Grant Components in Relationship Lending: Enhancing the Financial Sustainability of Government and Local Loans in Ukraine

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Abstract:

This study examines the integration of a grant component into relationship lending frameworks as a mechanism for ensuring the financial sustainability of government and local debt in transitional economies. Focusing on Ukraine's wartime fiscal transformation, the research analyses how hybrid financing models, combining repayable loans with non-repayable grants, reshape debt dynamics and support structural adjustment under conditions of extreme uncertainty. The study applies comparative

analysis, the Public Finance Sustainability Index (PFSI), and multivariate regression modelling with scenario forecasting to a panel of eight countries (Ukraine, Moldova, Georgia, Poland, Hungary, Latvia, Croatia, and Bulgaria) over the period 2020–2024. The results demonstrate that Ukraine exhibits the highest Grant Participation Ratio (GPR), exceeding 0.4 in 2022, while in EU countries it generally remains below 0.1–0.2. Regression estimates reveal a statistically significant positive relationship between the share of grants and fiscal sustainability: a 10% increase in the grant share raises the PFSI by approximately 0.025, whereas a higher loan share has the opposite effect.

Scenario modelling indicates that maintaining a grant share of at least 25% in external financing is a necessary condition for preserving macro-financial stability in Ukraine during 2025–2027. The academic contribution of the paper lies in operationalizing the grant component within a relationship lending framework and embedding it into a quantitative sustainability assessment. Practically, the findings provide policymakers with an evidence-based tool for optimizing loan–grant ratios in public borrowing, particularly in post-conflict reconstruction and decentralization contexts, where fiscal resilience is critical for long-term institutional transformation.

Introduction

The deepening military and economic crisis in Ukraine has significantly changed the sources of deficit coverage: official international assistance, external loans, and grants have become the leading ones. In 2024, grants accounted for up to 16% of all government revenues (Ministry of Finance of Ukraine, 2025). Part of the loans of international financial organizations (IFOs) is not subject to repayment or is converted into grants, which requires the formalization of the concept of a grant component in financial agreements. Effective debt management depends not only on the volume of borrowings, but also on their structure (Batrakova & Semibratova, 2023; Le Van et al., 2023). In particular, grants reduce the debt burden and contribute to macro-financial stability. For example, tax debt remains low (6.6%) in Ukraine due to grant revenues despite the growth of public debt (The World Bank Group, 2025). Grants are often integrated into lending programmes, changing the logic of fiscal planning.

At the international level, the grant component is already enshrined in agreements with organizations such as the World Bank, EBRD, and IMF. At the same time, the regulatory and methodological regulation of this issue remains fragmented in national systems, in particular in Ukraine. As noted by Organisation for Economic Co-operation and Development (OECD) (2024), a clear distinction between grants and loans promotes transparency and allows for more accurate forecasting of debt risks. Therefore, there is a need for research that will identify, assess, and compare the impact of the grant component in borrowing on the fiscal sustainability of Ukraine and countries with similar experience. This is especially important given the United Nations' (UN's) SDGs, which emphasize the mobilization of financial resources, including grants (United Nations, 2024). So, the relevance of the study is determined by the need for an empirical assessment of the grant component in the system of state and local finances in the post-war period.

The aim of the article is to identify the impact of the grant component in the structure of government and local loans on the debt burden of Ukraine in wartime, taking into account international experience.

Research objectives:

RQ1: Study the mechanisms of integrating grants into state and local lending programmes in Ukraine.

RQ2: Analyse international experience in distinguishing between grant and loan components in financial agreements.

RQ3: Identify the impact of the share of grants in the structure of government loans on the debt burden index in Ukraine and the selector countries.

The proposed framework directly complements Ukraine's decentralization reform, which devolved significant fiscal responsibilities to local self-governments. As municipalities assume greater autonomy in managing investment projects and public services, the need for tailored financing mechanisms, such as relationship lending models calibrated by sustainability metrics, becomes increasingly vital. The integration of the FSI index provides a structured tool to align subnational borrowing with macroeconomic and debt-responsible objectives.

