long-term rates also fell significantly, which had a positive effect on the economy (Henderson, 2022).

Absolutely opposite results are the absence of such interaction and the priority of politically motivated goals of fiscal policy, which brings politicians a faster and more attractive result. This happened, for example, in Israel and Poland in the mid-1990s, where fiscal policy led to an "overheating" of the economy and increased inflationary pressures.

The lack of coordination of monetary and fiscal policy in Slovakia in 1996-1998 also had negative consequences. The government of the country began to rapidly increase public spending against the backdrop of a reduction in budget revenues, in particular, stimulated investment through the accelerated construction of roads, a dam, and a nuclear power plant. However, this only worsened corporate governance and significantly reduced corporate income tax revenues. The inefficiency of the welfare system and rising unemployment exacerbated the crisis. The consequences of this policy

were high deficits in both the state budget and the current account, as well as the rapid growth of public debt (Kominkova, 1999).

Crisis phenomena in Slovakia tried to counteract the central bank. Since mid-1996, his monetary policy has been tightened to prevent macroeconomic imbalances. This contributed to the establishment of high real interest rates: at the beginning of April 1997, they were 13.1%, while in the Czech Republic — 5.3%, and in Hungary — 1.5%. However, this monetary policy only exacerbated the situation. This happened both because of the lack of coordination with government policy, and because of the inconsistency of the central bank itself, which maintained a fixed exchange rate, which did not allow leveling imbalances in the economy (Meyer, 2019).

Against the backdrop of high rates in the national currency, the demand for loans in foreign currency began to grow, primarily from large enterprises and enterprises that had a state guarantee. This led to the growth of medium-term inflationary and devaluation expectations and eventually ended in a currency crisis.

II. Budgetary measures of post-crisis recovery.

Budgeting returns to its established routines, reliable duties, and expected results once the crisis has passed. When the crisis is over, this trend, which has typically been the case in the past, may very well continue. Recent hardship may prompt some governments to improve their budget work, add a multi-year perspective, or increase their capacity to examine how the budget and economy interact. Budgeting will undoubtedly continue to reflect the fidgety fiddling with rules, methods, informational requirements, and other aspects of the process that has characterized change for the previous fifty years. But there won't be a great deal of pressure to change budgeting.

Nonetheless, the current crisis could have a considerable effect on budgetary practice in at least four different ways. *First*, the crisis will leave several nations with high amounts of public debt, some of which will exceed generally recognized standards like the 60% GDP ratio stipulated in the European Union Stability and Growth Pact (European Commission, n.d.). *Second*, national governments will give budgetary sustainability issues more consideration, which will lead them to look beyond the medium-term to cross-generational issues. *Thirdly*, authorities will look for fresh ways to evaluate fiscal risk and incorporate risk projections into the budget and other financial accounts. *Last* but not least, the crisis and its effects will encourage countries to coordinate some budget laws and policies (fig.2.3).

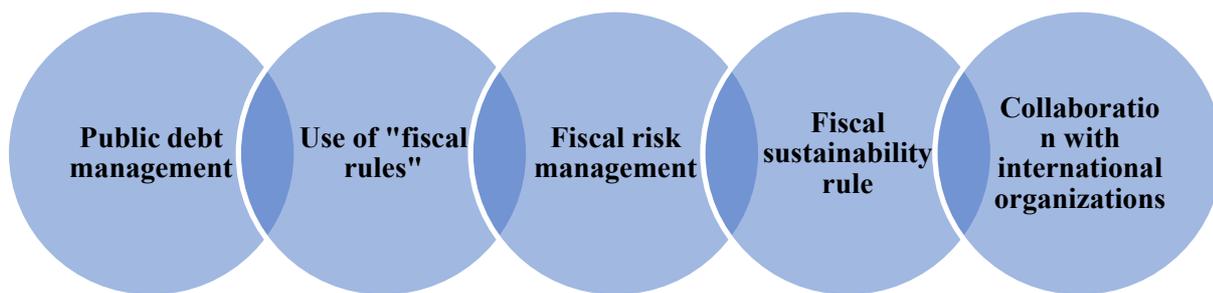


Figure 2.3 Budgetary measures of post-crisis recovery

Source: compiled by the author

1. Public debt management. Massive stimulus programmes, including grants, loans, and budget guarantees, put out by some nations will push debt loads to all-time highs. Debt-to-GDP ratios will certainly decline once economic growth picks up again, but they won't go back to their pre-crisis levels for a while. Future economic performance, the willingness of surplus nations to purchase bonds issued by debtor governments, and the ability of fiscally pressured governments to raise taxes are just a few of the crucial variables that will determine the level of debt and the ability of governments to finance it (IMF, 2003).

Certainly, persistent pressure to reduce public spending on national governments that are drowning in debt is possible. With the government conducting basic evaluations of public expenditures and program promises, managing in some nations function in part as a decremental process.

2. Use of "fiscal rules". IMF experts recommend developing fiscal rules based on targets adjusted for cyclical fluctuations. A prerequisite for the effective functioning of budgetary systems in modern conditions is the establishment of certain fiscal rules, which are considered the most important innovations of the last two decades. Such norms usually limit key budget indicators (including the level of budget expenditures). And although empirical studies do not give an unambiguous answer to the question of whether the introduction of fiscal norms helps to reduce the risks to the functioning of the public finance system, such norms should be an addition to balanced procedures for making budget decisions and the budget process and make the authorities live within their means (Caselli, 2022).

Increased interest in fiscal regulations limiting governments will also be sparked by soaring debt and deficits. As international experience shows, fiscal rules and regulations are introduced for various reasons: ensuring macroeconomic stability (Japan); increasing confidence in government fiscal policy (Canada); ensuring the long-term stability of fiscal policy (New Zealand) (Osetka, 2015).

The regulations also impose a medium-term fiscal policy framework, because budgetary stabilisation always takes several years. At the same time, the shorter-term regulations allow for a more gradual improvement of the key budgetary balances (Manliev, 2013).

Among the EU countries, different approaches are used to include fiscal norms in budget legislation. In particular, in the UK they are included in the Financial Stability Code, and in Germany, fiscal rules are even included in the Constitution. The budgetary legislation of Ukraine contains fiscal rules aimed at ensuring the financial discipline of the government and solvency. Taking into account international experience, to ensure the effectiveness of fiscal rules, the following prerequisites must be met: a) the willingness of the authorities to take obligations to maintain the long-term stability of public finances; b) openness of the statistical base; c) coverage of the main budget aggregates by the current reporting system; a) existence of an audit of public finances; e) disclosure of data for external monitoring of compliance with fiscal rules (Bohdan, 2016).

The examples of fiscal rules are in Table 2.1.

Table 2.1 Fiscal rules for budget spending in the countries of the world

Country	Essence of the fiscal rule
Ecuador	Since 2011, a new rule on budget expenditures has come into force: budget expenditures cannot exceed permanent revenues, including oil revenues. External financing and oil revenues should be used exclusively to finance public investment
Israel	In 2010, the government debt limit was set at 60% of GDP. The budget expenditure rule has been adjusted to reflect the new debt target.
Nambia	Since 2010, the budget rule on expenditures has come into force, which fixes their maximum amount at the level of 30% of GDP.
Poland	A new budget expenditure rule that came into effect in 2011 limits the growth of discretionary expenditures by the central government to 1% in real terms as measured by the consumer price index.
Romania	From 2010, general government spending increases should not exceed projected nominal GDP growth for the next three years until the fiscal balance turns positive. In addition, limits have been set for the maintenance of personnel of budgetary institutions.
Bulgaria	Consolidated government debt should be limited to 60% of GDP

Source: compiled by the author based on Schaechter (2012), Manliev (2013)

Governments usually make more promises that strain upcoming budgets during prosperous periods. They base their decision on the plausible justification that the budgetary situation is strong and that it is wise to use the resources at hand to advance social objectives. Nonetheless, this behavior has significantly weakened public finances in significant OECD nations. It is significant that numerous nations with structural budget restrictions have weathered the economic storms rather successfully.

Emerging economies may derive their own lessons from the budgetary aftershocks of the economic crisis. Some are likely to become quite cautious in expanding the government's commitment to pensions and other long-term obligations.

3. *Fiscal sustainability rule.* Sustainability involves a number of characteristics, including intergenerational equity and government solvency, as was previously explored (Schick, 2005). Several national governments consider a third aspect of sustainability in light of the crisis and the legacy of high debt levels: whether they can maintain their existing fiscal trajectory, including tax rates and pension/health responsibilities.

For them, the crisis could not have come at a worse time because the long-anticipated increase in older populations is already happening or is about to. The pressure on future budgets is now being added by governments already having to pay for rising health and pension costs.

Budget planning should incorporate sustainability studies by limiting current choices that are anticipated to have a negative influence on long-term sustainability (OECD, 2010).). Creating an intertemporal budget constraint that prevents the government from taking any actions that might increase the present value of its fiscal gap is one way to do this. As an alternative, governments might control expenditure by measuring their fiscal position from a balance-sheet perspective.

It can be argued that a fiscal sustainability rule should only apply to changes in the long-term fiscal outlook brought about by new policies and not to changes brought about by anticipated changes in the economy, increases in the price of health care or other public services, or changes brought about by demographic trends (HM Treasury, 2023).

4. *Fiscal risk management.* Fiscal risks are defined as the likelihood of significant discrepancies between actual and projected fiscal performance over the short to medium-term horizon (Kopits, 2014). Countries should "identify, assess, and manage prudently longer-term sustainability and other fiscal risks" (OECD, 2015; HM Treasury, 2023, p.11).

The sharp economic downturn and demise of significant financial institutions have had a significant impact on national governments. Hazards that seemed cost-free in prosperous times have materialized in challenging circumstances, considerably escalating budgetary distress and complicating efforts to stabilize public finances. Governments take steps to improve risk management by gathering and disseminating data on potential liabilities and other risks, either as annexes to budget documents or as extra schedules to financial statements. Some set up independent risk assessment offices with the power to trump sectoral agencies' risk-taking.

A multi-year plan accompanied by explicit fiscal regulations that limit spending (including tax expenditures) can boost policy credibility by being counter-cyclical and promoting fiscal discipline, transparency, accountability, and certainty (Anderson & Minarik, 2005).

5. *Collaboration with international organizations.* The cross-national financial management system could undergo the final, and potentially most significant, change. The financial and economic interdependence of national governments has increased, as well as their awareness of global contagions that extend from their initial sources to new venues.

Initial initiatives to increase global capacity might concentrate on voluntary initiatives, early warning systems, accounting standards, and information exchange. Global guidelines and standards for many aspects of budgeting and other aspects of public financial management will eventually emerge. The substantive policy will be the last bastion of national financial independence, even this crucial component of state sovereignty may be threatened by the risk.

However, while this is a viable strategy for the post-war period, aid dependency has long-term consequences. Essentially, aid dependency makes governments accountable to foreign donors instead of their own citizens. To avoid this, aid could be limited to 50% of tax revenue (Wood, 2008) in stages over 10–15 years. One of the main challenges is to convince donors to agree to such a restriction.

III. THEORETICAL FRAMEWORK

3.1 Uncertainty theory

Uncertainty is inherent in all economic activity. In the vast majority of cases, a decision maker does not know the full range of factors at play and is forced to formulate a number of hypotheses before evaluating, managing, and making decisions. A situation of uncertainty is characterized by the fact that the choice of a particular action plan can lead to any result, generally speaking, from a variety of possible outcomes, but the probabilities of their realization are unknown. There are two cases: a) the probabilities are unknown due to the lack of necessary statistical information; b) the situation is not statistical and it makes no sense to talk about objective probabilities at all (this is a situation of pure uncertainty in the narrow sense). It is pure uncertainty that is most common in the economy because decisions (especially strategic ones) are made by each particular firm in unique conditions (Bland, 2012).

