

# HOW DOES ACTIVE DIGITAL TRANSFORMATION AFFECT THE EFFICIENCY OF GOVERNANCE AND THE SUSTAINABILITY OF PUBLIC FINANCE? THE UKRAINIAN CASE

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**Abstract.** The challenges of the digital economy are leading to radical changes in public governance, creating conditions for convenient and prompt access to public services and public information. Moreover, the pandemic has caused drastic changes in the use of digital public service – it has become a necessity. Ukraine has significant prerequisites for the development and effective transformation of public administration to a higher technological level. Furthermore, during the time of crisis (2013–2014, 2020–2021), the government priorities were shifted to support digital transformations to improve the effectiveness of public administration and ensure the sustainability of public finance. *The purpose* of the paper is to investigate and assess a correspondence between efficiency of governance and sustainability of public finance based on digital transformations under the Ukrainian approach. The main scientific question was: How does the active digital transformation in public governance affect the sustainability of public finance in Ukraine? *Methodology.* Seeking the solution, own methodological developments were used; correlation analysis of main indicators of government effectiveness and sustainability of public finance was estimated. To assess the impact of digitalization on public governance efficiency, Ukrainian governance practices over the past 13 years were analyzed, expressed by indicators of governance effectiveness, through the introduction of digital technologies. *Results.* Based on empirical research, it has been found that due to several limitations, a strong direct relationship between active digital transformation and the sustainability of public finances (debt security) has not been identified. But at the same time, significant progress has been made in efficiency of public governance through the implementation of costly but effective digital change. This correspondence is especially noticeable during the crisis caused by the pandemic (2020–2021). *Practical implications and value/originality.* The convergence of synergies between key aspects – public governance, digitalization, finance, and security – has great potential for relevant solutions that provide a broader view of sustainable development issues. It can be noted that this issue is extremely relevant for further research in the field of public administration and finance in the context of sustainable development of the digital economy.

**Key words:** governance efficiency, government effectiveness, public finance, sustainability, debt security, government spending, e-government development, e-participation, digital transformation.

**JEL Classification:** E61, E65, H54, H63, H83

## 1. Introduction

Currently, digitalization is a challenge and a key benchmark for transformation and a gradual future for good governance in the public sector. World financial thought mentions that even whether the products of the modern digital economy are introduced into public governance to increase its efficiency, the focus should

be on the quality of digital transformations, the openness of decision-making, protection of financial interests, and security. Despite the availability of many digital tools to achieve the desired level of government effectiveness, developing effective ones remains a challenge, especially in periods of economic crisis.

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Recent significant debt activity of governments and the expansion of the expenditure component of budgets around the world are an adequate response to the challenges posed by the pandemic. Expanding government funding for the social sphere and supporting effective demand, many countries are considering improving the quality of public services.

The availability and contactless of obtaining public services in the context of digital transformation is becoming especially important. Ukraine has made great leap in this direction, and, in the last two years, it has almost become a state in a smartphone. Digital support is especially meaningful in the recent emergency with which Ukraine has faced. However, despite such capacities in the digital transformation of public administration, the issue of sustainability of public finance remains open.

Thus, the convergence of synergies between key aspects – public governance, digitalization, finance, and security – has great potential for relevant solutions that provide a broader view of sustainable development issues.

Hence, our paper consists of the following parts: after a brief introduction, we make a brief overview of the theoretical framework and literature review on the development of digital government products and their impact on the sustainability of public finances, the relationship between governance and security; the third part outlines the data and methodology and explains the choice of indicators, determines the order of construction and evaluation of its correlation; the fourth section describes in detail the progress of the study and the results obtained, and the final section presents the discussion, conclusion, and recommendations for further research.