Research hypothesis: an increase in the grant component in the structure of government and local loans reduces the overall level of debt burden and increases fiscal sustainability in times of crisis.

1. Literature Review

The study of the grant component in the structure of government and local loans covers an interdisciplinary field that combines public finance, international aid, macroeconomics, and loan-grant financing models. According to Kravchuk et al. (2023), Ukraine's public debt requires deep restructuring, especially in wartime, when the share of grant financing increases. A similar thesis is developed by Le Van et al. (2023), who mathematically prove that grants have a lower debt burden and a more stable long-term effect on the economy compared to loans.

Gavkalova et al. (2022) draw attention to the difficulties of organizational support of local budgets in Ukraine, which complicates the effective administration of grant components. Blanco-Oliver et al. (2024) point to gender-sensitive effects in microcredit provision, which are not always taken into account when distributing grants, and this is another "white spot" in the topic. Similarly, Crawford et al. (2024) summarized approaches to public financing of SMEs, but focused mainly on loans and guarantees, leaving grants out of deep analysis. Considerable attention in the literature has been paid to digital tools for assessing creditworthiness (Wang et al., 2023; Lenka et al., 2022; Christian & Berkowitz 2022), but these studies are rarely adapted to the conditions of grant financing. At the same time, machine learning (Kiran et al., 2023) can improve the prediction of the effectiveness of grant distribution and risk assessment, although this issue remains poorly studied at the level of public administration. Other researchers Gong et al. (2022) consider the optimization of loan agreements in the face of political uncertainty, but do not include grants as an alternative, which limits their model to the public sector.

Publications on the Ukrainian context focus mainly on general issues of fiscal policy in wartime. Alekseieva et al. (2023) analyse government business support programmes, but do not distinguish grants and loans as separate instruments. Kovpaka (2022) emphasizes the importance of external support, but without an in-depth analysis of the effectiveness of the grant component. This gap is only partially filled by the study of Sych & Kruhliakova (2023), which analyses EU financial assistance instruments, but mostly without focusing on grants in

the structure of the debt burden. Audretsch et al. (2025) also emphasize the importance of institutional barriers to access to grants, especially in new sectors, which may be relevant to the Ukrainian context.

Interdisciplinary study of Epure et al. (2024) is useful for the analysis, which examines the impact of the global financial cycle on households and macroprudential policy, but leaves out the fiscal sphere and grants. Another paper by Manoharan et al. (2023) presents credit risk assessment techniques that are potentially applicable to assessing the efficiency of grant allocation. Kärnä &- Stephan (2022) also examine inequality in access to credit for businesses, which is indirectly related to regional differences in access to international aid. Ortina et al. (2023) examines the digital transformation of public administration, which is relevant for grant financing, but the authors do not pay attention to fiscal aspects or the relationship between digital mechanisms and the structure of foreign aid.

The study by Santos et al. (2024) is worth noting, which proves that the source of funding directly affects the dynamics of innovative growth, with grants having the greatest impact. In the monograph, Shuliuk (2023) creates a conceptual framework for the development of financial mechanisms for public-private partnerships, which partly involves the attraction of grants, but lacks a clear operationalization of the role of grants in these processes.

Despite a significant number of studies in the field of public finance, there is still a number of unresolved issues. First, there is no comprehensive methodology for determining the share of the grant component in mixed credit products. Second, there are contradictions between the assessments of the impact of grants on fiscal discipline: some researchers consider them neutral, others, stimulating or, conversely, destructive. Third, there is a shortage of empirical data on the impact of grants in the system of local borrowing, in particular in Ukrainian amalgamated territorial communities (ATC), which requires further research. So, the existing academic background creates a basis for research, but does not comprehensively cover the issue of the grant component in borrowing relations. This opens up prospects for empirical analysis with the involvement of international experience, which is the academic novelty of this study.