Uncertainty means the lack of comprehensive information and the inability to accurately predict the future. The uncertainty of a situation lies in the fact that it depends on many variable factors, the effect of which cannot be predicted with any certainty. Uncertainty is also affected by the lack of clearly defined goals and criteria for their evaluation. Uncertainty is the basis of risk. Many economists define risk based on the concept of uncertainty. For example, Nickbakht and Groppelli (1993) state that "risk is the level of uncertainty associated with investments or project implementation". The book by Dolan and Lindsay (Dolan & Lindsay, 2012) states that "when people are not sure what will happen in the future, they are said to be taking a risk".

One of the first scholars to draw attention to the problem of uncertainty within modern economic theory in his article "The Concept of Risk and Uncertainty" published in 1921 was the American economist Frank Knight (Yermushko, 1999).

In accordance with his concept, the following sources of uncertainty and the risk caused by it are distinguished:

- economic environment;
- regulatory and legislative environment;
- technical and technological environment;
- internal environment.

There is another classification of sources of uncertainty. It is based on the scheme of analyzing the behavior of counterparties described by K. Bowman in his book "Fundamentals of Strategic Management" and supplemented by E. Grove in his book "Only Paranoia Survives". Grove in his book "Only the Paranoid Survive" (Grove & Andrew, 1999):

If we summarize all the causes of uncertainty, it can be argued that it can be the result of two circumstances (Vitlinsky, 1996): 1) incomplete information; 2) limited capabilities of the management entity to process the information obtained.

In general, the causes of uncertainty are divided into three groups (Vitlinsky & Makhanets, 2008).

Group I. Most economic processes are fundamentally deterministic. This is the case, for example, with scientific and technological progress, the course of which cannot be predicted.

Group II. There is a concept of economically optimal incomplete information. It arises in cases where it is more expedient to work with incomplete information than to collect costly, almost complete information. This group also includes incomplete information due to limited processing capacity. This also includes inaccuracies associated with approximate methods of data estimation. Reducing these inaccuracies also requires certain additional costs.

Group III. There is "organized" uncertainty or asymmetry of information. It is caused by the fact that often some economic agents consider it expedient to conceal some information for economic, political, and other reasons.

Decision-making rules under conditions of uncertainty, conflict, and risk are based on different concepts. The most well-known, sufficiently researched, and widely used in theory and practice is the concept of game theory and statistical decision-making.

Game theory is a branch of modern mathematics that studies mathematical models of decision-making under conditions of uncertainty and conflict, i.e., in situations where the interests of the parties (players) are either opposite (in the case of antagonistic games) or do not coincide, although not opposite (in the case of games with non-opposing interests). The founders of game theory are the American scientists John (Janusz) von Neumann (1903-1957), of Hungarian origin, and Oscar Morgenstern (1902-1977), of Austrian origin. In the second half of the 1940s, they attempted to use mathematics to describe the phenomena of competition characteristic of a market economy as a kind of "game".

A game is a formalized description (model) of a conflict situation that includes clearly defined rules of action for its participants, who are trying to win a certain victory by choosing a specific (in a sense, the best) strategy of behavior.

A large number of scientific works are devoted to the issues of optimality in the functioning and development of economic systems under conditions of uncertainty, conflict and the risk they generate. This is due to the diversity of manifestations of uncertainty and conflict factors in real processes and phenomena.

Given an issue, decision making necessitates an integrated and holistic view of various alternatives, their potential consequences, and implementation conditions. Alternatives are methods that may be used to achieve the objectives. Depending on the problem, the alternatives could be policies, strategies, plans, designs, actions, or anything else that appears to be capable of achieving the goal (Miser and Quade, 1985). Walker (2000) defines decision making as selecting among alternatives in order to influence system outcomes in the desired direction (Fig. 3.1).

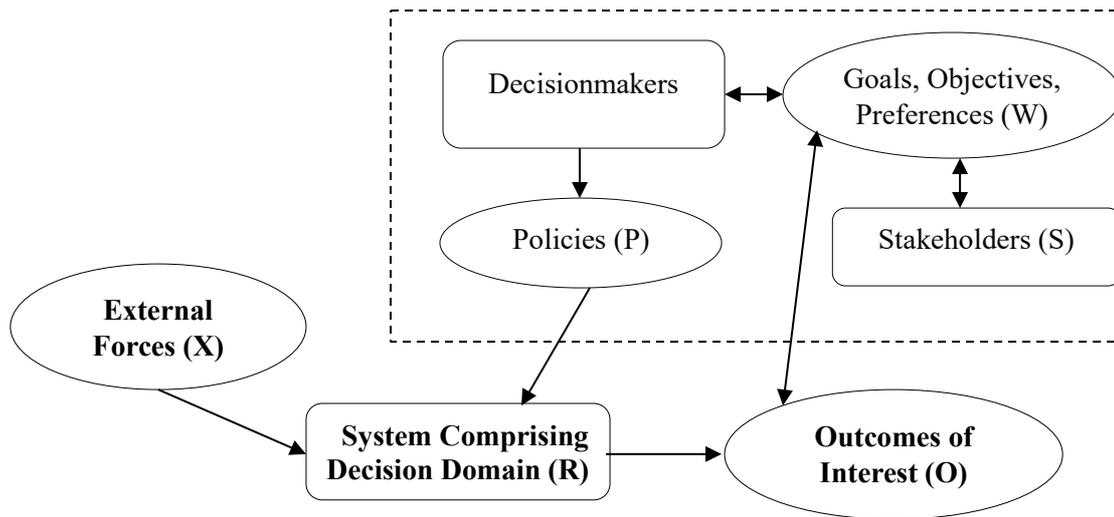


Figure 3.1 Decision-making process

Source: Walker, 2000

It entails specifying policies (P) to influence the behaviour of the system in order to achieve the goals. The system is at the heart of this viewpoint, which distinguishes the system's physical and human elements, as well as their mutual interactions. The outcomes of interest are the outcomes of these interactions (the system outputs) (O).

They are regarded as relevant criteria for policy evaluation. The valuation of outcomes refers to the (relative) weights, not always quantitative, assigned to outcomes by key stakeholders such as decision-makers (W). Other external forces (X) interact with the system in addition to the policies.

Both may have an impact on the relationship between system elements (R) and thus the structure of the system itself, as well as the outcomes of interest to decision-makers and other stakeholders. External forces are forces outside the system that are not under the decisionmaker's control but can have a significant impact on the system. Furthermore, there are uncontrollable autonomous developments within the system that may also influence the desired outcomes.

When applied to decision-making under uncertainty, the framework shown in Table 3.1 reveals several locations where uncertainties may arise. First, there will almost certainly be scenario

uncertainty because it is difficult to predict which external developments will be relevant for long-term future system performance and, perhaps more importantly, the magnitude and direction of these changes. Second, even if external developments were certain, structural uncertainty about how the system would respond to those external developments could exist.

Table 3.1. The four intermediate levels of uncertainty for the four locations

Indicators	Level 1	Level 2	Level 3	Level 4 (deep uncertainty)	
				Level 4a	Level 4b
Content (X)	A clear enough future	Alternative futures (with probabilities)	A few plausible future	Many plausible futures	Unknown future
System model (R)	A single (deterministic) system model	A single (stochastic) system model	A few alternative system models	Many alternative system models	Unknown system model: know we don't know
System outcomes (O)	A point estimate for each outcome	A confident interval for each outcome	A limited range of outcomes	A wide range of outcomes	Unknown outcomes; know we don't know

Source: Vincent et al., 2019

The causal mechanisms governing system performance may also be uncertain, or there may be competing hypotheses of causation. Finally, the valuation of the various outcomes may be contested. Stakeholders frequently disagree on the significance of future problems and the goals to be achieved with a plan. As a result, different, often conflicting, perspectives on the various policies and the characterization of outcome acceptability emerge. Of course, new stakeholders may emerge over time, current stakeholders may leave, or preferences may change, all of which will impact the valuation of the outcomes.

Most traditional applied scientific work assumes that uncertainties arise from a lack of information (i.e., assumes that uncertainties associated with a problem are of Level 1 or 2), which leads to an emphasis on uncertainty reduction through ever-increasing information seeking and processing, or from random variation, which focuses efforts on stochastic processes and statistical analysis.

The approach to dealing with Level 3 uncertainties presumes that a few future worlds can be specified sufficiently well to determine robust policies that will produce favorable outcomes in the vast majority of them. Scenarios are used to describe these future worlds.

The best policy is the one that produces the most desirable outcomes across all scenarios, minimizes the maximum possible regret across all scenarios, and so on.

Although this approach has been successful in the past, the problem is that if the range of future assumptions proves to be incorrect, the negative consequences could be severe. Furthermore, research shows that scenarios are rarely used to address discontinuities in future developments; scenarios have a natural tendency to stay close to evolutionary (discontinuity-averse) business-as-usual situations (van Notten et al., 2005).

However, the significant issues confronting decisionmakers are frequently characterised by a higher level of uncertainty (Levels 4a and 4b) that cannot be adequately reduced by gathering more information. At the moment, the uncertainties are unknown.

Uncertainty pervades some or all aspects of the problem, including external developments, the appropriate (future) system model, model outcomes, and (future) stakeholder valuation of the outcomes. Such situations are characterised by decision making under extreme uncertainty.

3.2 Budgeting under uncertainty

The war in Ukraine has led to an increase in economic uncertainty. Daily indices of uncertainty have grown, although not as nearly as much as they did during the Covid-19 epidemic. Measures of subjective uncertainty obtained from firm surveys, particularly those linked to future inflation, have also grown (Yotzov et al., 2022).

The war reduced the long planning horizon from two or three years to a period of less than a year. Short-term plans are measured in weeks and months and destroyed due to situations that cannot be predicted.

The problem of planning in a period of uncertainty was faced by people at the individual level, businesses, and the government. It seems that nothing can be done during the war, but it is realistic to minimize losses and optimize budget expenditures.

My idea is to consider External Forces, the System Compressing Decision Domain, and its components that form and allow us to get Outcomes of Interest (O). The results obtained are the modification of the parameters of state policies and the consideration of the interests and influence of stakeholders.

First, I considered the main elements of the decision-making process (table 3.2)., and then I focused on the uncertainty condition.

Table 3.2. Main elements of decision-making process in budgeting under uncertainty

Main elements	Their characteristics
External Forces (X)	Different crises caused by war
System Comprising Decision Domain (R)	including:
Decisionmakers	President of Ukraine, Verkhovna Rada of Ukraine
Stakeholders (S)	Cabinet of Ministers of Ukraine, Ministry of Finance of Ukraine, Ministry of Economy of Ukraine, non-governmental and public organizations, Activists, Households, Enterprises, Citizens
Policies (P)	Social, economic, financial, monetary, budgetary, regulatory
Goals, Objectives, Preferences (W)	Production resumption, population support, adaptation of IDPs, employment support, currency stability
Outcomes of Interest (O)	<i>Macroeconomic indicators:</i> improvement in living standards and social protection of the population, resumption of production, and reduction in unemployment <i>Financial Indicators:</i> Reducing Debt and Fiscal Deficit

Source: compiled by the author

As stated earlier, there are four intermediate levels of uncertainty. In the second year of a full-scale war in Ukraine, I choose Level 3. The approach to deal with Level 3 uncertainties assumes that a few future worlds can be specified well enough to determine robust policies that will produce favorable outcomes in most of them. These future worlds are described by means of scenarios (fig.3.2).

