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DEBT SUSTAINABILITY ANALYSIS AND ITS POLICY IMPLICATIONS FOR UKRAINE

Abstract

Since the outbreak of the Russian invasion in 2022, Ukraine's public debt has risen sharply, and debt sustainability turned out to be a matter of concern. This study aims to conduct a comprehensive debt sustainability analysis (DSA) for Ukraine, focusing on probabilistic judgments about the trajectory of public debt, the government's gross financing needs in the 2025–2028 period, and essential policy measures to prevent an unsustainable debt situation. The DSA incorporates references to quantitative debt-related benchmarks and assessments of performing a debt treatment and changing the structure of budget deficit financing. Four medium-term scenarios are run: a baseline scenario, a negative scenario, a positive macro-scenario, and a policy shock scenario. The first three scenarios yield public debt stocks from 94.8% to 128.8% of GDP in 2028, above the intermediate threshold of 82% and far above the final threshold of 65%. Even under the baseline projections, public debt trajectory and gross financing needs magnitudes deviate considerably from the benchmark levels. Only the policy shock scenario is compatible with ensuring public debt sustainability, being conditional on a substantial extension of foreign grants, and applying a significant haircut through the second debt restructuring. The results suggest that avoiding public debt crisis while meeting recovery and reconstruction needs would require raising the share of grants up to around 45% in the structure of foreign official financing and debt reduction by at least 50% in the framework of new foreign debt restructuring, covering official bilateral debt and euro-bonds' debt.

Keywords

debt sustainability, forecasting scenarios, war, fiscal deficit, debt restructuring, foreign aid, reconstruction

JEL Classification

H63, H68, H81, C15, O11

INTRODUCTION

During the 2022–2024 Russian invasion of Ukraine, its economic implications and Western support have considerably changed the volume and composition of Ukrainian public debt. Whereas public and publicly guaranteed debt stood at 50.5% of GDP at the end of 2021, it went up by 27.3 percentage points (p.p.) of GDP in the course of 2022 and by 6.6 p. p. in the course of 2023 (calculations based on data of the State Statistics Service of Ukraine and the Ministry of Finance of Ukraine (2024a)).

Narrowing tax bases, along with simultaneous increases in public expenditures, resulted in a considerable budget deficit. Public expenditure on national defense and security increased more than tenfold, fueled by sharp public debt growth. In parallel, Ukrainian government financing needs increased tremendously, while the budget deficit rose to 16.1% of GDP in 2022 and to 20.3% of GDP in 2023 (NBU, 2024a).

The rapidly accumulating budget deficit pushed the government toward heavy borrowings from domestic and external sources. The valuable support from foreign bilateral and multilateral donors provided in 2022–2024 enabled the Ukrainian government to use predominant-

ly foreign sources of budget deficit financing. However, the main part of Western support to Ukraine was disbursed in the form of loans rather than grants, augmenting the public debt burden. The share of official multilateral and bilateral creditors in the structure of public external debt went up from 32% at the end of 2021 to 73.2% at the end of Q3 2024.

Tackling the evolving debt problems and mitigating the debt-related risks should rely on comprehensive assessments of Ukraine's fiscal gaps and debt sustainability issues from a medium-term perspective. In this regard, debt sustainability analysis (DSA) is an appropriate analytical and forecasting tool to detect, prevent, and resolve potential financial crises in the borrowing countries and countries-beneficiaries of international financial aid.

1. LITERATURE REVIEW

Debt sustainability analysis (DSA) entails probabilistic assessments of the trajectory of public debt, its components, and the availability of financing for the government, along with an evaluation of the risks and degree of uncertainty adjoining the relevant forecasts. In general, DSA asks if, under given macroeconomic assumptions and policies, the government will be in a position to service public debt in the medium or long run without defaulting on debt and implementing policy adjustments measures that are extraordinarily large in economic, social, or political dimensions (IMF, 2013).

DSA is performed, mainly, in the context of medium-term forecasting. Forecasting scenarios incorporate a set of indicators that embody the expected behavior of macroeconomic variables and other factors that help identify the conditions under which the public debt and debt-related measures are stabilized at an acceptable level, main risk factors for fiscal stance and debt position, and needs and a scope for required adjustments (IMF, 2000).

The DSA framework entails that anticipated debt burden indicators, based on the debt dynamics equation, are related to the established thresholds or benchmarks. When debt and debt-related indicators surpass the thresholds, a careful interpretation is needed, and a commonsensical conclusion about the sustainability of the debt outlook must be drawn.

Berg et al. (2004) argue that the quantitative benchmarks of such type should rely on econometric estimates from a specific class of models, i.e. "early warning models." For the cases when most predicted debt indicators are located above the empirical

thresholds (under the stress-tests or baseline scenario), a country's debt stance is viewed as a source of worry that may result in debt crisis.

Baldacci et al. (2011) identified four types of criteria to capture an event of debt crisis:

- (i) default on debt or debt restructuring;
- (ii) implicit default on domestic obligations in the form of hyperinflation;
- (iii) recourse to exceptional official financing by the IMF; and
- (iv) a sharp deterioration in market access and a rise in government borrowing yields by more than 1000 b.p.

However, any threshold debt stock should be interpreted with caution, as it depends significantly on specific factors and circumstances attributable to a given country (Bogdan, 2012). Practical evidence suggests that no threshold indicator allows determining accurately the turning point from which the public debt will evolve as unsustainable. As a rule, higher debt ratios are less of a concern in the countries with faster GDP growth rates, higher export-to-GDP ratios, and higher share of domestic debt in the structure of total public debt.

A notable aspect of this issue is the much lower tolerable or safe level of public debt in countries with emerging markets and developing countries than in advanced countries. Reinhart et al. (2003) noted that this fact is associated with the imminent features of the economic development of such countries – instability, weak institutions, and bad credit history.

An important component of assessing debt sustainability is running stress tests under medium-term scenarios that establish the consequences of alternative events in macroeconomics, finances, and economic policy. IMF (2011) experts indicate that DSA's modeling is often applied through various stress tests to assess the impact of external shocks on the dynamics of public debt and government financing needs. They also form a basis for analyzing the significant relationships between the elements of the system under investigation and reproducing the behavior of that system.

Stress testing investigates the resilience of the baseline to identified shocks and detects the economy's vulnerabilities. IMF (2003) experts highlight that it is essential to accurately capture the risks a country is susceptible to in view of country-specific characteristics. Apart from these, the effects of stress tests are channeled by changing the developments of the indicators of debt stock and by changing the debt-repayment capacities relative to the baseline scenario.

Jones et al. (2004) suggest that although historical events may seem appropriate for designing a stress test, the choice of hypothetical scenarios without analogs in the past proves to be more justified in many cases. This is especially true if a country has undergone significant changes in the financial system, the structure of the economy or when the course of economic policy has been redirected.