## 2. Literature review

Foreign and domestic authors have recently touched on the issues of sustainability and performance management provided in the public sector based on reliability, trust, transparency of public finance, predictability, and security (Harborne et al., 2017). However, different authors (Groves and Valente, 2003; Cabaleiro et al., 2013; López Subires and Rodríguez Bolívar, 2017) note that the pandemic has led to continuing to provide public services on a mandatory basis, so there is a need for a coherent search of mechanisms, including digital transformations, to ensure the sustainability of public finance in multilevel government.

Financial capacity and sustainability are prerequisites in the public sector and they determine the impact of financial attitudes on the provision of public goods. (Saleh et al., 2021). Moreover, investigating the sustainability of developing EU countries and highlighting the importance of the public sector and

fiscal sustainability as effective public governance matters (Onofrei et al., 2021). The results of several studies show (Çera et al., 2020) that cultural and national peculiarities matter in explaining the linkage between financial attitudes within additional funding and the quality of public goods. Ukraine is one of the countries with a high bias to avoid uncertainty; it has a negative correlation between risk tolerance and public funding. Therefore, the investigation of the correspondence between innovative transformations in public administration, security, and sustainability of public finance is relevant, especially in times of crisis.

Bergmann and Grossi (2014) point out that security is an incentive for good governance and economic development. In a recent article, Byrd and Guimbert (2009) argue that the effectiveness of public administration would be enhanced if the existing links between public finance, security, and development were clearly defined. The fact that digital transformations in public administration contribute to a high level of information and financial security of the state has been also demonstrated by Ukrainian authors (Yarovoy et al., 2020). However, according to Matheusa et al. (2020), open data could not lead to transparency and high-quality public goods provision but can generate information overload. Moreover, digital transformation is not always accompanied by the trust of citizens as an indicator of good governance. (Grimmelikhuijsen, 2009) Public administration in the digital age strengthens citizens' trust only in case of a high level of transparency, development of infrastructure, and data protection. In addition, Ukrainian authors (Danshina and Britchenko, 2017; Shcherbak, 2020) argue that digital transformation in Ukraine's public sector is an issue how to take advantage of the "digital" world to open public data, increase productivity and economic growth, and improve the quality of life of Ukrainian citizens.

Therefore, we focus our research on the current issue of the dialectic correspondence between government effectiveness and sustainability of public finance based on digital transformations taking into account the Ukrainian approach and assessing the impact of digital transformations in public administration on the debt security.

## 3. Methodology

This research relies on official statistics from: World Bank (Government Effectiveness Index, Control of Corruption Index (determined by the methodology of Kaufmann, Kraay and Mastruzzi, 2010), Division for Public Institutions and Digital Government of UN Department of Economic and Social Affairs (E-Government Development Index as a weighted average of the volume and quality of online services, development of telecommunications infrastructure, and

E-Participation Index, which includes the evaluation of electronic information exchange, stakeholder engagement, i.e. electronic consultations, and electronic participation in decision-making), an independent academic institution with Swiss roots International Institute for Management Development (Digital Competitiveness Ranking), Internet World Stats website (for international Internet usage statistics), State Treasury Service of Ukraine (share of funding of public governance digital transformation in total budget spending), Ministry of Finance of Ukraine (Debt Security Indicators (Annex 1)) and the Ministry of Digital Transformation of Ukraine ("State and I", other digital products providing public goods and services).

The main scientific question of the work: How does the active digital transformation in public governance affect the sustainability of public finance in Ukraine? Thus, for further research, the scientific hypothesis will be – digitalization in public governance increases its efficiency and facilitates the level of debt security.

To assess the impact of digitalization on public governance effectiveness, we will analyze Ukrainian governance practices over the past 13 years (including three crises 2008–2009, 2013–2014, 2020–2021), expressed by indicators of governance effectiveness, through the introduction of digital technologies. Undoubtedly, the focus of the study will be on the adequacy and funding opportunities for the implementation of digital governance. Therefore, we will analyze the relationship between the effectiveness of government in general, e-government in particular, and the sustainability of public finance in Ukraine. We will determine the last position through the debt security indicator.