2. Research Methodology

The research methods applied in this study were selected from well-established and empirically validated methodological approaches commonly used in fiscal and financial sustainability analysis. In cases where methodological adaptation was required, the rationale and theoretical grounding were outlined in the Introduction section and supported by prior literature review. The overall research design is presented schematically in Figure 1, which illustrates the sequential structure of the empirical investigation across three stages.

As shown in Figure 1, Stage 1 involved the collection and aggregation of official statistical data from reputable international and national sources, including the Association of Ukrainian Banks (AUB), the Ministry of Finance of Ukraine, OECD databases, the State Statistics Service of Ukraine (SSSU), and the World Bank Group. Stage 2 comprised sampling procedures and the calculation of the share of grant components within the lending structure, as well as the computation of the Fiscal Sustainability Parameter (FSP) and comparative assessment across countries. Stage 3 involved regression modelling to estimate the impact of the grant component on fiscal sustainability indicators. Based on the econometric results, policy scenarios were formulated and recommendations were developed regarding the optimal ratio of grants and loan financing.

Figure 1: Research stages
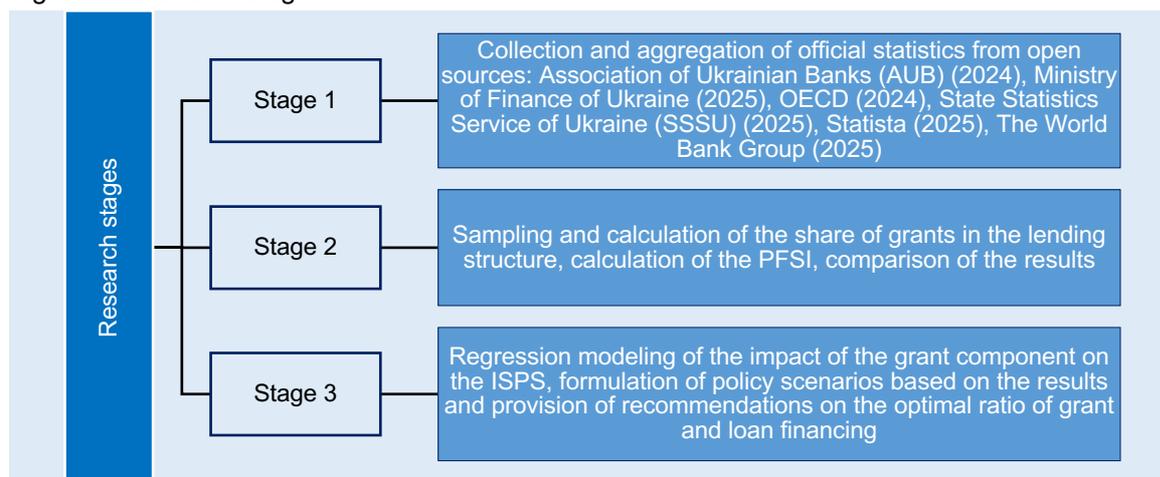
Source: Developed by the author.

The empirical sample included eight countries: Ukraine, Poland, Moldova, Georgia, Croatia, Bulgaria, Latvia, and Hungary. These countries were selected due to their varying degrees of reliance on grant financing within public budget structures, allowing for an assessment of how non-repayable aid influences debt burden dynamics.

The key selection criteria included: (i) the presence of both credit and grant components in the structure of government or local borrowing; (ii) the availability of comparable statistical data for the last three years in areas such as national budgets, international assistance, and public debt obligations; (iii) documented experience in post-crisis fiscal management, particularly under conditions of external or internal shocks, including military conflict, pandemic disruption, or economic recession.

The sample was intentionally limited to eight countries to ensure analytical depth, maintain a balance between quantitative rigor and qualitative contextualization, and preserve regional comparability with Ukraine in terms of historical, political, and economic characteristics. The research used analytics for 2020–2024 inclusive, taking into account the available relevant and available secondary data. Microsoft Office Excel (version 2021) was used for data processing, analysis, and calculation. The following methods were used in the empirical analysis:

- comparative analysis (comparison) to compare the specific volumes of grants in credit programs between Ukraine and the selector countries. The GPR was calculated for each country using the formula:

$$GI = G/(G + C) * 100\%,$$

where: G – grant volume, C – volume of loans on repayment terms.