In the framework of DSA's standard methodology, it is assumed that under various stress tests, the government's debt position should remain resilient (that is, debt indicators should not reach threshold values) not only under basic conditions but also in case of possible shock emergence. Only in this case is public debt assessed as sustainable.

Yefimenko et al. (2014) argue that a set of methodological and practical problems appear to forecast debt indicators and assess debt sustainability. Their solution requires a high level of professional skills:

- (i) conducting adequate stress tests for DSA – selecting probable and relevant events (shocks) that may affect the debt trajectory and the availability of funds;

- (ii) assessing the validity of assumptions regarding the dynamics of key macroeconomic indicators;

- (iii) analyzing the realism of the computed adjustments to the primary budget balance, which are necessary to stabilize the public debt.

Raga (2024) and Pindyuk (2024) suggest that many components of standard DSA are difficult to project with a reasonable degree of plausibility in the economy affected by war. Obviously, real GDP growth rates in Ukraine will be contingent on the state of peace or warfare and the outcomes of the war. These outcomes, sequentially, are dependent on Ukraine's battlefield performance and the sufficiency of foreign aid to Ukraine that is impacted by geopolitical events. Exchange rates and budget deficits (key variables in the debt dynamics equation) are also affected by the magnitude of foreign aid.

Danylyshyn (2022) suggests that preserving macro-financial stability and debt sustainability in a war-torn economy has to rely on alignment of the monetary policy decisions with fiscal policy priorities, regulation of cross-border capital flows, maintaining the domestic market for public borrowings, state support to new jobs creation in the productive sectors and to the centers of significant value-added creation.

Heimberger et al. (2024) indicate that DSA plays a key role in reforming the European Union's fiscal rules, which came into force in April 2024. For EU member states with a fiscal deficit above 3% of GDP or a public debt ratio above 60% of GDP, the European Commission put forward a DSA-based "reference trajectory." This is supposed to ensure that, by the end of a multi-year fiscal adjustment period, the public debt ratio "is on a plausibly downward trajectory or stays at prudent levels, even under adverse scenarios."

In view of the above-mentioned findings and flaws, the aim of this paper is to conduct a comprehensive DSA for Ukraine, focusing on probabilistic judgments about the trajectory of the public debt stock and the government's gross financing needs in the 2025–2028 period and identifying the essential policy measures needed to prevent an unsustainable debt situation.

2. METHODOLOGY

The standardized debt sustainability framework requires projection of debt indicators and financing needs in the context of medium- (or long-) term scenarios. Judgments in these numerical evaluations are focused on the major risks and the scope for policy adjustments. Conventional DSA consists of assessing and interpreting a country's current and prospective debt-related indicators under different scenarios. Forecasting results are interpreted in a manner that a country's public debt outlook should be robust and remain below its respective thresholds both in the baseline and in the face of probable shocks.

The debt dynamics equation (1) plays the central role for DSA:

$$d_t = \frac{[1 + i_t^w + \alpha_{t-1} \xi_t (1 + i_t^f)]}{(1 + g_t)(1 + \pi_t)} d_{t-1} - pb_t, \quad (1)$$

where: d_t – public debt stock at the end of t period, as a % of GDP; d_{t-1} – public debt stock at the end of $t - 1$ period, as a % of GDP; pb_t – budgetary primary balance, as a % of GDP; i_t^w – weighted average of domestic and foreign nominal interest rates; i_t^f – nominal interest rates incurred on foreign currency denominated debt; ξ_t – change in the exchange rate (local currency unit per US dollar); α_{t-1} – share of foreign currency denominated public debt; g_t – growth rate of real GDP; π_t – GDP deflator in period t (IMF, 2016).

The DSA's methodology relies on a core debt dynamics equation (1) and incorporates standard macroeconomic interlinkages and assumptions about macroeconomic developments, security risks, fiscal policy indicators, foreign assistance patterns, etc. DSA's template operates as an integral comprehensive tool that allows different simulations with the inclusion of various shocks and assumptions.

This DSA for Ukraine encompasses the 2024–2028 period, i.e., wartime and first recovery years. The aim of this DSA is threefold: (i) forecasting public debt levels and gross financing needs for the consolidated budget based on functional relationships between macroeconomic and fiscal variables, (ii) detecting the risks of explosive debt dynamics and (iii) searching for an adequate policy response to arising debt difficulties.

First stage of DSA consists in building and running a baseline scenario. It presumes ending the war in the middle of 2025 and projects the developments of key macroeconomic variables – real GDP, inflation, exchange rate, nominal effective interest rates, budget revenue, expenditure and primary deficits. These projections consider the available macroeconomic forecasts for Ukraine's economy, prepared by the IMF and Ukrainian entities. Table 1 summarizes alternative macroeconomic forecasts and compares them with the key assumptions of this baseline scenario.

Table 1. Macroeconomic forecasts for Ukraine's economy and DSA macroeconomic assumptions

Source: Developed using the data of the Cabinet of Ministers of Ukraine (2024), Ministry of Economy of Ukraine (2024), IMF (2024a), NBU (2024b).

Indicator	Institution	2024	2025	2026	2027	2028
Real GDP growth, as a %	Cabinet of Ministers of Ukraine data	3.5	2.7	7.5	6.2	n.a.
	Ministry of Economy of Ukraine data	3.6	3.5	5.0	4.5	n.a.
	IMF data	2.5-3.5	3	5.3	4.5	4.3
	National Bank of Ukraine data	4.0	4.3	4.6	n.a.	n.a.
	DSA baseline assumption	3.7	5.4	7.1	6	5.2
Inflation (GDP deflator), as a %	Cabinet of Ministers of Ukraine data	10.6	10.1	11.2	9.6	n.a.
	Ministry of Economy of Ukraine data	11.5	11.4	10.3	9.6	n.a.
	IMF data	12	10.5	8	6	5
	National Bank of Ukraine data	12.2	9.6	6.6	n.a.	n.a.
	DSA baseline assumption	11.5	10.3	9.6	8.6	7.9
Nominal exchange rate yearly average, UAH per USD	Cabinet of Ministers of Ukraine data	40.8	45.0	n.a.	n.a.	n.a.
	Ministry of Economy of Ukraine data	40.3	42.7	46.22	46.37	n.a.
	IMF data	40.9	45.0	46.8	48.6	50.2
	DSA baseline assumption	40.4	44.6	48.0	50.3	52.1

Table 2. Debt and borrowing limits established by the IMF for Ukraine

Source: International Monetary Fund (2024a).