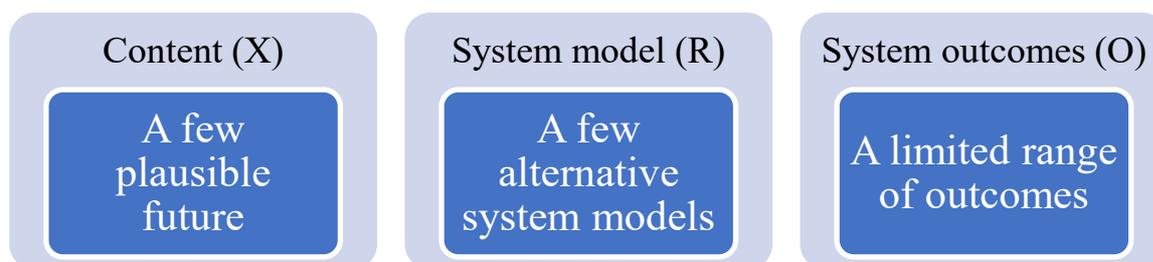


Figure 3.2. Decision-making process under uncertainty

Source: compiled by the author

The choice of level 3 is explained by the fact that a year of a full-scale war has passed and it has become clear that Ukraine is capable of, what it has withstood the hardest, and has every chance of winning. If people's memories of February 24, 2022 speak of shock, confusion, **uncertainty**, and unpreparedness, then after a year of a full-scale invasion, faith in victory is 95%, although back in January 2022 it was 56%. The majority (63%) believe that it takes at least six months or more to win (Public Culture, 2023).

The help and support of foreign partners also play an important role. According to the Ministry of Finance, from the beginning of the Russian invasion until the end of 2022, the amount of international

financial assistance exceeded \$32 billion. It is important that 45% of this amount was grants, that is, they were provided to Ukraine without the need to return (BBC News Ukraine, 2023).

All this gives us reason to have only a few plausible futures and form a few alternative system models to obtain a limited range of outcomes.

IV. METHODOLOGY

Methodology is the intellectual framework in which research is conducted or the basis upon which research is built (Brown, 2006). According to Holden et al. (2004) methodological choice should be related to the researcher's philosophical position and the analyzed scientific phenomenon.

O'Leary (2004) believes that a methodology is a framework connected with a certain set of paradigmatic assumptions we will use to conduct our study. According to Allan et al. (2005), when conducting research, the following two criteria must be met:

- first, the methodology should be the most appropriate for achieving the research objectives.
- second, it should be possible to replicate the methodology used in other similar studies.

My research methodology includes Research design, Data collection strategy, Data analysis and Research philosophy and ethics. The basic steps in my research are shown in Figure 4.1.

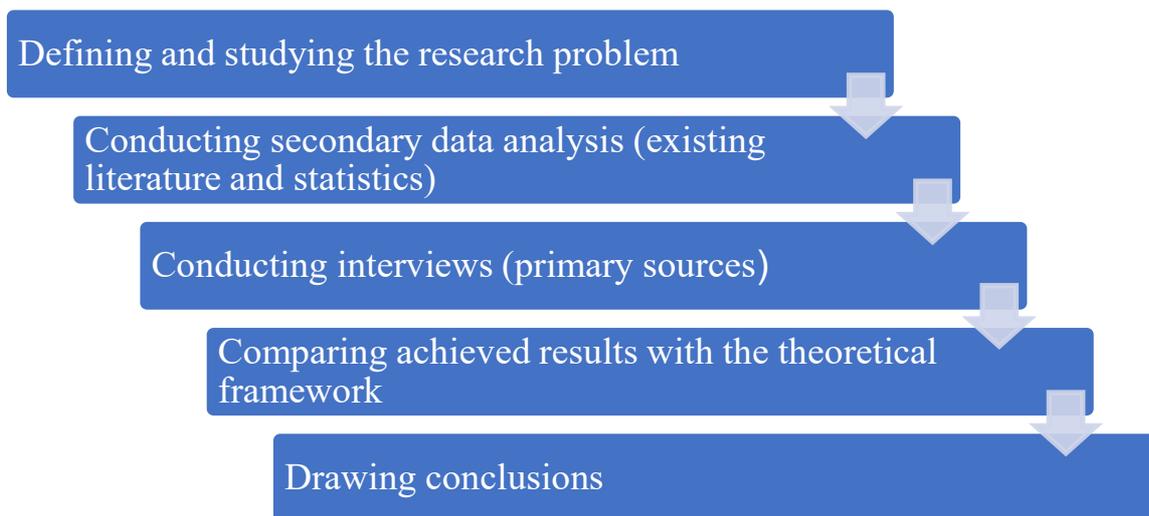


Figure 4.1 Basic steps of the research project

Source: compiled by the author

4.1 Research design

A research design is a comprehensive formulation of a research problem and the overall strategy to integrate the various components of the study in a coherent and logical manner. It serves as a framework or blueprint for carrying out the research. Simply put, it is the overall strategy for conducting the research. Smith (2000) defines a design as "a carefully planned scheme for conducting an experiment." An experiment's design refers to the selection and arrangement of conditions." A research design, according to Kerlinger (1997), is the investigational plan, structure, and technique designed to address research questions and control variation.

The researcher can collect empirical materials using a variety of methods, including interviews, direct observation, document, and cultural record analysis, and the use of visual materials or personal experience (Denzin et al., 1994).

Qualitative research is generally exploratory in nature. It is utilised to get an understanding of underlying reasoning, attitudes, and motives. In-depth interviews, documents, focus groups, and case study research are all examples of qualitative research methods.

One of the main instruments for data collection in my master's thesis is an interview. An interview is a qualitative research method that collects data by asking questions. It is a "dialogue between people in which one person assumes the role of the researcher" (Arksey et al., 1999). Face-to-face interviews, telephone and Internet interviews, group interviews, and postal questionnaires are all options. The questions can be either open-ended or closed-ended. In my research, the questions are open-ended because I wanted to get the interviewees' full view of the situation. In addition, this was influenced by the study of the situation under conditions of uncertainty.

In qualitative research, interviews are one of the most commonly used methods of gathering primary data. It allows researchers to collect qualitative and in-depth data. Many people believe that the simplest way to obtain information from someone is to simply ask them.

Interviews aid researchers in understanding the body language and facial expressions of research participants. It can also be very beneficial to understand their personal beliefs, opinions, and values. Moreover, researchers can build rapport with study participants. This can make the latter feel more at ease and engaged in the process, which should result in very positive responses (McLeod, 2023).

Moreover, the interview is considered one of the most appropriate methods for studies under conditions of **uncertainty**. Interviews can assist researchers in gathering valid and reliable data relevant to their research aims and objectives.

However, interviews do have some limitations. The process of optimizing budget expenditures includes the analysis of statistical data and financial indicators, as well as forecasting based on macroeconomic indicators. This justifies the need to use Quantitative research. While qualitative research relies on verbal narrative data such as spoken or written data, quantitative research draws conclusions based on logical or statistical observations.

I used interviews and statistics to examine the data I gathered to see if their ideas about patterns or relationships are supported by the facts revealed in my research.

Thus, I used a mixed methods study that combines quantitative and qualitative data collection and analysis in one study. In my opinion, these approaches can answer different questions, so combining them can provide me with more in-depth findings.

4.2 Data collection strategy

I explored the process of optimizing budget expenditures in war conditions in the example of Ukraine. To do this, I have developed a list of questions that will help me finally answer the key questions. 8 specialists in this field took part in my Qualitative Research, including representatives of the Ministry of Finance of Ukraine, the Ministry of economy of Ukraine, Kyiv City State Administration, the Verkhovna Rada of Ukraine, the State Treasury Service of Ukraine, research institutes, universities. Before collecting data, I asked experts in what form it would be convenient for them to answer my questions.

At the beginning of the interview, I asked each interviewee about his/her area of professional responsibility and how the process of optimizing state budget expenditures correlates with his/her professional activities.

I also asked the interviewees to assess the importance of each question and give their own assessment. The evaluation was based on the following scale: 5 - very good, 4 - good, 3 - satisfactory, 2 - poor, and 1 - very poor. This helped me assess the average importance of each issue in the context of the war in Ukraine.

However, my research strategy has some limitations. Firstly, the process of optimizing budget expenditure is carried out in conditions of uncertainty. Moreover, in such conditions that Ukraine has not previously encountered, and therefore it is difficult to justify the correctness of the decision without any previous experience. Wars are not like all other crises (financial and economic crises or pandemics). No one knows when the war will end and therefore it is very difficult to estimate the scale of future losses. Secondly, there may be a certain subjectivity here, since all people faced the war and its consequences in different ways, and therefore they evaluate the current situation by their own example.

4.3 Data analysis

After conducting 8 interviews, it was necessary to process and analyse the results. During the interviews with experts and studying the literature review, it was found that with limited financial resources in Ukraine, a very topical issue is the optimization of the composition and structure of expenditures of the State budget of Ukraine. This is because the majority of the state's financial resources are redistributed through the State budget. But if Ukraine has developed a methodology for forming a system of state budget expenditures, an unresolved issue of optimizing budget expenditures arises.

In addition to the primary data from the interviews, I studied Ukrainian legislation, research papers, policy briefs and open analytical sources on optimizing public expenditures to supplement the

interviews. These secondary sources of information were used to prepare for the interview and verify the information's accuracy afterward.

The criteria for including information from the interviews in this study was any information that describes the process which was described in Fig.3.1 with a detailed description of the main elements in Table 3.2. Questions about how crises affect the structure of state budget expenditure, which stakeholders influence the process of budget expenditure optimization, what research results should be achieved, and what policies, goals, and objectives are used to achieve these results are crucial. Therefore, when asking questions, I focused on these questions. If the interviewer did not give an answer that satisfied me, I tried to return to this question later.

Given the fact that the topic is being considered in the context of a full-scale war, which Ukraine faced for the first time, it is difficult for experts to give answers based on theoretical aspects, statistics, or even the experience of other countries since the current war is not similar to wars in other countries in different periods. Therefore, most of the answers are based on their own assessments, experience, and feelings. Each opponent's assessment is subjective, but at the same time, by superimposing one assessment on another assessment, and so on, we obtain an objective assessment of the situation we are studying.

4.4 Research philosophy and ethics

Each researcher is guided by his or her own approach to the research. The development of research assumptions, knowledge, and nature can be defined as research philosophy (Saunders et al., 2007).

Scientific research philosophy is a method scientists use to convert ideas into knowledge in the context of research.

In my research, I used the Pragmatist research philosophy concerned with facts. It asserts that the research problem drives the selection of research philosophy. In this research philosophy, practical outcomes are important (Lancaster, 2005). Furthermore, pragmatism does not belong to any philosophical system or reality, according to Alghamdi et al. (2013). Researchers are free to pursue their interests. They can choose the methods, strategies, and processes that best satisfy their demands and scientific research goals. Pragmatists do not believe in absolute oneness in the world. The truth is what is currently happening; it is independent of the mind, which is not subject to reality and mind dualism.