#### 4. Results and discussion

Digitalization is the part of transparent government that aims to improve openness, increase citizens' involvement and trust as well. It is considered one of the essential conditions for good governance and a crucial means for balancing power between government and society. Digital transformations are currently gaining momentum in Ukraine. Thus, according to world metrics (Ukraine Internet Usage and Marketing Report, Internet World Stats website), the number of Internet users in Ukraine has increased by 35% (from 21.9 million to 29.4 million) over the last 5 years and covers almost 70% of the total population of Ukraine. There is a steady upward trend in the implementation of innovative products in the public administration of Ukraine, above all, it has almost become a "state in a smartphone" last years (especially, accelerated by circumstances reasoned by pandemics). Currently, the government digital portal provides more than 50 administrative services for 25 million users (Fedorov, 2021; Matuszk, 2021).

Generally, over the last 10 years, various digital products have been introduced in the public sector of Ukraine, such as Open Data, E-data, Prozorro, Smart city, Open budget, State-and-I (DIIA), etc. These digital government portals aimed to support public authorities in disclosing and publishing data, to provide access to information on the use of public funds, to develop awareness and involvement of citizens in public decision making. However, the digital transformation in public administration is quite expensive. Therefore, governments of many countries restrict access to public information due to the high potential costs of data protection (Bannister and Connolly 2012). It should be noted that government spending on e-governance in Ukraine has increased decennially only for the last year. Of course, the rise in budget funding requires carrying out additional sources and could affect the sustainability of public finances, especially under the crisis.

Sustainability of public finance from one side means the capacity of the government to be solvent without having to resort to unfeasible or undesirable policies, and from other – strength to support economic growth and fair distribution of fiscal burden between generations. From this perspective, public debt security becomes a defining landmark in ensuring the sustainability of public finance. According to Ukrainian debt statistics (Annex 1), the dynamics of Ukraine's integrated debt security indicator are characterized by a secure level in the pre-crisis years and this high level of risk of the debt crisis since the 2009 crisis year. In 2014–2015, in line with the deep economic and financial crisis inside the country, the indicator was at an extremely dangerous level due to economic reasons (such as significant volatility spreads, high-interest rates on bonds, significant growth in nominal volume, and public debt-to-GDP ratio, along with a significant reduction in international reserves), which was reflected in the procedure of public debt restructuring of Ukraine. After 2016, the level of risk remains high and the crisis of 2020 was reflected in the negative dynamics. Understanding the additivity of expansionary fiscal measures in time of recession, we, as economists, remember that fighting a recession with larger budget deficits and debt-to-GDP ratio might mean short-term gain but long-term pain (Slemrod and Bakija, 2017). Obviously, the sustainable concept in government effectiveness takes into account the short and long-term perspectives as well, both in terms of funding and information transformations. The correlation between government spending on digital transformation and debt-to-GDP ratio in Ukraine shows (Figure 1) that more active government support of digital innovations falls on the crisis period, due to the search for adequate ways to meet public needs.

Latest digital technologies modify the quality of public decisions, i.e., its effectiveness, which

emphasizes the priority for the allocation of budget funds to this branch of economy in Ukraine. Given the considerable funding for supporting the implementation of digital transformations, as well as issues related to cybersecurity and the sustainability of public finance, from our point of view, it is important to estimate the impact of digitalization on the effectiveness of public administration in Ukraine.

#### 4.1. Digitization and efficiency of public administration in Ukraine

Examining the first part of our hypothesis – digitalization in public administration increases its efficiency – we suggest whether there is a high degree of citizens' trust in e-governance and estimate the correlation between the dynamics of government spending on digital transformation and E-government development index and E-participation index in Ukraine. According to Figure 2, it can be clearly seen that:

- an active government funding of E-governance indicates the intensive development of this sphere in Ukraine. In the early 2010s under the 2013–2014 crisis, there was a maximum increase in government funding and during the pandemic (2019–2021) fiscal policy priorities have been shifted to digitalization as well;
- the introduction of digital public services initially boosted citizens' trust, but over time, despite the development of E-governance, digital participation is volatile and remains at the level of the beginning of the decade. Such a buoyant trend demonstrates no very close correlation between the government's financial support of E-governance and the involvement of citizens.