Indicator	Quantitative limit
Principal targets:	
Public and publicly guaranteed debt (excl. ERA loans) in 2033	65% of GDP
Cross financing needs (excl. ERA loans), average over 2028–33	8% of GDP
Complementary targets:	
Public and publicly guaranteed debt (excl. ERA loans) in 2028	82% of GDP
Annual flow relief over 2024–27	1-1.8% of GDP

A DSA template produces the baseline projections of public debt and gross financing needs indicators through 2024–2028. Functional relationships between macroeconomic and fiscal variables for obtaining nominal GDP, fiscal balance, budget expenditure, effective interest rate and interest payments on debt, exchange rate depreciation, public and publicly guaranteed debt stock, gross financing needs, etc., as well as assumptions on exogenous variables make up the DSA template.

In the second stage, DSA is extended to a negative scenario. It is built upon the assumptions of a continuation of the Russian war until the middle of 2026, deeper GDP decline, higher inflation rates, bigger devaluation of hryvnia, larger public debt service, and persistently high budget deficits. Third DSA's scenario is a macro-positive scenario that incorporates favorable economic and security assumptions. The macroeconomic framework underlying this scenario is built upon expectations of the war winding down in the 1st quarter of 2025, higher economic growth rates through 2024–2028, slower devaluation pace, lower inflation rates, and smaller budget deficits, as compared to the baseline and negative scenarios.

Comparison of the projected debt burden indicators across specified scenarios with the indicative thresholds (Table 2) enables to interpret the debt dynamics and evaluate the associated risks. The general presumption of DSA is that debt-burden indicators should remain below the thresholds in both the baseline and the stress scenarios. If threshold indicators are surpassed in the framework of different scenarios, the public debt is treated as unsustainable, and the economy is left highly vulnerable to various shocks.

In a practical context, restoring debt sustainability and mitigating associated risks should rely on

policy adjustment, which must be determined. Therefore, the fourth DSA scenario is specified as a policy shock scenario that relies on a rising share of grants in foreign financing and performing debt treatment before suspending the IMF program. This DSA's simulations yield quantitative parameters that must be incorporated for restoring debt sustainability via debt restructuring (covering foreign official bilateral debt and debt to euro-bonds holders).

A specific financing instrument that requires separate treatment within DSA is an ERA (Extraordinary Revenue Acceleration) loan. Under the ERA initiative, each contributor (Canada, Japan, the EU, the UK, and the United States) is developing its own financing modality within a general limit of USD 50 bn. The Ukraine Loan Cooperation Mechanism (ULCM) will provide Ukraine with non-repayable financial support to repay the financing provided under the ERA initiative over time (Anderson, 2024). The ULCM will be funded by the extraordinary revenue stream generated from immobilized Russian assets.

The IMF (2024a) adds the ERA funds to Ukraine's public debt stock while performing its DSA. However, this paper uses a different approach, given that ERA obligations will be serviced and repaid in full by the future flows of revenues stemming from Russian assets. The size of the underlying immobilized assets would be much larger than total ERA financing, as would the interest to be generated, supporting the sufficiency of this mechanism. Thus, in this DSA, ERA receipts are recorded as grant financing that is neutral to public debt and diminishes gross financing needs.

At the final stage of DSA, a special analytical and representative tool is used, i.e., a heat map. It recaps the risks to debt sustainability from the vari-

ous modules in a standardized way. Heat map colors are determined by comparing debt levels and gross financing needs against various benchmarks. They aim to classify risks in three levels: green means low risks, yellow – moderate ones, and red corresponds to high risks of debt distress.

3. RESULTS AND DISCUSSION

This paper constructed a baseline medium-term scenario and ran relevant simulations. The core assumption for this scenario is that the war will wind down in mid-2025. The macroeconomic framework underlying the baseline scenario is built upon the following assumptions.

First, real GDP growth in 2024 is assumed to reach 3.7%, which is attributable to significant inflows of foreign funds and powerful fiscal stimulus, rebounding private consumption and rebuilding destroyed infrastructure, improved logistics for goods exports, and an increase in military-industrial production. However, the poor security situation in many regions of Ukraine and disruptions in energy supply would hamper the economic recovery up to the end of 2025. Active reconstruction and return of Ukrainian refugees will push domestic demand and drive real GDP by 7.1% and 6% in 2026–2027. Over the medium term, economic growth would be accelerated by institutional reforms on the way to EU accession and by considerable investments in Ukraine's reconstruction from private and official sources.

Second, inflation (based upon the GDP deflator) is projected at 11.8% in 2024 and 10.3% in 2025 – quite a high level that is explained by high energy prices, ravaged domestic production and infrastructure, and continuing hryvnia's devaluation. Post-war recovery, presumably, will bring about declining inflation – 9.6% in 2026, 8.6% in 2027, and 7.9% in 2028. These inflation projections are lower relative to the IMF's forecast, its baseline scenario, but higher relative to the Ukrainian government's forecast (see Table 1).

Third, nominal exchange rate devaluation was contained by policy measures in 2023 but accelerated in 2024. It is projected that hryvnia will depreciate by 12.4% over 2024, and the nominal

rate will approach 42.7 UAH/USD at the end of the year. Considerable current account deficit, lack of confidence in the stability of the national currency, and switching from the fixed exchange rate to a more flexible regime explain the significant hryvnia's devaluation in 2024. In the course of 2026–2028, the hryvnia exchange rate will depreciate marginally less than a rise in domestic prices due to economic recovery and the inflow of foreign funds. However, slight nominal devaluation will persist due to ongoing inflation and dollarization of the financial assets.

Fourth, the primary budget balance is foreseen at quite a high level in the 2024–2025 period, i.e., more than 12% of GDP. Defense spending pressure will drive up the total fiscal expenditure and deficit. Ending the war will reduce the primary deficit to 7.7% of GDP in 2026 and close to 5–6% of GDP in 2027–2028. Smaller defense expenditure will contribute to a reduction in the primary deficit after 2025; however, drastic cuts in public expenditure and deficit would be unattainable due to high recovery and reconstruction needs. Overall, the budget deficit is anticipated at 12.2% of GDP in 2025, 12% in 2026, 10.1% in 2027, and 9% of GDP in 2028. This forecast of budget deficits in 2025–2026 is more optimistic than the IMF's forecast that stems from this treatment of the ERA inflows as grant financing (which supplement budget revenue).

Fifth, nominal effective interest rates (defined as interest payments divided by debt stock at the end of the previous year) are projected to fluctuate in the range of 5.2–6.7% in the 2024–2026 period. Thereafter, the effective interest rate on debt will go down due to a reduction in the interest rates at a domestic market under the conditions of declining inflation and lower credit risks. Over the entire forecasting horizon, the higher nominal rates on domestic debt will be offset by cheap loans from the official creditors.