In this case, qualitative and quantitative methods can be used. They are confirmed to concrete research questions or aims. There can be used measures from positivist as well as from interpretivist paradigm, for example, interviews, observations, testing and experimentation.

Given the nature of qualitative research, the interaction between researchers and volunteers might be morally problematic for the former. because they are personally involved in various stages of the study. As a result, the development of specific ethical guidelines in this regard appears to be critical.

Ethics should be considered throughout the lifetime of a research project, especially if it incorporates primary research components such as surveys, focus groups, or interviews. Ethical concerns should be considered from the start of any study, and including them in the research design will likely boost the project's validity and rigor, as well as being responsible and fair to participants. (Halej, 2017).

Appendix II contains the messages I sent to the respondents. This message includes all of the pertinent information about my personality and research project. That is, the future respondent had the opportunity to familiarise themselves with the peculiarities of the interview and make their own decision regarding their participation in it.

Furthermore, it was stated that all personal data of respondents will not be shared, with the exception of the specialist's direction to understand the respondent's background and analyze the obtained information. Appendix I contains this list. This table in Appendix I shows that the information is limited and cannot be used to determine identity.

When sending an invitation to an interview, the letter stated the issue of anonymity, which can be found in Appendix II, and the second time during a personal meeting before the interview, I noted that this meeting is confidential and all information shared during it will be used only for scientific purposes in compliance with all personal data requirements. A brief response to the survey questions confirmed a serious intention to participate in this study and share personal thoughts. During the interview, I did not insist or press the respondents to answer questions that they had indicated they did not want to answer during the survey.

Following that, I requested permission to record the information received prior to the interview. Depending on the type of interview, I collected information through audio recordings, online conference recordings, or personal notes. To protect respondents' personal information, I collected the data on my personal computer using data encryption. After processing and analysing the data, all collected materials containing human components were removed and are now only available in the form of this master thesis.

V. RESEARCH CONTEXT

5.1. The case of Ukraine

In the last decade, Ukraine has faced various crises: the financial and economic crisis, the coronavirus pandemic and the war. Each of them has its own characteristics: if the financial and economic crisis and the coronavirus pandemic began in Ukraine as a result of world globalization, then in the case of the war, on the contrary, it began in Ukraine and its consequences spread to the whole world.

The results of a preliminary study by the Center for Economic Strategy on the optimal scale of public spending showed that the share of public spending in Ukraine's GDP is too high with a low institutional capacity of the state and a low level of trust in state institutions (Center for Economic Strategy, 2023). This actualizes the issue of optimizing budget expenditures in Ukraine. At the same time, the optimization of budget expenditures in peacetime and during the war is different.

In turn, threatening is the reduction of tax revenues, which make up the largest part of budget revenues.

In wartime, it is extremely difficult to draw up a budget based primarily on forecasts of macroeconomic indicators. There is no reliable methodology that can predict the development of the economy after the damage already caused by the war. In addition, it is impossible to predict the further actions of the enemy, whose main goal is to destroy the economic and human potential of the country.

A full-scale war in Ukraine requires a revision of approaches to the formation of policy in the field of state regulation of the economy and the search for new effective methods of public administration.

When preparing the 2023 budget, the Ukrainian government was forced to use standard peacetime forecasting procedures and methods. However, the government assumed that the war would continue the next year. In preparing the state budget, the government considered 14 scenarios of economic development and military aggression and settled on a "conditionally pessimistic scenario" (Vinokurov, 2022).

Ukraine ended 2022 with a 30% drop in real GDP. During the Second World War, almost no such volumes of GDP decline were recorded within one calendar year. The fall of Ukraine's GDP by a third cannot be explained solely by military factors. This actualizes the discussion about the possible modification of the parameters of the *state policies* to ensure its more optimal impact on the economy.

Another important discussion is the participation of different stakeholders, including citizens. It is essential to take into account a viable strategy in wartime and post-war period and the long-term

consequences of aid dependency because it makes governments accountable to foreign donors instead of their citizens with their views, ideas and needs.

Forecasts for further growth of the Ukrainian economy also vary on a very modest scale: from 0.3% in 2023 to 6.4% in 2025 (NBU forecast data). This is very little, both in wartime conditions and in conditions of a probable post-war recovery.

The key challenges for the current economy of Ukraine are the decline in production, the growth in the number of unemployed, the weakening of the stability of public finances, and the threat to currency stability. It is also important to take from foreign experience, that the large-scale restoration of production and the creation of jobs is the basis of the macroeconomic and monetary stability of post-war Ukraine (*Goals, Objectives, Preferences (W)*). In turn, it should be reflected in *Outcomes of Interest (O)*.

In a crisis, achieving better outcomes from optimizing state budget spending is hampered by a variety of variables, the most important of which is ***uncertainty***.

VI. EMPIRICAL FINDINGS

6.1 The war budget of Ukraine: re-budgeting and constantly changing expenditures

As already mentioned, the optimization of public expenditures can be carried out in peacetime and in war.

In peacetime, optimizing public expenditures is to identify areas where public spending is too high and assess the extent of possible reductions due to higher efficiency in using funds (Interviewee 1).

Under wartime conditions, revenues in 2022 were drastically reduced due to a full-scale Russian war, destruction and damage, and a recession of the economy, but expenses increased significantly due to the need and priority of financing the security and defense sector and social spending (Interviewee 2).

In turn, threatening is the reduction of tax revenues, which make up the largest part of budget revenues.

«A significant decrease in tax revenues of the state budget was caused by the cessation of the economic activities of many business entities in the context of armed aggression» (Interviewee 5)

The first element of the Decision-Making process in budgeting under uncertainty is External Forces (X). Different crises are caused by war:

Depending on their nature, various crisis phenomena can significantly impact the structure of state budget expenditures (Interviewee 3).

Crisis phenomena affecting the structure of state budget expenditures include natural disasters, the COVID-19 pandemic, external economic crises, internal political instability, strikes, revolutions, and war (Interviewee 7).

Summarizing, we can say that the following types of crises are taken into account in the structure of state budget expenditures: economic, social, political, natural, and military crises. At the same time, the military crisis is now the most important:

The military crisis has had a massive impact on the state budget. It depends on many factors, such as the duration of the crisis, the scale of intervention, the financial obligations of the state, etc (Interviewee 1).

The following consequences of the military crisis on the revenues and expenditures of the state budget are possible:

- increase in defense spending: in the event of hostilities, the state can increase its defense spending, including the acquisition of new military equipment and weapons, the training of the military, the construction of military bases, etc. This may lead to an increase in government spending and a decrease in funds for other sectors;
- decrease in revenues: a military crisis can also lead to a decrease in government revenues, as it can scare away investors and tourists. In the context of a decrease in economic activity, tax revenues to the state budget may decrease;
- increase in debt burden: in the event of a military crisis, the state can increase its debt burden, since it can attract more loans to finance military operations. This may lead to an increase in debt service costs and a decrease in the possibility of other expenses;
- potential decrease in investment: a military crisis could scare off investors and reduce their confidence in the state. This could lead to less investment and economic growth, affecting government revenues.

Nowadays, the level of execution of the expenditure part of the State Budget of Ukraine is low, there is a shortfall in certain items of expenditure, which exacerbates the issues of their optimization (Interviewee 7).

This situation is confirmed by statistical data (table 6.1.).

Table 6.1. Implementation of the state budget of Ukraine from 2013 to 2022, mln UAH

Years	Revenues		Expenditures	
	% of GDP		% of GDP	
2013	339180.3	23.31	403403.2	27.73
2014	357084.2	22.79	430217.8	27.46
2015	534694.8	27.01	576911.4	29.14
2016	616274.8	25.86	684743.4	28.73
2017	793265	26.59	839243.7	28.13
2018	928108.3	26.08	985842	27.70
2019	998278.9	25.12	1072891.5	26.99
2020	1076016.7	25.66	1288016.7	30.71
2021	1296852.9	23.75	1490258.9	27.30
2022	1787395.6		2705423.3	

Source: compiled by the author based on the source (MinFin, 2022)

That the growth of social programs and citizens' incomes is impossible due to the state budget deficit and the inability of the economy and business to provide its revenue component. It should be emphasized that now, more than ever, state budget expenditures, their structure directly depends on state budget revenues. We see a significant gap between expenditures and revenues of the state budget for 2022. The sources of covering this gap were government loans, financial assistance, grants from

the USA, Great Britain, international financial institutions and EU countries, and other partner countries of Ukraine

An analysis of the state budget expenditures of Ukraine for the period from 2013 to 2022 indicates the absence of a unified state strategy that would determine the priorities of socio-economic development and implement national interests (table 6.2). At the same time, a significant part of the state budget expenditures went to servicing and paying off public debt, and in 2013 this amounted to 7.86% of the state budget expenditures, then in 2015 — 14.65%, and such a trend continued. At the same time, it should be noted that during this period the exchange rate changed from 7.9 UAH per USD to 36.65, which led to cardinal changes in the absolute values of the state budget indicators (table 6.2).

Table 6.2. State budget expenditures of Ukraine (functional classification), %

Indicators	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
General state functions	20 546,0	15.30	17.87	17.22	16.97	16.53	15.68	26 634,0	13.87	17 349,0
i.e. Servicing the public debt	31 594,0	42 309,0	14.65	13.99	13.16	26 238,0	45 241,0	47 362,0	16 346,0	
Defense	24 532,0	13 302,0	44 935,0	24 685,0	31 625,0	30 926,0	34 578,0	13 028,0	20 668,0	42.24
Public order, security, judiciary	26 177,0	13 789,0	17 411,0	17 441,0	17 441,0	31 717,0	45 090,0	45 627,0	25 873,0	16.39
Economic activity	45 566,0	8.00	16 224,0	21 641,0	22 037,0	16 589,0	27 181,0	45 243,0	41 974,0	19 419,0
Environmental protection	41 640,0	0.60	0.70	0.70	0.56	0.53	0.59	0.52	0.55	0.17
Department of Housing and Utilities	0.02	0.03	0.00	0.00	0.00	0.03	0.01	0.01	0.01	0.02
Healthcare	44 960,0	16 834,0	35 796,0	29 952,0	36 161,0	47 150,0	21 610,0	25 812,0	16 377,0	29 738,0
Spiritual and physical development	46 023,0	41 275,0	42 005,0	0.72	0.94	44 986,0	0.93	0.76	45 108,0	0.41
Education	24 289,0	24 624,0	45 047,0	45 174,0	32 964,0	18 354,0	29 677,0	45 203,0	46 844,0	42 401,0
Social protection and welfare	21.93	18.72	17.98	22.19	17.22	16.62	20.38	45 102,0	22.77	15.75
i.e. Social protection of pensioners		17.62	16.43	20.82	15.90	15.22	16.99	15.70	13.50	

Source: compiled by the authors based on the source (MinFin, 2022)

During the martial law period, with an extremely limited budget and the need to increase defense spending, the government introduced special rules for spending. Government Resolution No. 590 (Markuts, 2023), adopted in the summer of 2021, introduced strict priorities for wartime spending from both state and local budgets in March 2022 and imposed significant restrictions on certain types of items. Even if specific revenue targets are met, expenditures with lower wartime funding priorities will not be met, ensuring the liquidity of the Treasury's single account.

During 2022-2023, spending on national security and defense and the implementation of martial law measures will be a priority, while public sector wages, debt service, social spending, public works, and energy, and other expenditures will be a lower priority. Capital expenditures will be financed last and, as a rule, only if the urgent need for such expenditures in the current fiscal year is justified. Prioritization of expenditures depends on the availability of funds (Zheleznyak, 2023).