– the pandemic has caused drastic changes in the use of digital public service, it has become a necessity. So, there are 5 times more users of online public services over 2021 compared to 2020 in Ukraine. Currently, digital public services are common among 60% of the population.

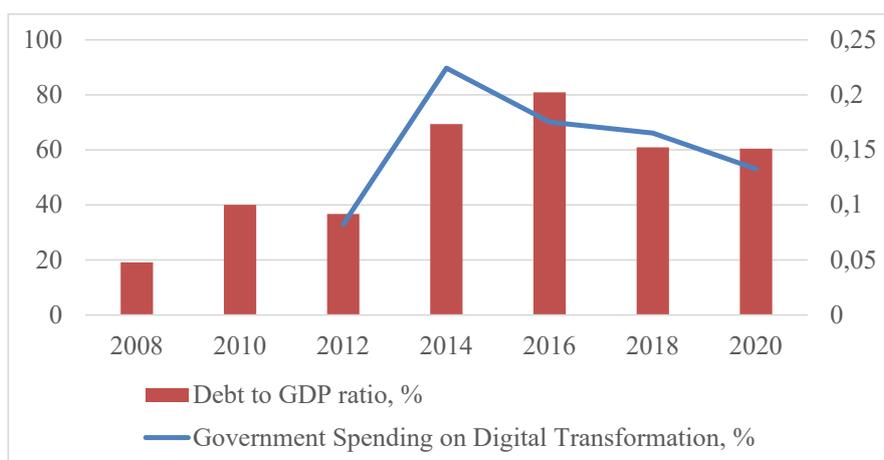
Therefore, the illustrated correlation on the graph (Figure 2) partially rejects the first part of our hypothesis about the positive impact of digitalization on the effectiveness of public administration in Ukraine. This suggestion can also be proved based on assessing the government effectiveness of Ukraine.

As Figure 3 shows, Government Effectiveness Index has improved by 85% over the past 12 years in Ukraine but is still low compared to developed countries. Based on World Bank statistics (<https://info.worldbank.org/governance/wgi/Home/Reports>) on Government Effectiveness and Control of Corruption indexes in 2008 and 2020, it can be seen direct correlation between these indicators and sustained dynamics. Thus, in the countries of Central and Western Europe there is a high level of control of corruption and correspondingly high efficiency of government, while the countries of Eastern Europe (including Ukraine) have a relatively high level of corruption and moderate efficiency of government.

Thus, among others, by the high level of corruption in public administration, even though one of the crucial aims of active digital transformation is to increase the transparency of public administration and its efficiency.

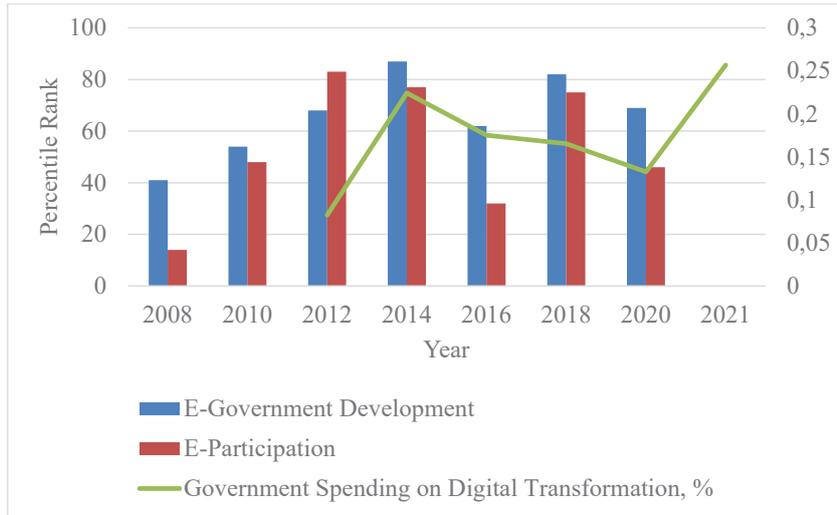
#### 4.2. Digitization and sustainability of public finance in Ukraine