Foreign grants to GDP ratio is assumed to follow the path predicted by the IMF but with a surcharge of ERA funds. As a result, foreign grants would approach 5.8% of GDP in 2024, 10.7% of GDP in 2025, 5.2% of GDP in 2026, and 2–3.6% of GDP in the 2027–2028 period. Within a baseline scenario, foreign official financing would stand for

Table 3. Ukraine's DSA baseline scenario as a percent of GDP (if otherwise not indicated)

Indicators of outputs and inputs for DSA	Actual			Projections				
	2021	2022	2023	2024	2025	2026	2027	2028
Nominal gross public debt	50.5	77.8	84.4	96.5	100.8	102.4	101.9	101.6
Domestic public debt	21.7	27.9	25.3	25.1	22.2	20.5	20.4	22.4
– held by commercial creditors	15.0	13.0	13.7	15.1	–	–	–	–
– held by the National Bank	5.7	13.5	10.6	8.8	–	–	–	–
– guaranteed loans and bonds	0.9	1.4	1.1	1.2	1.8	1.7	1.5	1.5
External public debt	28.8	49.9	59.1	71.4	78.7	82.0	81.5	79.2
– official multilateral and bilateral creditors	9.2	24.1	38.1	53.6	–	–	–	–
– bonds	11.5	13.7	11.5	8.8	–	–	–	–
– other creditors	3.2	6.6	5.5	6.0	–	–	–	–
– guaranteed loans and bonds	4.9	5.5	4.0	3.0	2.8	3.3	3.7	3.9
Gross Financing Needs	11.6	24.9	26.5	24.8	20.6	21.5	20.0	17.8
Primary deficit	0.6	13.0	16.5	12.7	6.5	7.7	6.0	5.3
Amortization payments	8.2	8.8	6.2	7.0	8.4	9.5	9.9	8.8
Interest payments	2.8	3.1	3.8	5.1	5.7	4.3	4.1	3.7
Macroeconomic assumptions								
Nominal GDP in bn UAH	5,450.8	5,239.1	6,537.8	7,579.7	8,811.9	10,344	11,907	13,516
Real GDP growth in %	3.4	–28.8	5.3	3.7	5.4	7.1	6	5.2
Inflation (GDP deflator) in %	24.8	34.9	18.5	11.8	10.3	9.6	8.6	7.9
Inflation (CPI, Dec./Dec.) in %	10.0	26.6	5.1	9.5	8.1	7.6	7	6.5
Consolidated budget revenue, including grants	30.5	41.9	47.5	48.3	52.1	43.1	40.5	38.5
o/w Tax and non-tax revenue	30.5	32.7	40.9	42.5	41.4	37.9	36.9	36.5
o/w Foreign grants	0.0	9.2	6.5	5.8	10.7	5.2	3.6	2.0
Consolidated budget non-interest expenditure	31.0	55.0	64.1	61.0	58.6	50.8	46.5	43.8
Consolidated budget expenditure	33.9	58.0	67.9	66.1	64.3	55.1	50.6	47.5
Primary budget balance	–0.6	–13.0	–16.5	–12.7	–6.5	–7.7	–6.0	–5.3
Overall budget balance	–3.4	–16.1	–20.3	–17.8	–12.2	–12.0	–10.1	–9.0
Budget balance, exclud. grants	–3.4	–25.3	–26.8	–23.6	–22.9	–17.2	–13.7	–11.0
Interest payments on debt	2.9	3.1	3.8	5.1	5.7	4.3	4.1	3.7
Effective nomin. interest rate, %	7.2	6.9	6.2	5.8	6.7	5.2	4.7	4.4
Nominal exchange rate, end of period, UAH/USD	27.3	36.6	38.0	42.7	46.5	49.4	51.2	53.0
Nominal exchange rate, yearly average, UAH/USD	27.3	32.3	36.6	40.4	44.6	48.0	50.3	52.1
Nominal exchange rate depreciation, in % per year	–3.5	34.2	3.8	12.4	8.9	6.2	3.6	3.5
Public debt dynamics								
Change in public debt, % of GDP	–	27.3	6.6	12.1	4.3	1.6	–0.6	–0.3

USD 49.3 bn in 2025, 43.4 bn in 2026, 39.3 bn in 2027, and 34.3 bn in 2028. Out of these amounts, a grant component would reach USD 21 bn in 2025 and 11.1 bn in 2026 (including ERA). In the subsequent years, the volume of foreign grants will go down to USD 8.5 bn in 2027 and 5.2 bn in 2028.

Under baseline projections, Ukraine will see its debt-to-GDP ratio shooting up in the course of 2025–2026, and the public debt level will reach a peak of 102.4% of GDP in 2026. This implies an increase of 18 p.p. of GDP during 2024–2026, following the increase of 33.9 p.p. of GDP during 2022–2023. Thus, this estimation suggests that debt sustainability is under serious threat within a baseline scenario.

Public debt stock is projected to surpass the indicative threshold (a long-term target of 65% of GDP and a medium-term target of 82% of GDP). Moreover, the debt peak of 102.4% of GDP in the baseline deviates considerably from a safe debt level.

DSA's baseline yields a more optimistic, although problematic, trajectory of government gross financing needs. The magnitude of gross financing needs jumped from 11.6% of GDP in 2021 to 26.5% of GDP in 2023; it is foreseen to stabilize at 24.8% of GDP in 2024 and to decline gradually in the course of 2025–2028. However, at the end of the forecasting period, gross financing needs will approach 17.8% of GDP, being higher than a benchmark indicator of 15% of GDP.

At this stage, the study found that debt burden and debt-related risks are likely to be larger than anticipated by the IMF. In October 2024, the IMF undertook a DSA for Ukraine based on the Sovereign Risk and Debt Sustainability Framework for Market Access Countries (IMF, 2024a). The IMF experts came up with more disadvantageous public debt dynamics up to 2027, which is explained by the inclusion of the ERA funds into the debt volume. However, ERA financing is treated here as grants, whose allocations do not affect public debt in the DSA's scenarios.

Another reason for discrepancies in projected debt is recording half of the USA-2024 loan as a part of public debt in these scenarios and its absence in the IMF's scenario. The fact is that in April 2024, the USA's budget support to Ukraine (USD 7.849 bn) was approved in the form of a loan by the Ukraine Security Supplemental Appropriations Act (USSAA) (IMF, 2024b). The USSAA gives the US president the power to cancel repayments on this loan – one-half at any time after November 15, 2024, and any remaining amounts after January 15, 2026. J. Biden's Administration has already submitted a request for partial debt cancellation to the US Congress in November. However, under the Presidency of D. Trump, cancellation of the remaining debt is unlikely, given that the Leadership of the Republican Party has insisted on transforming the budget support to Ukraine from grants to loans. In the framework of its DSA, the IMF modeled potential payments stemming from this loan as a contingent liability with a risk of materialization in 40 years.

In other words, if half of the 7.849 bn debt is not canceled by the US President after January 15, 2026, the actual debt burden will be higher in Ukraine. Therefore, this DSA envisions augmenting the debt volume by USD 3.925 bn. Lack of interests on this part of debt requires its special treatment within debt dynamics equation.