This method determined in which countries the grant component plays a leading role in financial support;

- PFSI quantitatively assessed fiscal sustainability taking into account grant support. The index is calculated as a weighted average of three normalized indicators:

$$PFSI = 1/3 * (N\_1 + N\_2 + N\_3),$$

where: N_1 denotes the public debt-to-GDP ratio (inverse indicator), N_2 the share of grants in public revenues, and N_3 the share of debt service in the budget. All variables were normalized using the min–max method on a 0–1 scale.

The obtained values allowed to rank countries by the level of fiscal sustainability;

- multivariate regression modelling with elements of scenario forecasting was used to determine the impact of the share of grant aid on the PFSI. The regression model is:

$$PFSI = \beta\_0 + \beta\_1 * G + \beta\_2 * C + \beta\_3 * X + \varepsilon,$$

where: G – share of grants in the structure of external financing, C – share of debt financing, X – set of control variables (inflation, exchange rate stability), ε – model error.

The modelling results were used for developing scenarios for Ukraine for 2025–2027 with different ratios of grants and loans: optimistic (45%), basic (30%), and pessimistic (10%). The threshold parameters of grant participation, under which fiscal sustainability is maintained, were determined.

3. Results

Comparative analysis (Table 1) showed that during 2020–2024, Ukraine stood out significantly among the selected countries in terms of the share of grants in external financing (GPR). While grants were almost not used in 2020–2021, the GPR increased to ~0.4 starting from 2022, and it remained high (~30–33%) in 2023–2024. For Moldova, this indicator fluctuated within ~0.25–0.3, while it did not exceed 0.1 for Georgia. Moldova usually planned grants at the level of ~2.7% of budget revenues (~0.5% of GDP), but the volumes increased after 2022. Georgia relied mostly on soft loans, and grants amounted to <1% of GDP.

The situation is different in EU countries. Poland, Hungary, Latvia, Croatia, and Bulgaria have access to EU funds, but the GPR remained low. In 2020–2024, the CGU in the EU usually did not exceed 0.1–0.2, and higher values (up to 0.3–0.4) were recorded only in Latvia and Croatia. In Ukraine, the GPR in 2022 exceeded 0.3 (Table 1). Ukraine and Moldova lead in the share of grants: in 2022, they accounted for about 40% of official revenues in Ukraine and ~25% in Moldova, while it is usually <10% in EU countries. The GPR value above 0.5 (predominance of grants over loans) was observed only episodically, in 2022–2023, Ukraine received more grants than loans in some months. In other countries, grants complement loans, but do not replace them.

Table 1: Dynamics of The Grant Participation Ratio (GPR) in the Sample Countries (2020–2024)

Country	GPR 2020	GPR 2022	GPR 2024	Δ GPR (2020–2024)	Mean GPR (2020–2024)
Ukraine	0.01	0.40	0.33	+0.32	0.25
Moldova	0.10	0.25	0.30	+0.20	0.22
Georgia	0.05	0.10	0.10	+0.05	0.08
Poland	0.02	0.05	0.05	+0.03	0.04
Hungary	0.03	0.08	0.08	+0.05	0.06
Latvia	0.10	0.20	0.15	+0.05	0.15
Croatia	0.05	0.30	0.25	+0.20	0.20
Bulgaria	0.01	0.10	0.10	+0.09	0.07

Source: Developed by the authors based on AUB (2024), Ministry of Finance of Ukraine (2025), OECD (2024), SSSU (2025), Statista (2025), The World Bank Group (2025).