Examining the second part of our hypothesis, we suggest that digitalization in public administration



**Figure 1. Government Spending on Digital Transformation and Debt to GDP ratio, (2008–2020)**

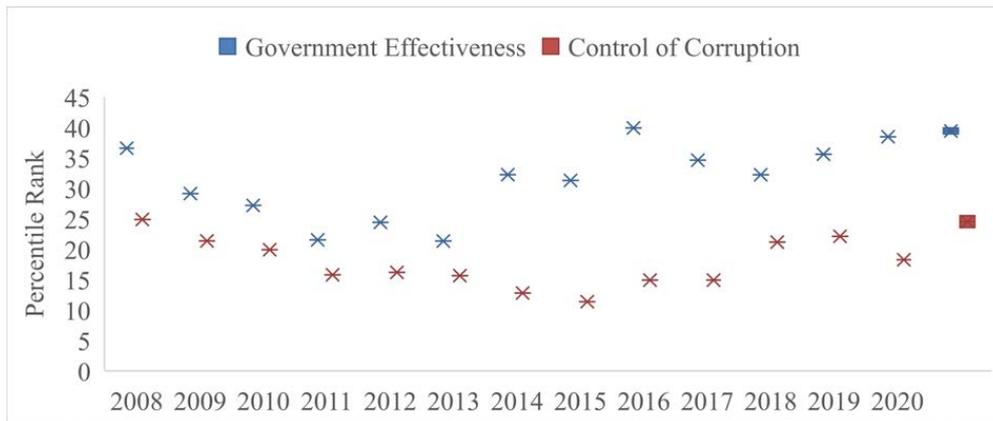
Source: generated and calculated by the authors on the base of <https://www.treasury.gov.ua/ua/file-storage/vikonannya-derzhavnogo-byudzhetu>, Annex 1



**Figure 2. Government Spending on Digital Transformation and E-government development in Ukraine, (2008–2020)**

Source: generated and calculated by the authors on the base of <https://www.treasury.gov.ua/ua/file-storage/vikonannya-derzhavnogo-byudzhetu>

<https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/180-Ukraine>



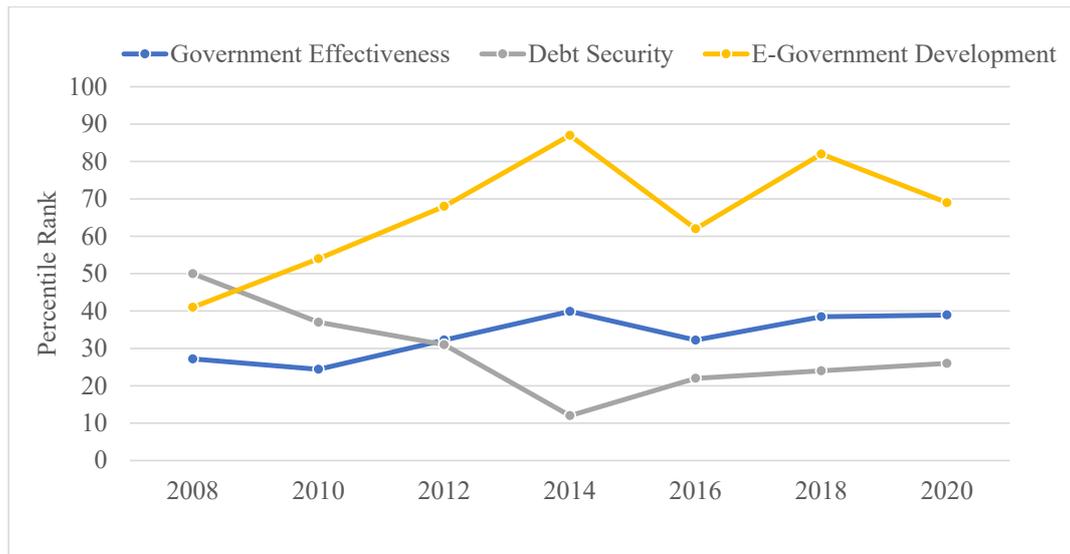
**Figure 3. Government Effectiveness and Control of Corruption indexes in Ukraine, (2008–2020)**