Besides, the projected debt levels in 2027–2028 are higher than those foreseen by the IMF due to higher primary deficit assumptions. The IMF predicts that primary balance will improve from –13.4 % of GDP in 2025 to –5.8% of GDP in 2026 and will be slightly positive during 2027–2028. This current assessment indicates that the destructive consequences of war and huge recovery and

reconstruction needs will sustain Ukraine's budget balance in a sizeable negative area even after the end of the war.

The IMF's baseline scenario generates a public debt peak of 107.6% of GDP in 2026 along a moderate downward trend thereafter. The IMF finalized its DSA, concluding that Ukraine's public debt is unsustainable in the framework of baseline and downside scenarios. Nevertheless, Ukraine's public debt was assessed by the IMF's experts as sustainable on a forward-looking basis, being contingent on strong policy commitments, treatment of the remaining commercial claims, financing commitments from donors, and credible assurances of debt relief.

Next, this DSA moves on to a stress test scenario, which is called a negative scenario. The following macroeconomic assumptions underlay this scenario.

First, real GDP contraction is predicted at 1.3% in 2025, attributable to further destruction of the production sector and physical infrastructure, electricity deficit, high security risks for private investments, and problematic logistics for goods exports. Ending the war in 2026 and accelerating the reconstruction process would put the economy on an upward trajectory; as a result, GDP would grow at 2.1% in 2026, 4.5% in 2027, and 4.2% in 2028.

Second, inflation is projected to move to 13.2% in 2024, 15% in 2025, 10.7% in 2026, 9.4% in 2027, and 8.6% in 2028. The same factors are likely to be at play, as in the baseline scenario, although deeper recession and higher exchange rate devaluation will amplify the effects of restrained domestic production and of the pass-through effect of hryvnia's devaluation on inflation.

Third, nominal exchange rate devaluation would be impacted by private capital flight, high current account deficits, domestic inflation hikes, and undermined domestic competitiveness. The significant hryvnia devaluations of 2024 and 2025 (at 13.7% and 10.6% rates) will be smoothed in subsequent years, amounting to 7.9% in 2026, 6.6% in 2027, and 5.5% in 2028. It is projected that the nominal hryvnia's exchange rate will approach 58 UAH/ USD at the end of 2028.

Fourth, the nominal effective interest rate is projected to increase from 5.9% in 2023 to 6.9% in 2024 and is likely to decline to 4.8% in 2025. The average interest rate on foreign debt will fluctuate around 3.1%–3.8%. Such a moderate interest rate level is attributable to the high share of concessional debt owed to official creditors in the structure of public debt.

Fifth, the considerable budget deficit will be driven by military-related expenditure and the low tax capacity of the economy. The primary budget deficit is projected to improve slightly from –13.3% of GDP in 2024 and –11.5% of GDP in 2026 to –8.3% of GDP in 2028. The end of the war and the economic recovery would mitigate the pressure on public finance and, possibly, the government would be able to reduce the primary deficit down to 8% of GDP. However, large recovery and reconstruction needs in Ukraine after the protracted war exclude the possibility of reducing the primary deficit to 3.2% of GDP in 2027 and to 0 in 2028, as foreseen by the IMF.

The negative stress test signals that Ukraine's public debt stock is vulnerable to the shocks of real GDP, the exchange rate, and the effective interest rate. All of these shocks have well-predictable adverse impacts on the public debt ratios, and gross financing needs amounts. Public debt stock will have an upward trajectory, reaching a peak of 128.8% of GDP in 2028. This debt peak is two times higher than a debt threshold level. Estimated public debt stock at the end of the forecast horizon would exceed the baseline debt level by 27.2 p.p. of GDP.

Already large gross financing needs in the baseline scenario would become even larger in the framework of this negative scenario. Gross financing needs are projected to reach 25% of GDP roughly in the 2024–2026 period and to decrease to 20.8% of GDP in 2028. Estimated numbers of financing needs will be positively affected by the ERA grant allocations, but even in this case, they will surpass a threshold level (15% of GDP).

Table 4. Ukraine's DSA negative scenario as a percent of GDP (if otherwise not indicated)

Indicators of outputs and inputs for DSA	Actual	Projections				
	2023	2024	2025	2026	2027	2028
Nominal gross public debt	84.4	96.6	108.6	119.1	124.4	128.8
of which: guarantees	5.1	4.2	4.6	5.0	5.2	5.4
Domestic public debt	25.3	25.1	23.9	23.8	24.9	28.3
Guaranteed loans and bonds	1.1	1.2	1.8	1.7	1.5	1.5
External public debt	59.1	71.5	84.7	95.3	99.5	100.4
Guaranteed loans and bonds	4.0	3.0	2.8	3.3	3.7	3.9
Gross Financing Needs	26.5	25.4	24.6	25.3	23.1	20.8
Primary deficit	16.5	13.3	10.5	11.5	9.1	8.3
Amortization payments	6.2	7.0	8.4	9.5	9.9	8.8
Interest payments	3.8	5.1	5.7	4.3	4.1	3.7
Macroeconomic assumptions						
Nominal GDP in bn UAH	6 537.8	7600.6	8627.1	9751	11147	12590
Real GDP growth in %	5.3	2.7	–1.3	2.1	4.5	4
Inflation (GDP deflator) in %	18.5	13.2	15	10.7	9.4	8.6
Inflation (CPI, Dec./Dec.) in %	5.1	11.3	9.7	8.8	8.5	8.0
Consolidated budget revenue, including grants	47.5	46.6	48.7	41.1	37.9	35.8
o/w Tax and non-tax revenue	40.9	41.0	39.2	36.0	35.5	34.8
o/w Foreign grants	6.5	5.6	9.5	5.1	2.4	1.0
Consol. budget non-interest expenditure	64.0	59.9	59.2	52.6	47.0	44.1
Consolidated budget expenditure	67.8	65.4	64.8	57.6	51.8	48.7
Primary budget balance	–16.5	–13.3	–10.5	–11.5	–9.1	–8.3
Overall budget balance	–20.3	–18.8	–16.1	–16.5	–13.9	–12.9
Budget balance, excluding grants	–26.8	–24.4	–21.7	–21.6	–16.3	–13.9
Interest payments on public debt	3.8	5.5	5.6	5.0	4.8	4.6
Effective nominal interest rate, %	6.2	5.9	6.9	5.5	5.1	4.8
Nominal exchange rate, end of period, UAH/USD	38.0	43.2	47.8	51.6	55.0	58.0
Nominal exchange rate, yearly average, UAH/USD	36.6	40.6	45.5	49.7	53.3	56.5
Nominal exchange rate depreciation, % per year	–	13.7	10.6	7.9	6.6	5.5

Thus, the combined shock has a significant adverse impact on near-term debt sustainability. Key indicators of debt sustainability – public debt stock and gross financing needs – signal the solvency and liquidity problems for Ukraine’s public finances over the medium term.