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It is worth noting that in 2020–2021, most of the sample countries covered their deficits mainly through loans, and grants played a secondary role. Only after the start of the full-scale war in Ukraine and the energy crisis donors began to provide large-scale non-repayable aid. Forecasts for 2025–2027 indicate that Ukraine's need for grants will remain high, while other countries will gradually reduce their dependence on external transfers. The plans of the Ministry of Finance of Ukraine for 2025–2027 include significant international assistance, without which the debt will grow to critical levels. For example, in Poland, debt is expected to increase from 49% to 59% of GDP, while a slight decrease to 69% of GDP is expected in Hungary. Table 2 summarizes the scale of external support for 2022, a key period of peak financial burden and record grant participation, when Ukraine attracted a record 22.2% of GDP, of which 9.2% were grants. For Moldova and Georgia, aid amounted to 5% and 3.5% of GDP, respectively. In the EU countries, this figure did not exceed 4% of GDP, mainly due to grants from the EU budget.

Table 2: Structure of External Aid (% of GDP) in 2022

Country	Grants	Loans	Total aid	Share of grants (%)
Ukraine	9.2	13.0	22.2	41.4
Moldova	3.0	2.0	5.0	60.0
Georgia	0.5	3.0	3.5	14.3
Poland	3.2	0.0	3.2	100.0
Hungary	2.5	0.0	2.5	100.0
Latvia	3.0	0.0	3.0	100.0
Croatia	4.0	0.0	4.0	100.0
Bulgaria	2.5	0.0	2.5	100.0

Source: Developed by the authors based on AUB (2024), Ministry of Finance of Ukraine (2025), OECD (2024), SSSU (2025), Statista (2025), The World Bank Group (2025).

The data obtained confirm that Ukraine has become a unique case of emergency grant support: every third dollar of external revenues in 2022–2023 was irrevocable, which allowed to contain the sharp increase in debt. Moldova and Georgia received significantly fewer grants, so their deficit was financed mainly by loans (for example, under IMF programmes). EU countries, having access to single funds, demonstrated an intermediate model: they attracted significant grants for development, but these transfers were not aimed at covering the deficit, and therefore are not considered as a "grant component of borrowing" in the narrow sense. Accordingly, Ukraine benefited the most from grant financing in terms of stabilizing public finances, while other countries in the group mostly relied on traditional debt instruments.

Fiscal sustainability, taking into account grant support, was quantitively assessed by calculating the PFSI, a composite indicator based on three normalized indicators: the level of public debt (% of GDP, inverse indicator); the share of grants in the structure of government revenues; the share of debt service expenditures in the budget. Each component was normalized to the scale [0;1] using the min-max method, after which the weighted average (equilibrium) index value was obtained for each country. A higher PFSI indicator corresponds to more sustainable (less risky) public finances. Table 3 presents the key input data, debt burden and debt service expenditures, which affect the PFSI value.

Table 3: Financial Sustainability: Debt, Servicing And Grants Of Selected Countries (2022)

Country	Public debt (% of GDP)	Service costs (% of budget revenues)	Grants (% of budget revenues)
Ukraine	77.7	8.9	15,9
Moldova	34.5	3.4	4.8
Georgia	39.8	5.2	1.4
Poland	48.8	4.1	6.1
Hungary	75.5	7.3	5.2
Latvia	44.4	2.5	5.6
Croatia	68.2	5.1	6.3
Bulgaria	30.3	2,4	3.1

Source: Developed by the authors based on AUB (2024), Ministry of Finance of Ukraine (2025), OECD (2024), SSSU (2025), Statista (2025), The World Bank Group (2025).

The index assessment of the PFSI takes into account both debt indicators and grant support. The highest PFSI values are recorded in Bulgaria, Moldova, and Latvia. Bulgaria maintains a low level of debt (~30% of GDP) and minimal interest expenses, which ensures classical fiscal sustainability, despite the absence of grant participation. Moldova, despite lower institutional capacity, had moderate debt (~34% of GDP in 2022) and significant grant support, which increased its PFSI. Hungary showed the lowest PFSI because of its high debt burden (~75% of GDP) and lack of grants.