Budget revenues have declined significantly during the war, while expenditures, on the contrary, have been increasing both for the country's defense and for social and humanitarian needs.

In 2022, many budget programs were not implemented (Onyshchuk, 2022). However, an important conclusion from the point of view of this year's expenditures is that all significant expenditures were covered. Of course, this would not have been possible without the support of international partners, as well as without the emission. Nevertheless, the stability of the budget was maintained and there is hope for positive changes in 2023 (Markuts, 2023).

6.2 The first year of the full-scale war in Ukraine: optimization public expenditures under uncertainty

The first year of the war was marked by increased uncertainty (Levels 4a and 4b), which cannot be adequately reduced by gathering more information. The uncertainties are currently unknown. Some or all aspects of the problem are uncertain, including external developments, the appropriate system model, model outcomes, and stakeholder valuation of the outcomes. Decision-making in such situations is characterised by extreme uncertainty (Vincent et al., 2019).

At the same time, even in the conditions that Ukraine faced for the first time, the Ukrainian government had to come up with ways to optimize budget expenditures. At the same time, Ukraine already has some experience in optimizing budget expenditures in times of crisis.

The main features of the process of optimizing state budget expenditures during different crises are the following:

- change of budget priorities;
- limiting the cost of remuneration and maintenance of the heads of enterprises, members of the board, and members of the supervisory boards of subjects of the public sector of the economy;
- termination of financing of optional expenses that do not affect the quality of the main types of budgetary services.

During the war, the optimization of state budget expenditures is carried out in the direction of increasing expenditures on the country's defence, the restoration of defence, infrastructure,

social facilities destroyed by the enemy, the evacuation of the population, social security for refugees and the unemployed, and support for certain business sectors. (Interviewer 6)

There is also a growing need to fund new categories of war-related spending, particularly providing social assistance to internally displaced persons and war veterans. (Interviewer 2)

Since the beginning of the war, emergency measures have been introduced to maintain macroeconomic and financial stability, in particular, to protect the main areas of priority spending. Such measures included the introduction of a fixed exchange rate, the introduction of foreign exchange restrictions, the use of regulatory easing in the financial sector, and the introduction of tax incentives, and others. (Interviewer 3).

The credibility of fiscal policy is adversely affected by the lack of a comprehensive management system for these risks, which has negative implications for the sustainability of public debt and the efficient allocation of public resources in line with public policy priorities.

The growth of fiscal risks creates a discrepancy in budget expenditures from planned indicators (Interviewer 2).

The macroeconomic forecast, on which the calculation of the 2023 budget indicators is based, is more pessimistic compared to the NBU forecast. Thus, the NBU expects a deeper decline in the economy in 2022 and a stronger recovery in 2023 (table 6.3).

Table 6.3. Comparison of the forecast of macro indicators of the government and the NBU

Indicators	2022		2023	
	CMU	NBU	CMU	NBU
Real GDP growth, %	-33,2	-37,5	+4,6	+5,5
GDP deflator, %	+28,3	+24,5	+30,7	+25,0
Nominal GDP, billion UAH	4680	4540	6399	5990
CPI, December to December, %	+30,1	+31,0	+30,0	+20,7
Average monthly salary, %, r/s (nominal)	+0,1	-13,5	+32,0	+36,3
(real)	-23,1	-26,9	+1,0	+6,7
Unemployment rate, %	27,9	28,9	28,2	+27,0
Export of goods and services, % R/S	-29,8	-35,0	+9,1	+20,8
Import of goods and services, % R/S	-9,9	-12,2	+1,0	+9,5

Source: Danylyshyn (2022)

As a result of the negative impact of the war, the budget deficit is planned at 20% of GDP and the government plans to raise most of the financing needs from external loans and grants, and the rest from internal loans, privatization and other sources (table 6.4).

Table 6.4. Indicators of the public finance system of Ukraine

Indicators	UAH billion			% relative to GDP			% relative to the previous year		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
	fact	plan	project	fact	plan	project	fact	plan	project
Income	1295.6	1422.2	1278.8	23.7	30.4	20.0	+20.5	+9.8	-10.1
Tax revenues	1107.1	1204.1	1156.0	20.3	25.7	18.1	+30.1	+8.8	-4.0
VAT	536.5	608.8	596.3	9.8	13.0	9.3	+74.1	+13.5	-2.0
income tax	147.8	170.0	132.0	2.7	3.6	2.1	+35.9	+15.1	-22.4
Part of the profits of the GP	28.5	113.0	7.3	0.5	2.4	0.1	-59.7	3 times more	16 times less
Expenses	1490.3	2648.1	2513.9	27.3	56.6	39.3	+15.7	+77.7	-5.1
Defense	127.5	632.6	870.0	2.3	13.5	13.6	+5.9	4 times more	+37.5
Social sphere	574.5	701.6	647.3	10.5	15.0	10.1	+14.8	+22.1	-7.7
Investments	134.4	97.9	95.0	2.5	2.1	1.5	+41.6	-27.2	-2.9
Debt service	155.3	170.6	330.7	2.8	3.6	5.2	+28.7	+9.8	2 times more
Shortage (+grants)	-199.2	-1239.2	-1280.1	-3.6	-26.5	-20.0	-8.9	5 times more	+3.3
External loans and grants	111.8	753.1	1497.4	2.0	16.1	23.4	+6.6	6 times more	2 times more
Domestic loans	66.6	475.2	-225.3	1.2	10.2	-3.5	-55.4	6 times more	-
Other sources	20.9	11.0	8.0	0.4	0.2	0.1	-	-47.3	-27.6
National GDP	5459.6	4680.2	6399.0	100	100	100	+30.2	-14.3	+36.7

Source: Danylyshyn (2022)

6.3 Immediate and long-term effects of expenditure optimization in Ukraine

Since 2014, the Ukrainian economy has been operating in the conditions of a hybrid war waged by the Russian Federation against Ukraine, however, the massive military actions of the aggressor state on the territory of Ukraine have created new extraordinary challenges, namely:

- non-receipt of financial assistance from international financial organizations and donor countries may lead to additional money emissions, and a reduction of budget expenditures, which will negatively affect the volume of economic demand and production and additionally affect price dynamics;
- *uncertainty* about the duration and intensity of the military conflict between Ukraine and the Russian Federation, which could lead to further involuntary resettlement of the population, the continued destruction of vital infrastructure, and increased loss of economic and productive potential;
- loss of crops as a result of the destruction by the Russian Federation of fields and crop storage sites, which will lead to a reduction in food crops and agricultural production, which, *firstly*, will lead to a decrease in exports and foreign exchange earnings from exports, and, *secondly*, also food shortages in the domestic market and rising consumer food prices.

Without optimizing budget expenditures, Ukraine would not have been able to hold out at the proper level throughout 2014-2021, and it has learned certain lessons from this experience. At the same time, 2022 is a challenging year as Ukraine faces a full-scale invasion for the first time.

Therefore, it is advisable to consider the System Comprising Decision Domain (R), which includes the development of Policies (P), Goals, Objectives, and Preferences (W), as well as the influence of Stakeholders (S).

Achieving better results from optimizing state budget expenditures in a crisis is hindered by a number of factors, the key of which is *uncertainty*.

In times of war, uncertainty is extremely high, and the resumption of economic activity will depend on the course of hostilities. There is a rapid change in conditions, which leads to the need for rapid response and adjustment of budget expenditures (Interviewee 3).

Achieving better efficiency in optimizing budget expenditures in a crisis is hindered by implementing expenditures "in manual mode".

In the context of a full-scale Russian-Ukrainian war, the optimization of state budget expenditures depends on military operations. This leads to the need for prompt response and adjustment of budget expenditures. Almost the same situation was during the COVID-19 pandemic (Interviewee 2).

There are other problems and obstacles that are only exacerbated by the crisis.

Lack of a clear distribution of functional powers between central and local authorities; the limited horizon of budget planning; corruption risks of the formation and execution of the expenditure part of the state budget (Interviewee 5).

Legislative inertia and corruption (Interviewee 6).

The immediate effects of expenditure optimization in Ukraine are as follows:

I. Optimization of budget expenditures in war conditions. The main threat to the security of the public financial sector in Ukraine at the present stage is the deepening of the economic crisis, which is exacerbated by the deterioration of the financial condition of enterprises, banks, increases the risk of tax shortfalls by the state, leads to an increase in the state budget deficit and public debt.

First of all, this is the identification of the main areas of priority spending:

«Under martial law, this is the security and defense sector, expenditures on salary in the public sector, social protection, and other critical needs» (Interviewee 3).

This thesis is confirmed by the current legislation: on March 14, 2023, the Government adopted Resolution of the Cabinet of Ministers of Ukraine No. 230 “On Amendments to the Procedure for the Exercise of Powers by the State Treasury Service in a Special Regime Under Martial Law”. The enacted resolution enlarged the list of priority payments. This list specifically contains expenditures from the general and special funds of the state and local budgets.

Budget expenditures can be optimized in three areas: administration, economic activity, and the social sphere:

In the sphere of administration, it is the reduction to the optimal level of expenditures for the maintenance of public authorities and administration, courts, and the prosecutor's office, as well as the compilation of the structure of these bodies.

In the field of economic activity, increasing the optimal level of expenditures for state-owned enterprises to maintain their level of development and contribute to their stabilization. Among these expenditures, agriculture and the fuel and energy complex are subject to priority financing.

In the social sphere — rationalization of social expenditures, and optimization of budget expenditures without reducing benefits (Interviewee 7).

Taking into account foreign experience, in Ukraine it is advisable to pay attention to the following mechanisms:

1. Budget grants, budget loans, and budget guarantees. In Ukraine, there should be an expansion of state business support programs, which are the main engines of financing in a war. The instruments for the implementation of these programs are budgetary grants, budgetary loans, and budgetary guarantees. Taking into account the success of these programs, it is advisable to increase their amount and cover a wider range of borrowers. In addition, the planned amount of expenses for this program in 2023 should be revised taking into account the prospects for growth in the loan portfolio and an increase in market interest rates.

The USA also faced a crisis in 2008-2009 and in 2020 as a result of the COVID-19 pandemic. The USA government has used various measures, such as fiscal stimulus, lending, and relief programs, to increase expenditures and reduce the impact of the crisis on the economy. Ukraine can benefit from the experience of the United States in the use of fiscal stimulus and assistance programs in times of crisis (Interviewee 1).

2. Additional tools are extrabudgetary entities and special funds, as well as fiscal activities provided by central banks, which are used by countries precisely in times of crisis. In today's

conditions, the Funds for Defense Support and Combating the Consequences of War are extremely relevant. Thus, in Ukraine, recovery funds began to work in connection with the armed aggression of Russia: The Army Support Fund, the Humanitarian Fund, the Fund for Support of Small and Medium Businesses, the Fund for Economic Recovery and Transformation, the Fund for the Restoration of Property and Destroyed Infrastructure, and the Public Debt Service and Repayment Fund.

These funds are formed at the expense of contributions from international partners, investors, public organizations, business representatives and people. Their financial support will help restore the stability of the Ukrainian economy and help Ukrainians in the war with Russia.

The proceeds are used depending on the specialization of the fund: supporting the Ukrainian army and providing humanitarian assistance to the victims, restoring destroyed infrastructure and transforming the economy, reopening small and medium-sized businesses and servicing Ukraine's international financial obligations (Funds, 2022).