A macro-positive scenario is constructed at the next stage of DSA, which incorporates favorable macroeconomic and security assumptions. The purpose of this investigation is to assess whether a stronger economic base for Ukraine (without solid policy commitments related to Ukraine’s debt write-off and rising foreign grants) will be able to reduce debt-related risks radically. This scenario yields a public debt stock equivalent to 99.8% of GDP in 2025, 97.3% in 2027, and 94.8% of GDP in 2028, far away from an indicative benchmark (see Figure 1, green solid line). Similarly, gross financing needs approaching 20.4% of GDP in 2025–2026 also signal a high risk of debt distress.

Thus, even positive macroeconomic developments in Ukraine do not ensure the restoration of debt sustainability in the foreseeable future. Under an excessive public debt burden, Ukraine’s economy will be highly vulnerable to various shocks. Debt will also leave less room for countercyclical fiscal policy, which may induce deeper economic recessions. Moreover, high debt will expose a country to higher rollover risks, which increases the government’s vulnerability to market risk (Jensen, 2021; Claessens et al., 1996). There is also much evidence that high public debt stock is detrimental to economic growth (Mencinger et al., 2014; Augustine & Rafi, 2023; Reinhart et al., 2012; Ford & Laxton, 1995; Baum et al., 2013; Cecchetti et al., 2011).

For that reason, the first positive scenario was extended by including a repeated debt restructuring in 2026, by widening a foreign grant component, and by foreseeing the cancellation of the entire USA loan (USD 7.845 bn). Experiences of several countries ravaged by war in the second half of the twentieth or the beginning of the twenty-first century suggest that debt reductions or debt restructurings in the form of remarkable debt treatment were essential components of post-conflict rehabilitation – in Iraq, Afghanistan, and Egypt (Hinrichsen, 2021).

A positive policy shock scenario includes a rising share of grants in foreign financing and performing debt treatment at the final stage of the IMF-supported program. Such shifts in the structure of foreign financing will have significant impacts on debt output variables and debt-related risks. More specifically, the positive shock scenario is based upon increasing the share of foreign grants up to 42–45% through 2025–2028 as compared to 25% actually in 2024. Notably, this baseline scenario (that relies on foreign financing parameters projected by the IMF) presumes the shares of foreign grants at 15–26% in 2026–2028. Raising the share of grants in the structure of foreign financing will be aimed at the restoration of Ukraine’s debt sustainability and easing fiscal constraints for the government.

The larger grants in the 2024–2026 period would involve declining volumes of gross financing needs (borrowings by the Ukrainian government). The size of projected foreign grants (10.7% of GDP in 2025, 9.4% in 2026, and 8.2% of GDP in 2027) will be comparable to the level of 2022 when grants amounted to 9.2% of GDP. With regard to total external financing in the positive shock scenario, it would approach USD 48.1 bn in 2025, 45.2 bn in 2026, 42.6 bn in 2027, and USD 37.3 bn in 2028. The grant component of the foreign financing and its total amount should come from Ukraine’s recovery and reconstruction needs, estimated initially at USD 49 bn per year by foreign donors (World Bank et al., 2024).

Positive policy shock scenario presumes that ERA financing would go up from USD 35 bn (in a baseline scenario) to USD 50 bn. Additional USD 15 bn will be distributed among budgets of 2026 and 2027, adding USD 9.1 bn and 5.9 bn to the respective budgets. In such a way, the disbursements of ERA grants to Ukraine’s budget will follow such a path: USD 19.1 bn in 2025, 19.1 bn in 2026, and 11.8 bn in 2027. Besides, stabilization of Ukraine’s public finance and restoration of debt sustainability would require additional grants in the amount of USD 5 bn in 2027 and USD 13 bn in 2028.

Summing up, the exogenous parameters of foreign grants for the DSA’s positive shock scenario look as follows: 2025 – USD 21 bn, 2026 – USD 20.2 bn, 2027 – USD 19.4 bn, 2026 – USD 15.6 bn. In a post-war pe-

Table 5. Ukraine's DSA policy shock scenario as a percent of GDP (if otherwise not indicated)

Indicators of outputs and inputs for DSA	2022 actual	2023 actual	2024 project	2025 project	2026 project	2027 project	2028 project
Nominal gross public debt	77.8	84.4	96.5	100.5	89.1	84.6	81.2
of which: guarantees	6.9	5.1	4.2	4.6	5.0	5.2	5.4
Domestic public debt	27.9	25.3	25.1	22.1	17.8	16.9	17.9
guaranteed loans and bonds	1.4	1.1	1.2	1.8	1.7	1.5	1.5
External public debt	49.9	59.1	71.4	78.4	71.3	67.7	63.3
guaranteed loans and bonds	5.5	4.0	3.0	2.8	3.3	3.7	3.9
Gross Financing Needs	24.9	26.5	24.8	20.3	17.1	15.1	13.3
Primary deficit	13.0	16.5	12.7	6.2	3.5	1.4	1.2
Amortization payments	8.8	6.2	7.0	8.4	9.7	9.9	8.6
Interest payments	3.1	3.8	5.1	5.7	3.9	3.8	3.5
Macroeconomic assumptions							
Nominal GDP in bn UAH	5,239.1	6,537.8	7,579.7	8,811.9	10,344	11,907	13,516
Real GDP growth in %	-28.8	5.3	3.7	5.4	7.1	6	5.2
Inflation (GDP deflator) in %	34.9	18.5	11.8	10.3	9.6	8.6	7.9
Inflation (CPI, Dec./Dec.) in %	26.6	5.1	9.5	8.1	7.6	7	6.5
Consolidated budget revenue, including grants	41.9	47.5	48.3	52.1	47.3	45.1	42.5
o/w Tax and non-tax revenue	32.7	40.9	42.5	41.4	37.9	36.9	36.5
o/w Foreign grants	9.2	6.5	5.8	10.7	9.4	8.2	6.0
Consolidated budget non-interest expenditure	55.0	64.1	61.0	58.3	50.8	46.5	43.7
Consolidat. budget expenditure	58.0	67.9	66.1	64.0	54.7	50.3	47.2
Primary budget balance	-13.0	-16.5	-12.7	-6.2	-3.5	-1.4	-1.2
Overall budget balance	-16.1	-20.3	-17.8	-11.9	-7.4	-5.2	-4.7
Budget balance, exclud. Grants	-25.3	-26.8	-23.6	-22.6	-16.8	-13.4	-10.7
Interest payments on debt	3.1	3.8	5.1	5.7	3.9	3.8	3.5
Effective nominal inter. rate, %	6.9	6.2	5.8	6.7	5.2	4.4	4.3
Nominal exchange rate, end of period, UAH/USD	36.6	38.0	42.7	46.5	49.4	51.2	53.0
Nominal exchange rate, yearly average, UAH/USD	32.3	36.6	40.4	44.6	48.0	50.3	52.1
Nominal exchange rate depreciation, in % per year	34.2	3.8	12.4	8.9	6.2	3.6	3.5

riod, grant financing would be essential for meeting (at least partially) the recovery and reconstruction needs of Ukraine without endangering debt sustainability. In addition, a full amount of USSAA debt should be canceled in 2026 as a part of Ukraine's debt treatment (after the partial cancellation in 2024).