Ukraine took an average position: its debt increased to ~78% of GDP in 2022, but the PFSI was supported by a large share of grants (16% of budget revenues in 2024) and preferential debt service. The calculated value of the PFSI for Ukraine was ~0.33–0.35 – higher than in Hungary, but lower than in Bulgaria or Latvia. Table 4 presents the calculated values of the PFSI, which were obtained by normalizing the indicators in the range [0;1] using the min-max method and calculating the weighted average index for the three components.

Table 4: The PFSI for Selected Countries (2022)

Country	PFSI (0–1)	Rank
Moldova	0.77	1
Bulgaria	0.75	2
Latvia	0.71	3
Poland	0.47	4
Croatia	0.45	5
Georgia	0.42	6
Ukraine	0.33	7
Hungary	0.25	8

Source: Developed by the authors based on AUB (2024), Ministry of Finance of Ukraine (2025), OECD (2024), SSSU (2025), Statista (2025), The World Bank Group (2025).

The PFSI ranking demonstrates that low debt alone does not guarantee high fiscal sustainability – the financing structure is critical. A similar macro-fiscal interaction is observed by Cham (2023), who shows that inflationary pressures often trigger debt reversals in developing economies, reinforcing the need to assess sustainability not only through debt volumes but through the structural composition of public financing. Moldova, outperformed

Bulgaria in terms of PFSI thanks to grants, despite its higher debt. Ukraine also improved its position thanks to grant support, while Hungary showed the worst result without it due to its debt burden. The average PFSI values in Poland, Croatia, and Georgia (~0.4–0.5) are explained by high debt service costs and low grant participation, respectively.

The impact of the grant component on the level of fiscal sustainability was quantified by using a multivariate regression model, in which the PFSI acts as the dependent variable. The main factors of the model were the share of grants (G) and the share of loans (C) in the structure of external financing (G+C = 100%), as well as two control variables: the inflation rate and exchange rate stability. The analysis was conducted using panel data from eight countries for 2020–2024 (N = 40). Table 5 presents the results of the model estimation.

Table 5: Estimation of the Regression Model for the PFSI (2020–2024)

Variable	Coefficient	Standard error	t-statistic	Significance level (p)
Constant	0.215	0.048	4.48	0.000
Share of grants (G)	+0.253	0.062	4.08	0.001
Share of loans (C)	−0.187	0.074	−2.53	0.018
Inflation rate	−0.042	0.024	−1.75	0.089
Exchange rate stability	+0.015	0.020	0.75	0.456
R^2	0.621			

Source: Developed by the authors based on AUB (2024), Ministry of Finance of Ukraine (2025), OECD (2024), SSSU (2025), Statista (2025), The World Bank Group (2025).

An increase in the share of grants by 10% is associated with an increase in the PFSI by ~0.025, which is a statistically significant result. The loan burden, on the contrary, negatively affects stability (β = −0.187, $p < 0.05$). Inflation has a marginally significant negative effect, exchange rate stability turned out to be statistically insignificant. The model explains more than 62% of the variation in the PFSI among the sample countries. This finding is consistent with the panel-based evidence of Ali and Audi (2023), who demonstrate that the macroeconomic impact of foreign capital inflows depends on their composition, suggesting that grants and concessional resources exert qualitatively different effects from conventional debt flows. Based on the obtained coefficients, a scenario modelling of the future level of fiscal sustainability of Ukraine was conducted depending on the share of grants in the structure of external financing in 2025–2027 (Table 6). In the scenario forecast, basic assumptions were made regarding the stability of the exchange rate and inflation in accordance with the National bank of Ukraine (NBU) targets and the International Monetary Fund (IMF) forecasts.

Table 6: Scenario Forecast -Ukrainian PFSI Depending on Share of Grants in Financing (2025–2027)

Scenario	Share of grants (G)	PFSI (2025)	PFSI (2026)	PFSI (2027)	Comments
Optimistic	45,3%	0.41	0.46	0.50	High grant support, stabilization
Baseline	30,2%	0.36	0.36	0.37	Moderate support, maintenance
Pessimistic	10,4%	0.31	0.28	0.25	Decreased fiscal sustainability

Source: Developed by the authors based on the calculations of the regression model.