In the context of optimizing state budget expenditures during the crisis, the experience of the UK can be useful for Ukraine, in particular, in the context of public finances and assessing the government's performance in meeting fiscal goals. In the UK, official independent fiscal supervisory services, offices, and institutions have been established to analyze and report on the sustainability of public finances. Forecasts are developed and analyzed using budget execution reports, which also include the impact of tax and spending measures on the implementation of public finance policy (Interviewee 2).

3. Fiscal activities provided by central banks. An example of fiscal dominance in Ukraine is the provision in the 1990s by decisions of the parliament and the government of preferential loans for enterprises in certain sectors of the economy and direct financing of budget expenditures by the central bank. As a result, the macroeconomic situation in Ukraine got out of control. In 1992-1994, inflation at its peak reached over 10,000%, while real GDP fell by 9.7%, 14.8%, and 22.8%, respectively. The consequence of this was a catastrophic drop in the standard of living of citizens.

In 2010-2013, Ukraine had another negative experience of fiscal dominance. The government, through the issuance and sale of government bonds by the National Bank, financed the solution of a number of problems, in particular, the repayment of VAT debt, an increase in the authorized capital of banks, the capitalization of NJSC Naftogaz, social payments, etc. Such "hidden" emission has led to the accumulation of imbalances in the economy and the financial system. Together with the annexation of Crimea and the beginning of Russia's military actions against Ukraine, these imbalances materialized during the crisis of 2014-2015 (Meyer, 2019).

Crisis phenomena in the economy are accompanied by a decline in production, a decrease in the efficiency of the functioning of individual industries, and inflationary processes. (Interviewee 4)

The long-term effects of expenditure optimization in Ukraine are the following:

II. Budgetary measures of post-crisis recovery. It is advisable to consider the budgetary mechanisms that should be implemented during the crisis. These mechanisms are budgetary responses to crises. In addition, they should be prepared together with a package of measures and mechanisms for the post-crisis period.

1. Risks associated with public debt management and government guarantees. Due to the deterioration in the work of enterprises in the state and municipal sectors of the economy because of the war, in 2023, there is a risk that such entities will not fulfill their obligations to creditors for loans attracted under state guarantees (fig.6.1).

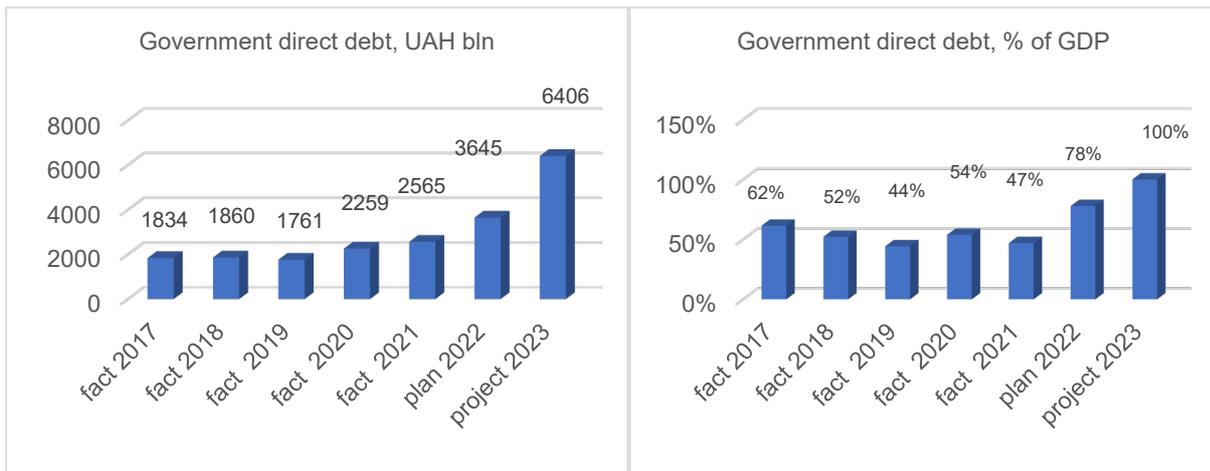


Figure 6.1 Government direct debt, (UAH bln and % of GDP)

Source: Danylyshyn (2022)

A significant deficit and its predominantly loan financing led to a rapid accumulation of public debt. The limit value of the state direct debt in 2023 is provided in the amount of UAH 6.4 trillion (100.1% of GDP), and exceeding the value of more than 60% of GDP is a threatening level of public debt. So, among the possible risks in the next year, it is advisable to highlight:

Firstly, in 2023 there is a significant likelihood of warranty cases for the obligations of PJSC State Food and Grain Corporation of Ukraine, as well as the risk of Ukravtodor fulfilling its debt obligations. There is also a risk of non-fulfilment of the Dnipropetrovsk Metropolitan Enterprise of obligations to the Ministry of Finance as a creditor to pay interest on loans and fees for the provision of loans attracted by the state in the total amount of UAH 17.1 million, as well as a high risk of failure

of the Kharkiv Metropolitan Enterprise of the relevant obligations in 2023 with a total volume of UAH 40.33 million.

In addition, there is a quasi-fiscal risk due to the possible default by representatives of small and medium-sized businesses. Thus, during 2023, within the framework of EIB projects, intermediary banks must pay EUR 10,727.54 million to the Ministry of Finance to repay the principal and interest on it. Also, as part of the implementation of joint projects with the World Bank, for the implementation of which loans were raised under state guarantees, JSC Ukreximbank must fulfill its obligations to the IBRD in the amount of UAH 858,464.3 million during 2023 (MOF, 2023).

Secondly, the NBU discount rate increase is also an additional burden for public sector entities and municipalities, whose portfolio contains loans linked to the NBU discount rate, in particular, guaranteed by the state. In the future, this may lead to defaults and, accordingly, additional unpredictable expenditures of the state budget. Moreover, an increase in the NBU discount rate and inflation rates will lead to additional state budget expenditures for servicing the public debt in 2023.

Thirdly, it should be noted that the reduction in the number of tax payments to the budget and the urgent need to cover the country's significant current expenditures in war conditions create significant fiscal risks for the state budget - they lead to an increase in the state budget deficit and public debt.

It is also important for the country not only to think about obtaining new grants and loans but also to reduce the pressure on the current debt budget (Interviewee 1).

2. Fiscal risk management. The reduction in the number of tax payments to the budget and the urgent need to cover the country's significant current expenses in war conditions create significant fiscal risks for the state budget - they lead to an increase in the state budget deficit and public debt.

Risks of shortfall in state revenues generated under the influence of objective factors and the growth of the level of the shadow economy led to tax evasion. Indicators of risks of shortfall in state revenues are the level of the shadow economy and the financial condition of the real sector, which are assessed on the basis of indicators of debt dependence of enterprises in the real sector, growth in sales volumes, and return on equity. There is a risk of shortfalls in government revenues in the event of a deviation of the base from the forecasted level, a deterioration in the solvency of enterprises due to an increase in debt dependence, and a decrease in the level of profitability.

«The main forecast macro-indicators that were used in calculating the indicators of the state budget for 2023 were formed under conditions of significant uncertainty: first of all, high-security risks were taken into account in terms of the duration and the war's aftermath, as well as the hazards linked with Russian strikes on energy, systems and other objects of critical infrastructure of Ukraine...» (Interviewee 1).

3. Use of "fiscal rules". The budgetary legislation of Ukraine contains fiscal rules aimed at ensuring the government's financial discipline and solvency. Taking into account international experience, to ensure the effectiveness of fiscal rules, the following prerequisites must be met: a) the willingness of the authorities to take obligations to maintain the long-term stability of public finances; b) openness of the statistical base; c) coverage of the main budget aggregates by the current reporting system; d) existence of an audit of public finances; e) disclosure of data for external monitoring of compliance with fiscal rules (Bohdan, 2016).

«The crisis of health care systems, which prompted the allocation of additional budgetary resources for medical purposes and led to a violation of established fiscal rules (budget deficit limits, public debt, etc) » (Interviewee 7).

4. Collaboration with international organizations. The globalization of budget processes and policies will take time to develop. While Ukraine continues its efforts to recapture Russian-occupied territories, the government of Ukraine and its supporters, as well as international financial institutions and think tanks worldwide, are planning to oversee and fund its recovery. At the same time, there are new challenges facing the implementation of post-war economic recovery programs: numerous urgent humanitarian problems; destroyed infrastructure; problems of efficient distribution and material resources.

A high level of corruption, lack of monitoring, and public control characterize the budgeting process in Ukraine. And the incidents caused by the political corruption in using budgetary funds negatively affect the image of Ukraine and the readiness to receive further financial assistance. All this determines the need to strengthen the level of state financial control over the targeted nature of the use of budget funds, and the implementation of mechanisms for the transparency of these processes, as well as monitoring by public institutions.

The Ukrainian government has a vision of a strategy for post-war reconstruction, where the basis is the standards of transparency and accountability for the use of funds for the restoration of the Ukrainian economy.

« An example of this is the launch of an interagency Donor Coordination Platform for Ukraine to harmonize existing and new mechanisms to support the budget of Ukraine, as well as reconstruction and rehabilitation» (Interviewee 2).

5. Improvement of organizational measures. This is due to the fact that the decrease in the level of execution of the State Budget of Ukraine in terms of expenditures is overwhelmingly associated with the process of distributing expenditures among the budget funds managers, as well as the incomplete implementation of budget programs.

Among these measures, important for optimizing the expenditures of the State Budget of Ukraine are the following: organization of state control over the use of budgetary resources; approving a sound and efficient budget; optimization of the network of executors of budget programs in order to have a minimum number of them per task; consistency of budgetary and tax legislation; transition from budget planning to budget forecasting (Interviewee 1).

Therefore, changes and additions to the legislative framework of Ukraine are needed to improve the optimization of state budget expenditures in a crisis. The Budget Code of Ukraine, after its adoption, has been improved many times over a long period of time, therefore, if they are needed, then minimal changes, taking into account the peculiarities of the economic crisis or war.

«The main legislative act, which should optimize the state budget expenditures in a crisis, is the law "On the budget", which should be changed several times during the year, performing the function of an anti-crisis regulator» (Interviewee 6).

«Such changes are carried out depending on the situation and tasks that need to be solved within the framework of the main measures, operations, and policies of the Government for priority expenditures and payments» (Interviewee 2).

This statement correlates with the legal framework: On March 14, 2023, the Government adopted Resolution of the Cabinet of Ministers of Ukraine No. 230 “On Amending the Procedure for the Exercise of Powers by the State Treasury Service in a Special Regime Under Martial Law” in order to resolve emerging problematic issues of treasury servicing of budget funds under martial law.

6. Study of foreign experience in the context of optimizing budget expenditures in a crisis.

Optimization of state budget expenditures in the context of crisis phenomena was carried out in many countries.

The experience of Israel, Bosnia, and Herzegovina, and Sweden is relevant (Interviewee 5).

But in order to analyze measures to optimize budget spending, the nature of these crises should be taken into account.

If we are talking about a crisis caused by structural economic problems on the way from a command-administrative socialist to a market economy, then the best experience is the economic reforms of the countries of Eastern Europe, which had similar problems at the end of the last century.

And if we are talking about crisis phenomena in the socio-economic situation of Ukraine, due to the military aggression of the Russian Federation, then the best experience will be the anti-

crisis policy of Israel, which has been developing its economy for decades under de facto martial law » (Interviewee 6).

The experience of the UK can be useful in the context of public finance and assessing government performance in meeting fiscal targets.