Figure 1 shows the trajectory of Ukraine's public debt under the baseline scenario, negative, macro-positive scenario, and positive policy shock scenario. The green lines reflect the eventual threshold at 65% of GDP and the intermediate threshold at 82% of GDP in 2028, which was established by the IMF for Ukraine.

Figure 1 demonstrates that different macroeconomic fundamentals and magnitudes of budget deficit fail to change the trajectory of Ukraine's public debt radically and to put the debt stock under the threshold line. The first three scenarios yield public debt stocks in the range from 94.8% of GDP to 128.8% of GDP in 2028, which lies even

above the intermediate threshold of 82% of GDP. Only a policy shock scenario ensures an appropriate pace of debt convergence to a threshold level.

Figure 2 depicts the trajectory of gross financing needs under above-mentioned four scenarios. The green line corresponds to the threshold value of 15% of GDP, suggested by the IMF. Figure 2 also presents clear evidence that huge government financing needs endanger public debt sustainability and require an effective policy response.

A challenging issue for Ukraine's debt sustainability is repeated debt restructuring. In 2024, euro-bonds debt with a nominal value of 20.47 bn USD and a total value of 24.3 bn USD (including postponed interests) has already fallen under debt restructuring. The euro-bonds in circulation were exchanged for a package of new bonds with a nominal reduction in face value of 37%, as a result of which Ukraine's public debt has been reduced by close to USD 9 billion (Ministry of Finance of Ukraine, 2024b).

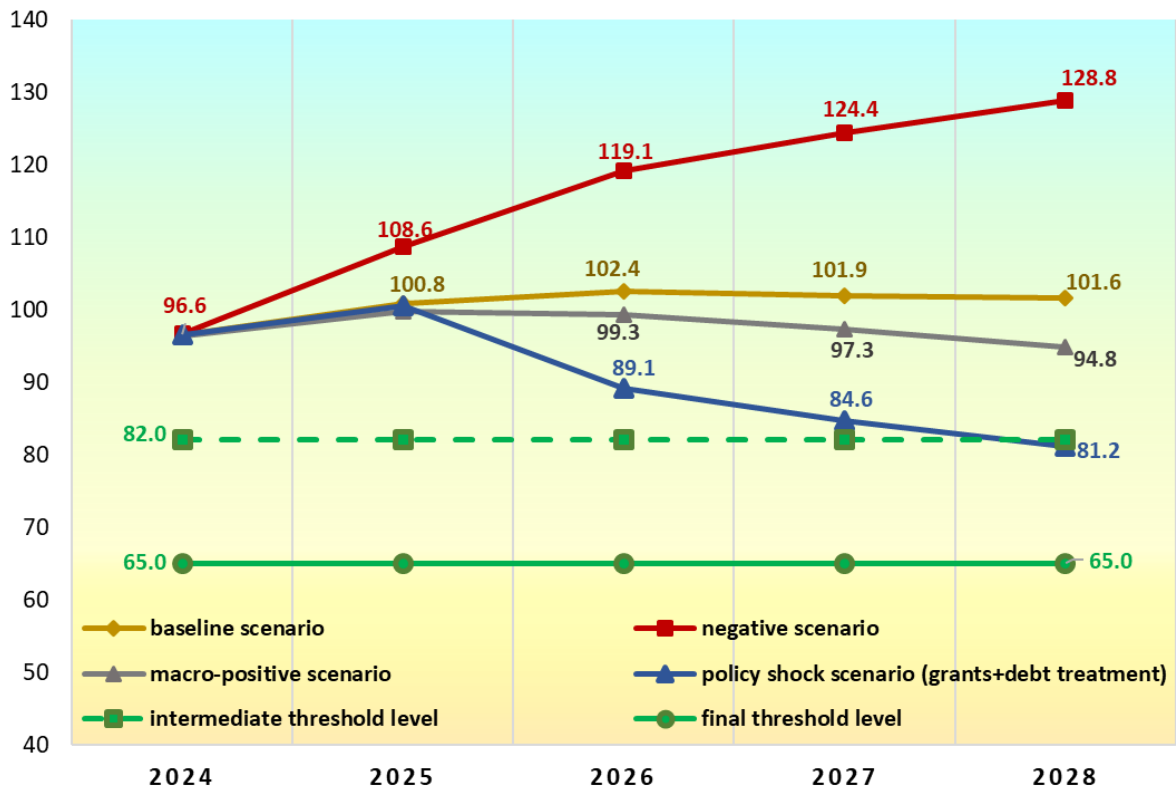


Figure 1. Projected public debt dynamics across DSA scenarios in 2024–2028 as a % of GDP