Source: illustrated by the authors on the base of <https://info.worldbank.org/governance/wgi/Home/Reports>

facilitates the sustainability of public finance. To approve our assumption, we identify the correlation between the indexes of E-government Development, Government Effectiveness, and integrated Debt Security indicator in Ukraine (Figure 4).

Estimating the correlation between the indexes of E-government Development and Government Effectiveness, we note that there are relatively one-way upward trends. However, fluctuations in the trend of digital development in public administration have a wider amplitude compared to the Government Effectiveness index. Therefore, it should be emphasized that digital changes are drivers of effective governance, but only with the high-quality infrastructure and strong citizens' trust. Assessing

the impact of digitalization of public administration on the debt security of the state over the past 12 years in Ukraine, it can be concluded that against the background of the inconsistency of Ukraine's financial system, the introduction of digital transformations still has a positive impact on public administration. At the same time, the slight boost in the efficiency of public administration is not closely facilitating the sustainability of public finance. However, taking into account the costliness of digital transformations (Figure 5), more consideration needs to be paid to the issue of sustainability and citizens' trust in digital governance. Moreover, the government of Ukraine together with the development of digital infrastructure and data protection (cybersecurity)



**Figure 4. E-government Development, Government Effectiveness and Debt Security in Ukraine, (2008–2020)**

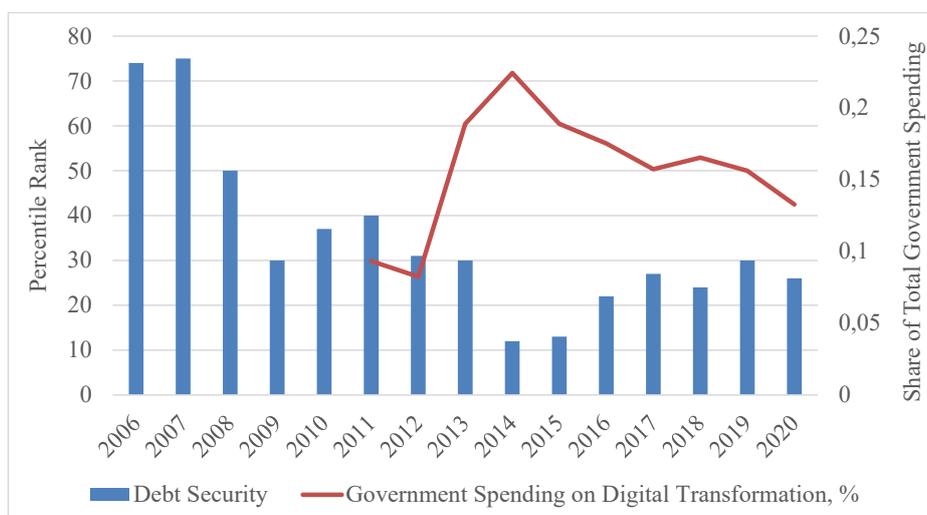
Source: generated by the authors on the base of <https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/180-Ukraine>, <https://info.worldbank.org/governance/wgi/Home/Reports, Annex 1>

should think about the sustainability of public finance which is one of the factors of the quality of public administration and economic development of the country.