«There are official independent fiscal supervisory services, offices, institutions that analyze and report on the sustainability of public finances, work closely with many government departments responsible for forecasting revenues, expenditures and financial transactions that affect public finances » (Interviewee 3).

At the same time, the creation of additional structures implies an additional burden on the budget due to the need to maintain these structures, and there is also a risk of duplication of functions and powers of public authorities:

«Avoiding duplication of powers of central executive authorities and local governments is important in optimizing budget expenditures» (Interviewee 5).

Crisis conditions may require specific measures to optimize the state budget, so the experience of different countries can be useful.

Germany was one of the first countries to face the eurozone crisis in the 2010s. The German government has focused on streamlining public spending, reducing the budget deficit, and improving the efficiency of government programs. Ukraine can benefit from the experience of Germany in rationalizing public spending and reducing the budget deficit in a crisis (Interviewee 1).

VII. DISCUSSION

7.1 Theoretical contributions

An analysis of the literature made me understand that the optimization process should be considered in two stages: the *first*, and most importantly, how to act in the face of uncertainty — what methods, tools, and activities should be used. And the *second* is to think about the future, so as not to create a significant debt burden and shift it to the next generation.

Since the beginning of russia's armed aggression, external financial assistance has played a critical role in maintaining the external stability of the economy, slowing down inflationary processes, and providing public social services. But the volume of this assistance and the predominance of credit sources in its composition create high debt crisis risks (Bohdan, 2023).

Expenditure optimization is a complex process in war conditions, provoking uncertainty in management and planning. Therefore, it is important to understand at what point of uncertainty we are, and then — how each of the elements (Decisionmakers, Stakeholders, Policies and Goals, Objectives, Preferences) can affect the optimization process. The Decision Theory under Uncertainty helped me to cope with this question (fig. 7.1).

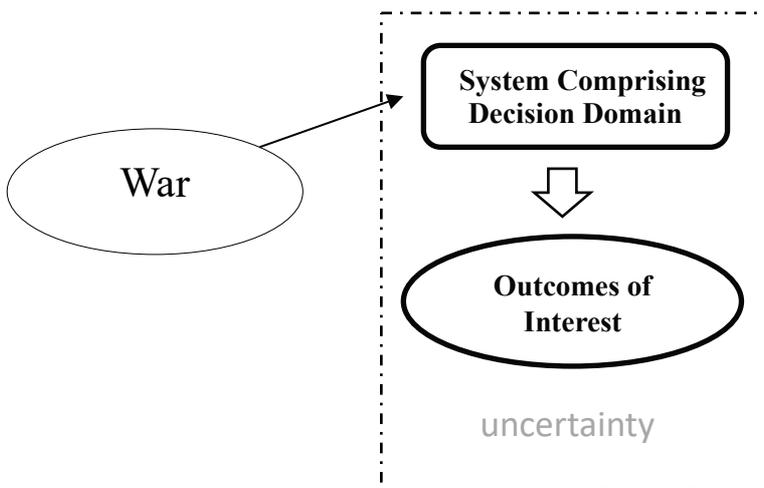


Figure 7.1 The Decision Theory under Uncertainty

Source: compiled by the author based on Walker (2000)

Thanks to this theory, I sorted out Decision-makers, Stakeholders, Policies and Goals, Objectives, and Preferences. I prepared questions for experts that include all these components and connected their results with data obtained during the literature and statistical data analysis.

First, budget expenditures can be optimized in administration, economic activity, and the social sphere. It should be focused on the security and defense sector, expenditures on salary in the public sector, social protection, and other critical needs.

In both the immediate and long-term effects of expenditure optimization, I found controversial points.

Firstly, I considered urgent measures. The first of these is budget grants, budget loans, and budget guarantees. And if during the crisis of 2008-2009, Ukraine did not pay enough attention to this issue, then world experience in providing budget subsidies in times of crisis included: subsidies to create new jobs (Slovakia); subsidies for hiring workers unemployed for more than six months (UK); subsidies for each remaining worker (Singapore); business subsidies to retain workers and expand jobs (Japan) (Vandenberg, 2009).

Government guarantee programs for private companies operate in many countries, including the Netherlands, the UK, and Canada. If in Ukraine the provision of state guarantees for the private sector of the economy was introduced only in 2014, in the Netherlands government guarantee schemes have been stimulating the creation and growth of private companies for more than 30 years. It was during the period of economic decline that governments of countries created or expanded guarantee schemes: in Canada, up to 85% of loans for real estate were guaranteed in accordance with the existing Small Business Finance Program, and in the UK, there were programs for small and medium-sized enterprises that provided for the provision of guarantees for obtaining working capital and loans.

The data obtained during the study of the literature were confirmed by the results of the experts. They named the experience of the United States in the context of two crises: the financial and economic in 2008-2009 and the coronavirus pandemic in 2019-2020. In these difficult times, the United States government used different measures, including fiscal stimulus, loans, and assistance programs, to raise spending and decrease the economic impact of the crisis. Ukraine can learn from the United States experience with fiscal stimulus and assistance programs in times of crisis.

At the same time, such measures as budget grants, budget loans, and budget guarantees are inappropriate in the context of a limited budget (what most of the experts say), although, on the other hand, they are given to an enterprise to achieve a social effect.

Secondly, I realized that significant assistance in the face of a shortage of budget resources, an additional source can be funded from specially created funds and organizations. Some of them continue to operate after the end of the war or other crises. Besides, official independent fiscal supervision agencies, offices, and institutions are formed to analyze and report on the sustainability of public finance.

The large-scale Russian invasion prompted not only Ukraine but also other states to think about creating funds for the armament of the army, defense, and combating the consequences of the war. As noted by experts, the United Kingdom has established formal independent fiscal supervision services, offices, and institutions to analyze and report on the sustainability of public finances.

However, this issue has also been debatable. Firstly, in the opinion of many experts, the creation of additional services, organizations, and institutions, as well as foundations, rests on the search for additional sources of their financing. And secondly, the formation of extra structures adds to the budgetary burden owing to the necessity to maintain these institutions, and there is also the possibility of duplication of tasks and powers of public authorities.

The *third* important point I got from my research is the government's quasi-fiscal operations. In this case, Ukraine already has two negative examples from fiscal activities provided by central banks, which led to the fact that the macroeconomic situation got out of government control. Thus, in 1992-1994, inflation at its peak reached over 10,000%, and in 2010-2013, such "hidden" emissions contributed to the accumulation of imbalances in the economy and financial system (Meyer, 2019). Consequently, as told me the experts, such operations may be too threatening in times of crisis, as crisis phenomena in the economy is accompanied by inflationary processes.

Fourthly, redistribution of budgetary powers. Expenditure management during a crisis tends to be top-down and more centralized than normal spending management. Therefore, the central government must carefully weigh the degree of stimulus before examining the needs of the sector.

The balance of power between recipients and administrators of funds is changing markedly due to the crisis. On the one hand, there may be a reduction in existing programs and then the recipients of budgetary funds lose. But when a crisis forces the government to increase expenditures, the opposite happens, and the recipients of the funds benefit because they would not have received them before the crisis.

Fifthly, every crisis response option has the potential to exacerbate existing budgetary tensions. The process may undoubtedly become more acrimonious with widespread involvement that allows every spending unit to compete for funding. In the case of war, the state government, no doubt, increases the defence expenditures. Social security and support are in second place; however, the amount of their provision is debatable.

In addition, funds must also be provided to various enterprises that are strategically important in a crisis or provide social support (keep jobs or hire new employees, thereby helping the state to fight against unemployment). Thus, during the financial and economic crisis of 2008-2009, most governments also supported businesses that created/retained jobs.

The *second part* of the measures is no less controversial — they are budgetary measures of post-crisis recovery. Most of the respondents in my survey agree that in addition to budgetary mechanisms that should be implemented during the crisis, it is also important to think about mechanisms for the post-crisis period.

The *first one* is the risks associated with public debt management and government guarantees. A significant deficit and its predominantly loan financing led to a rapid accumulation of public debt. Moreover, the reduction in the number of tax payments to the budget, along with the urgent need to fund the country's considerable current expenditures during wartime, creates significant fiscal risks for the state budget, resulting in an increase in the state budget deficit and public debt. These theoretical results agree with the opinion of most experts. In particular, experts noted that it is also critical for the country to consider not only getting new grants and loans but also easing the burden on the current debt budget.

The *second point*, which is impossible to disagree with, is fiscal risk management. The drop in tax contributions to the budget, combined with the urgent need to fund the country's enormous current expenses during the war, creates considerable fiscal risks for the state budget, resulting in an increase in the state budget deficit and public debt. Risks of a shortage in state revenues caused by objective factors, as well as the expansion of the shadow economy, lead to tax fraud.

While most of the experts point out risks associated with the budget deficit and public debt, some of them point out that security risks and other risks associated with the continuation of Russian attacks are the most important and needed to be included when calculating the indicators of the state budget.

A *third* important one is using of "fiscal rules". Ukraine's budgetary legislation includes fiscal restrictions designed to ensure the government's financial discipline and solvency but they are not as popular as in other countries.

Unfortunately, as the experts noted, the health-care system problem, necessitated the allocation of additional budgetary resources for medical purposes and resulted in a violation of established fiscal regulations (budget deficit limits, public debt, etc).

At the same time, to ensure the efficiency of fiscal rules, some requirements must be addressed, taking into consideration international experience (Bohdan, 2016).

Fourthly, one of the important problems of Ukraine before the war was corruption, which only intensified during the war. In the Association Agreement between Ukraine and the EU, it was written about increasing the transparency and publicity of budget funds, which is very important for enhancing the image of Ukraine and obtaining further financial support from international organizations and states. All of this points to the necessity to increase state financial control over the targeted character of budgetary spending, as well as the adoption of measures for the openness of these procedures and monitoring by public institutions.

The Ukrainian government envisions a post-war reconstruction strategy based on openness and responsibility for the use of funds for the rehabilitation of the Ukrainian economy. And I investigated in my research that one way to solve this problem is collaboration with international organizations. As experts told me, one example is the establishment of an interagency Donor Coordination Platform for Ukraine to coordinate existing and new mechanisms to support Ukraine's budget as well as reconstruction and rehabilitation.

But although this question is not very debatable, at the same time, according to experts, another point of view exists. Interaction with international organizations carries the risk of "imposing its own policies, goals, and objectives, while the country must defend its interests.

Fifthly, the improvement of organizational measures which are critical due to the deterioration in the degree of execution of Ukraine's State Budget and the incomplete implementation of budget programs. Experts helped me detail this list with such activities as the organization of governmental control over budgetary resources; approval of a sound and efficient budget; optimization of the network of budget program executors in order to have the fewest number of them per task; budgetary and tax legislation must be consistent; budget forecasting replaces budget planning.

Moreover, most experts agreed that changes and improvements to Ukraine's legislative framework are required for better optimization of state budget expenditures during a crisis. Such modifications are made based on the scenario and tasks that must be completed within the scope of the primary measures, operations, and policies, and the fundamental legislative act that should optimize state budget expenditures under a crisis is the budget law.

I made sure how it works in practice, for this I analyzed the legal framework and came to the conclusion that in accordance with the legislative framework, the Government of Ukraine adopted Resolution for the Exercise of Powers by the State Treasury Service in a Special Regime Under Martial Law, in order to address emerging problematic issues of treasury servicing of budget funds under martial law.