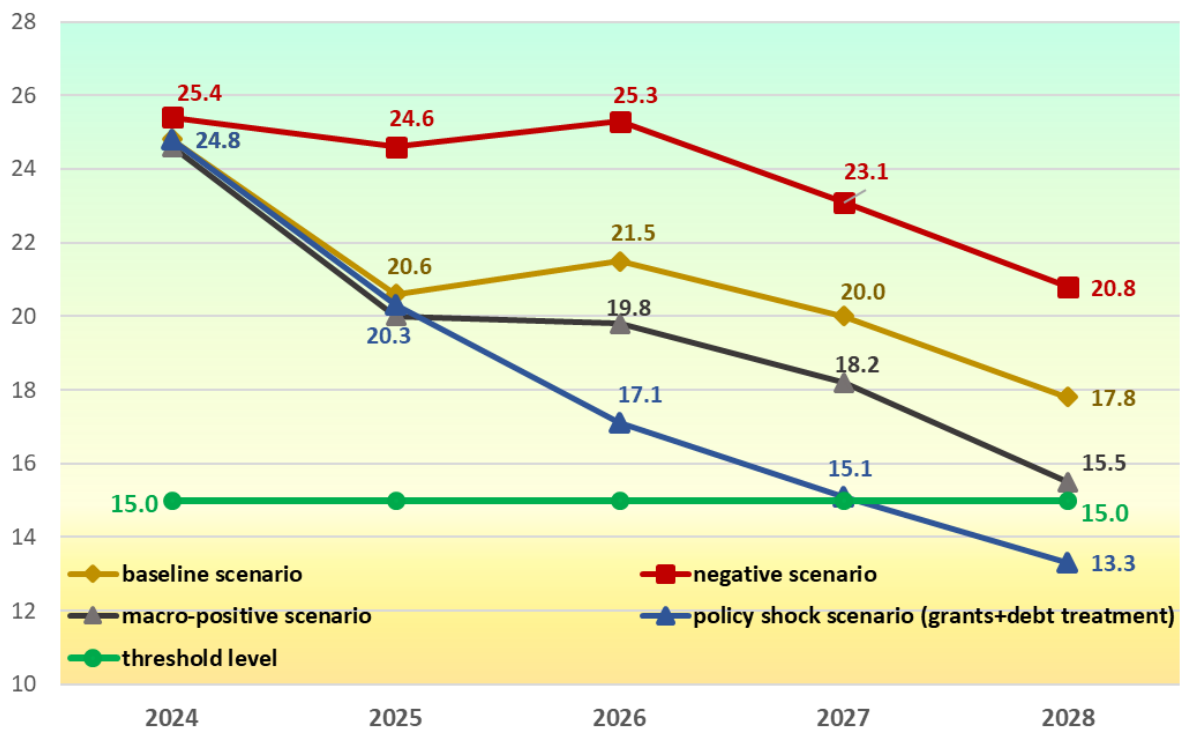


Figure 2. Projected gross financing needs across DSA scenarios in 2024–2028 as a % of GDP

However, two problematic aspects of this debt treatment are evident. Firstly, the agreement with creditors stipulates that if real GDP approaches a higher level in 2028 relative to the level projected by the IMF, the Ukrainian government will be obliged to pay an extra premium equal to 12% of the value of the initial bonds. Therefore, the actual haircut may turn out to be 25% instead of 37%. Secondly, these assessments show that the modest debt write-off agreed with commercial creditors in August 2024 would make a second debt treatment inevitable in 2026.

In the framework of the IMF-supported program, Ukrainian authorities committed to a second-stage restructuring, including commercial debt and official bilateral debt. The program stipulates that should the macroeconomic outlook worsen, the government will undertake further commercial debt treatment to restore debt sustainability in line with the program's parameters. The government also committed to seek debt treatment on comparable terms with official bilateral creditors, which have provided assurances to restructure their claims before the final review of the IMF-supported program. The IMF has defined the debt restructuring targets as: public debt excluding ERA liabilities should reach 82% of GDP by 2028 and 65% of GDP by 2033.

At the end of September 2024, public direct and guaranteed debt to euro-bond holders stood at USD 15.2 bn. It is predicted that Ukraine's public debt owed to official bilateral creditors will amount to USD 11.8 bn in 2026. These types of obligations, together with remaining commercial claims (subject to restructuring in 2024), yield USD 29.05 bn altogether, which will probably fall under repeated debt restructuring in the second half of 2026.

These calculations suggest that if a haircut of 50% to the nominal value of bonds and official bilateral loans is applied through a restructuring, the public debt stock will decline by USD 14.5 bn or 6.9 p.p. of GDP in 2026. In such a case, a quite optimistic debt

trajectory with a declining debt ratio would be observed: 100.5% of GDP in 2025, 89.1% in 2026, 84.6% in 2027, and 81.2% of GDP in 2028. The same will hold for the gross financing needs, which will be reduced from 24.8% of GDP in 2024 to 13.3% in 2028.

The application of a meaningful haircut to the face value of euro-bonds and official bilateral claims would be indispensable for the reduction of huge debt payments out of Ukraine's budget and freeing up resources for post-war recovery, rehabilitation of infrastructure, and social sector.

The final outcomes of the policy shock scenario are represented on Figures 1 and 2 – blue solid lines. After comparing to the previous scenarios, the study can draw the following conclusion. Only the considerable extension of foreign grants and application of a 50% haircut to the nominal value of debt under the restructuring in 2026 will drive a gradual restoration of Ukraine's public debt sustainability and will provide an opportunity for successful post-war reconstruction.

General risk assessments for all medium-term scenarios are summarized on a heat map depicted in Table 6. The major part of the heat map is colored in red, signaling that vulnerabilities are significant, both in terms of public debt stock and government financing needs. Only the positive policy shock scenario contains a moderate degree of risks that correspond to yellow cells on the heat map.

The heat map clearly demonstrates that unchanged policy setting and materialization of the key assumptions of the baseline scenario, the negative shock scenario, and the macro-positive scenario would move the country toward a debt crisis over the medium term. On the other hand, validation of the positive policy shock scenario (grant financing and a haircut of 50% to the nominal value of obligations liable to restructuring) will secure Ukraine's solvency and macro-financial stability.

Table 6. Heat map of risk assessment

Public debt level	Baseline (warfare up to mid. 2025)	Negative (warfare up to mid. 2026)	Macro-positive scenario	Positive shock of grant financing and 50% debt write-off
Gross financing needs	Baseline scenario	Negative scenario	Macro-positive scenario	Positive shock of grant financing and 50% debt write-off

CONCLUSION

The study aimed to conduct a comprehensive DSA for Ukraine with a focus on probabilistic judgments about the trajectory of the public debt stock and the government's gross financing needs in the 2025–2028 period. The results indicate that Ukraine's public debt is unsustainable across the main macroeconomic scenarios (the baseline, the negative, and the positive macro-scenarios). In particular, the risks of slow economic recovery, exchange rate devaluation, substantial primary deficits, and high interest rates are significant and are associated with steep public debt growth. Eventually, such a situation may lead to a solvency crisis or would require politically unsustainable policy moves.

Medium-term forecasting within DSA shows that, given the accumulated debt problems during a war, favorable macroeconomic developments in Ukraine do not ensure the restoration of public debt sustainability, and only considerable policy moves could bring optimistic outcomes. Simulations in the framework of DSA's policy shock scenario allowed the identification of economic policy measures and their quantitative parameters, which comply with achieving debt targets and mitigate the risks of the debt crisis.

Pursued comprehensive DSA reveals that a substantial extension of foreign grants as a component of foreign financing and a significant foreign debt write-off is indispensable for the restoration of Ukraine's public debt sustainability. Derived estimates suggest that a debt haircut of 50% in the course of foreign debt treatment and increasing the share of foreign grants in the structure of foreign disbursements up to 45% would provide alignment of the projected public debt stock with an established medium-term target of 82% of GDP.

The EU and USA authorities, the IMF, and the G7 governments should play their roles in raising larger foreign financing to meet Ukraine's recovery needs and in supporting the debt restructuring process (encompassing official bilateral debt and debt to euro-bond holders). Notably, official bilateral and multilateral donors should commit to exceptional financial support for Ukraine on highly concessional terms. These constructive efforts could mitigate the risk of debt distress and contribute to making the future reconstruction of Ukraine's economy a success story.

AUTHOR CONTRIBUTIONS

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