Hence, the illustrated correlation on the graph (Figure 5) partially confirms the second part of our hypothesis about the positive impact of digitalization on the sustainability and security of public finance in Ukraine, i.e. during the time of crisis (2013–2014, 2020–2021), the policy priorities were shifted to support digital transformations to improve the effectiveness of public administration and ensure the sustainability of public finance.

### 5. Conclusion

Ukraine has significant prerequisites for further development and effective transformation of public administration to a higher technological level. However, the range of such development and measures of the introduction of new digital products should be the evidence for the effectiveness of public administration and the sustainability of public finance. Government financial support of digitalization is possible with available sources of funding, and its validity – is the level of citizens' trust in e-government. Established the dependence between the effectiveness of public administration and the sustainability of



**Figure 5. Government Spending on Digital Transformation and Debt Security in Ukraine, (2008–2020)**

Source: generated by the authors on the base of <https://www.treasury.gov.ua/ua/file-storage/vikonannya-derzhavnogo-byudzhetu>, Annex 1

public finance in the context of digital transformation, considering national specific, we concluded that the development of digital technologies in public administration require additional funding, especially when government policy aims to ensure the digital culture.

The research found that the development of digital governance is more dynamic than increasing government efficiency in Ukraine. Therefore, it is important that digital change becomes a driver of good governance and strong public confidence in government. As a result of the analysis of the correlation between the digitalization of government and debt security, it is proved that the instability of public finances in Ukraine is not an obstacle to the implementation of digital transformations that have a positive impact on public administration.

At the same time, a slight increase in the efficiency of public administration does not contribute much to the stability of public finances.

However, the outcomes of the research confirm that the active digital transformation in the public administration of Ukraine is one of the factors to improve the efficiency of government. The principal limitation of our experimental approach is the number of indicators and the study focused on the last decade, there is not enough data to deeply demonstrate how digitalization in public administration facilitates the sustainability of public finance.

Meanwhile, it can be noted that this issue is extremely relevant to further research in the field of public administration and finance in the context of sustainable development of the digital economy.

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## Annex 1

### Debt security indicators of Ukraine, 2008–2020

Indicator/Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Public debt to GDP ratio, %	19,12	33,46	40,05	36,40	36,70	39,91	69,37	79,06	80,90	71,84	60,91	50,24	60,44
Gross external debt-to-GDP ratio, %	56,1	88,3	86,2	77,3	76,6	79,1	96	130	120,6	103	87,8	78,8	80,9
Average government securities yield, %	11,86	12,21	10,39	9,17	12,94	13,13	13,98	13,07	9,16	10,47	17,79	16,93	10,2
EMBI+ Index, points	845,5	1617,2	589,7	591,5	810	736,8	1013,5	2374,6	762,5	564,2	532,8	491,5	650,7
Official international reserves to gross external debt ratio, %	31,00	25,63	29,47	25,19	18,23	14,37	6,01	11,30	13,81	16,29	18,15	20,78	23,18
<b>Integral indicator of debt security</b>	<b>0,50</b>	<b>0,30</b>	<b>0,37</b>	<b>0,40</b>	<b>0,31</b>	<b>0,30</b>	<b>0,12</b>	<b>0,13</b>	<b>0,22</b>	<b>0,27</b>	<b>0,24</b>	<b>0,30</b>	<b>0,26</b>
<b>Risk assessment</b>	<b>Medium</b>	<b>High</b>	<b>High</b>	<b>Medium</b>	<b>High</b>	<b>High</b>	<b>Debt crise</b>	<b>Debt crise</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>High</b>

Source: generated by the authors on the basis of <http://ppeu.stu.cn.ua/article/view/219431>, <http://skhid.kubg.edu.ua/article/view/108103>, <https://www.mof.gov.ua/uk/derzhavnij-borg-ta-garantovanij-derzhavju-borg>