But the most interesting discussion point is the study of foreign experience in the context of optimizing budget expenditures in a crisis since foreign experience includes many countries that have faced crises and had to optimize their expenditures. Most experts agree that the experience of Israel, Bosnia, and Herzegovina, Sweden, and Germany need to take into account.

Each approach has its positive and negative sides, not all activities are universal, which gives rise to different views and discussions.

Some experts improved my idea, which was made during the analysis of literary sources. The nature of these crises should be taken into account. If we are talking about a crisis caused by fundamental economic challenges in the transition from a command-administrative socialist to a market economy, the best example is the economic reforms of Eastern European countries that faced comparable problems at the close of the past century. And, if we're talking about crisis phenomena in Ukraine's socioeconomic position as a result of Russian Federation armed aggression, the finest experience will be Israel's anti-crisis policy, which has been building its economy for decades under de facto martial law.

7.2 Practical contributions

First and foremost, to give more realistic advice on how public expenditures can be optimized in the Ukrainian example, we should consider the uncertainty. In a crisis, achieving better results through optimizing state budget expenditures is hampered by different variables, the most important of which is uncertainty. Thus, we have to decide in which area of uncertainty we are.

In Table 3.1, I considered four intermediate levels of uncertainty for the four locations from Level 1 with a clear enough future to Level 4 —deep uncertainty. The decision of level 3 is explained by the fact that after a year of a full-scale war, it became clear that Ukraine has survived and had a chance to win.

At the same time, empirical findings helped me understand that uncertainty reigns supreme in times of conflict, and the restart of economic activity is contingent on the outcome of hostilities. Conditions are rapidly changing, necessitating a quick response and adjustment of budget expenditures. Therefore, subsequent studies should include more detailed criteria for classifying the situation in the country to one or another level.

The *second issue* to be considered in the first place is the development of priority measures in terms of optimizing budget expenditures in the event of unforeseen circumstances. Legislative inertia is a significant problem in Ukraine. The optimization of state budget spending in the context of a full-scale Russian-Ukrainian conflict is dependent on military actions, and this necessitates a quick response and modification of budget expenses.

Clearly, immediate interventions are carried out already in the process, but not before the onset of the crisis. Unlucky, this situation is repeated in every crisis and almost the same situation was during the COVID-19 pandemic.

The fact is that in a crisis, implementing expenditures "in manual mode" makes it difficult to achieve more efficiency in optimizing budget expenditures. Unfortunately, this situation nullifies the planning

already done and undermines the subsequent ones, and leads, in turn, to the search for new resources in order to cover the public expenditures that were planned in the budget. Therefore, our government needs to pay attention to the main problems — the limited horizon of budget planning and unplanned budget arrangements in the event of unforeseen circumstances.

Third, future research should be in collaboration with international organizations. If in peacetime, in the absence of any crises, there is a dilemma about whether to borrow or live within one's means, then during a crisis, there is no dilemma. Therefore, it is necessary to think now about the future of the country and post-war reconstruction: what resources will be used to carry it out, and what part of the budget will go to debt service?

But in relation to international donors, there is another problem that existed in our country before. The introduction of policies that are convenient for other states and organizations in the case if they finance the country. At the same time, in a democratic society, the government needs to listen to what people say: what are their needs and where is it more expedient to use budgetary funds? I agree with Wood (2008) that to avoid this, aid might be limited to 50% of tax income in phases over 10-15 years. But one of the most difficult issues is persuading funders to agree to such a limitation. This problem needs time and further research in this direction.

Fourth, procedures for optimizing budget expenditures. Caiden and Wildavsky (1974) showed a generation ago that the poorer a government is, the more budgets it has each year. Similarly, when the situation develops, the government generates additional budgets. This is logical since then more control over budget funds is needed and the use of these funds is subject to reconciliation and detailed analysis. But, at the same time, the optimization of budget expenditures should include less reporting and bureaucratic procedures. Since the presence of a large number of documents makes it difficult to carry out the procedure for optimizing budget expenditures quickly and efficiently.

VII. CONCLUSION

The purpose of this master thesis was to investigate the process of optimization of public expenditures during the war in Ukraine. This process was based on the Decision-making theory under uncertainty as a tool for analyzing and conceptual framework. For the theory foundation, the Uncertainty Theory was chosen as a theoretical framework, which helped more theoretically justify the obtained results.

During the research, 9 interviews were conducted with different experts. Therefore, this work can reveal how state expenditures should be optimized under uncertainty, as well as define the features for optimizing state expenditures under crisis conditions caused by the war in Ukraine

This work harmoniously complements other scientific contributions in the field of optimization of public expenditures under crisis. Scientists' works are devoted to public expenditure management in normal times (Schick, 1998) and during a crisis (Tandberg and Allen, 2020). In turn, the necessity and methods for optimizing public expenditures were studied in normal and crisis situations (Manliev, 2013; Schick, 2009; Curristine, 2020).

Kraan, D.-K. (2004), Bohdan, T. (2016), and Anderson, B. (2021) addressed mechanisms for optimizing state budget expenditures even during a crisis. Budgeting for loans and guarantees, off-budget funds, and fiscal regulations were vital components of fiscal institutions.

Simultaneously, insufficient research has been conducted on the war's impact on optimizing public expenditures. At the same time, the war impacts not only the situation in Ukraine.

Ukraine's economy has been in a state of disaster since the outbreak of a full-scale war. Ukraine, still recovering from the coronavirus outbreak, is confronting a new crisis: russia's full-scale invasion of Ukraine, which raises the issue of budget reform. Otherwise, the state will rely solely on international support and will be unable to function freely in the future while serving people's interests.

In a crisis, achieving better outcomes from optimizing state budget expenditures is hampered by different variables, the most important of which is uncertainty. Therefore, I considered the process of optimizing public expenditures during the war on the example of the Theory of uncertainty.

I considered four intermediate levels of uncertainty for the four locations from Level 1 (a clear enough future) to Level 4 (deep uncertainty). My decision to level 3 is explained by the fact that after a year of a full-scale war, it became clear that Ukraine has survived and has a chance to win.

I realized that mechanisms for optimizing state budget expenditures during crises should be divided into 2 groups: first — optimization of budget expenditures in war conditions, and second — budgetary measures of post-crisis recovery.

At a minimum, it is necessary to continue scientific activities in the following directions.

The *first one* is the development of priority measures to optimize budget expenditures in the event of unforeseen circumstances. Legislative inertia is a significant problem in Ukraine. The optimization of state budget spending in the context of a full-scale Russian-Ukrainian war depends on military actions, which necessitates a quick response and modification of budget expenses.

Immediate interventions are carried out already in the process, but not before the onset of the crisis. Unlucky, this situation is repeated in every crisis and almost the same situation was during the COVID-19 pandemic.

In a crisis, implementing expenditures "in manual mode" makes it harder to attain more efficiency in optimizing budget expenditures. Unfortunately, this situation nullifies previous planning and undermines subsequent ones, leading to the search for new resources to cover the public expenditures planned in the budget. As a result, the government must focus on the key issues: restricted budget planning horizons and unexpected budget provisions in the case of unanticipated occurrences.

Secondly, future research should be in collaboration with international organizations. If there is a dilemma in peacetime, in the absence of any crises, whether to borrow or live within one's means, there is no dilemma during a war. As a result, it is vital to consider the country's future and post-war rebuilding now: what resources will be used, and what portion of the budget will go to debt service?

However, there is another issue that has previously existed in our country in relation to international donors. If they finance the country, implement policies that are advantageous to foreign countries and organizations. Simultaneously, in a democratic society, the government must listen to what people say: their needs, and where would it be more efficient to use budgetary funds? To avoid this, I agree with Wood (2008) that aid should be restricted to 50% of tax revenue, phased over 10-15 years.

My research has theoretical and practical contributions but has certain *limitations*. *First*, optimizing budget expenditure takes place in an uncertain environment. Furthermore, such conditions had never been encountered in Ukraine before, making it difficult to justify the decision's correctness without prior experience. Wars differ from other crises (such as financial and economic downturns or pandemics). Estimating the number of future losses is particularly difficult since no one knows when the war will end. *Second*, there may be some subjectivity here because everyone experienced the war and its consequences differently, thus judging the current situation based on their own experiences.

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APPENDIX I

Professional background of interviewees

№	Position (on the date of interview) or previous positions	Type of interview	Duration
1	Senior Specialist, Accounts Chamber of Ukraine	By correspondence *person provide me his/her essay on the provided questions	45 minutes
2	Deputy Chairman, Scientific Council of the Ministry of Finance of Ukraine	Zoom meeting	1 hour
3	Chief Specialist, Department of International Relations and Organizational and Analytical Work, Ministry of Finance of Ukraine	Zoom meeting	1 hour
4	Chief, Main department of the State Treasury Service of Ukraine in the Kyiv region	Zoom meeting	45 minutes
5	Chief Specialist, Department of Public Finance, State Institution "Institute of Economics and Forecasting of the National Academy of Sciences of Ukraine"	By correspondence *person provide me his/her essay on the provided questions	30 minutes
6	Senior Specialist, State Audit Service of Ukraine	By correspondence *person provide me his/her essay on the provided questions	45 minutes
7	Chief Specialist, Prosecutor General's Office of Ukraine	By correspondence *person provide me his/her essay on the provided questions	45 minutes
8	Head of the Department of State Finance, SESE "The Academy of Financial Management"	Zoom meeting	1 hour
9	Senior Specialist, Pechersk State Administration of Ukraine	Zoom meeting	45 minutes

APPENDIX II

Invitation for interview

Good afternoon, my name is Sviatoslav Liutii, I am a student and young researcher. I am studying a double degree program at the Taras Shevchenko National University of Kyiv and Nord University in Norway. I am currently engaged in a research project on optimization of state budget expenditures in the crisis conditions in Ukraine.

I am very interested in your opinion on the importance of this practice in Ukraine. I would be sincerely grateful if you could spare 10-15 minutes to answer my questionnaire and give me your assessment! If you wish, your contact information will not be included in the study and you are guaranteed anonymity.

Before starting the interviews, I explained the purpose of my research, the basic principles and what aspects of state budget expenditures I would like to learn.

In addition, I asked the experts to assess the importance of each question and give their own assessment. The evaluation was based on the following scale: 5 - very good, 4 - good, 3 - satisfactory, 2 - poor, 1 - very poor. This was done to find out the main key ideas and concerns of the experts at the first stage of the study. The results of the survey helped to find out which areas of research in this area are relevant and to form an understanding of which issues are best to focus on during the interviews.

After the preparatory stage, there was room for an indicative guide for conducting interviews:

Appendix III

The interview guide

1. What are the reasons for the optimization of budget expenditures?
2. What are the ways to optimize state budget expenditures in Ukraine?
3. How do crises affect the structure of state budget expenditures?
4. What are the features of the process of optimization of state budget expenditures during different crises (for example, the COVID-19 pandemic and wartime)?
5. What methods and indicators are used to assess measures for optimization of state budget expenditures?
6. How do assess whether state budget expenditures were used efficiently due to optimization?
7. What hinders achieving better results from the optimization of state budget expenditures during crises?
8. How often should the process of optimization of state budget expenditures be reviewed in crisis?
9. Which country's experience can be useful for Ukraine in the context of the optimization of state budget expenditures during crises?
10. Are changes/additions to the legislative framework of Ukraine necessary to improve the optimization of state budget expenditures in crisis?
11. Which stakeholders influence the process of optimizing budget expenditures?
12. What policies, goals, and objectives are used to optimize budget expenditures?
13. What results can be expected from the optimization of budget expenditures?