The results of the empirical analysis confirmed the important role of the grant component in ensuring the fiscal sustainability of countries, especially in times of crisis. Comparative data demonstrate that Ukraine is a unique example of a country that was able to reduce its debt burden due to the high share of grants in the structure of external financing.

To illustrate the practical relevance of the grant component, consider a hypothetical infrastructure project implemented by a local government under a decentralization framework. Without any grant support, the project's debt-service coverage ratio (DSCR), a key measure of solvency, falls below the sustainability threshold, indicating a heightened risk of repayment difficulty. However, when a 20% grant component is introduced into the project's financing structure, the DSCR significantly improves, reflecting stronger fiscal resilience and lower risk exposure. This example reinforces the quantitative effect of blending grants into public investment portfolios, confirming that even modest grant shares can substantially enhance the long-term debt servicing capacity of subnational borrowers.

The results of the study confirm the hypothesis of the positive impact of the grant component on the fiscal sustainability of states. According to the comparative analysis, Ukraine became a unique case of massive involvement of grant aid during the war, which helped to avoid a critical increase in the debt burden. In contrast, most EU countries, as shown by OECD (2024) and World Bank Group (2025), retain a predominantly loan model of external financing with a low GPR (<0.2).

Similar results were recorded in Le Van et al. (2023), who revealed the long-term effectiveness of grants in ensuring stable growth under low credit dependence. The study by Ionescu et al. (2022) emphasized that grants reduce the risks of systemic instability during a period of high interest rates, which correlates with the Ukrainian realities of 2022–2024. Crépon et al. (2024) also demonstrated the positive impact of grants on micro-entrepreneurship development, compared to loans, which only temporarily mitigate the crisis.

An important clarification to the results is the limited stabilizing effect of grants in countries with high levels of inefficient administration. As Gavkalova et al. (2022) noted, local budgets in Ukraine often face barriers in absorbing international aid. This can reduce the effectiveness of grant participation at the subnational level, which indicates the need for institutional modernization (Sych & Kruhliakova, 2023). Although Yadav (2024) focuses on corporate finance, his evidence that external financial conditions reshape default risk is analytically transferable to the public sector, strengthening the argument that grant-based financing can lower systemic vulnerability under heightened macroeconomic stress.

While the positive impact of grants on fiscal sustainability is statistically validated, the potential risk of moral hazard cannot be overlooked. Excessive reliance on non-repayable external aid may reduce incentives for fiscal consolidation at the local level, especially in the absence of strong institutional monitoring mechanisms. This concern aligns with the broader literature on aid dependency and fiscal slack. For instance, Hackney (2023) underscores that government guarantees and concessional instruments, if not embedded in performance-based frameworks, may weaken budgetary discipline. Although our findings suggest that grants strengthen macro-level fiscal sustainability (PFSI), further research should assess whether this effect translates into improved long-term governance or merely alleviates short-term budget constraints. Addressing this trade-off requires a nuanced policy design combining grants with accountability benchmarks.

The results of the regression analysis are consistent with the findings of Santos et al. (2024), who showed that the source of financing has a decisive impact on innovative growth and fiscal stability. However, unlike them, this study also takes into account the impact of the credit component, which has a negative correlation with the PFSI (coefficient –0.187, p=0.018). In his study, Hackney (2023) notes that state guarantees have limited effectiveness in times of crisis. We partially agree, as only grants, unlike debt instruments, have a positive impact on fiscal sustainability according to our regression model. Cornelli et al. (2024) find that external financing is overvalued without taking into account institutional risks, but our analysis of the PFSI shows a stabilizing effect of grants even in difficult conditions.

The limitations of the study are related to the lack of representative data at the level of local communities and the lack of a unified methodology for accounting for grants in blended programmes. Furthermore, the lack of direct indicators of the effectiveness of grant use at the ATC level requires further analysis. The data also confirm the need to adapt financial instruments to modern challenges, including war, energy security crisis, and social vulnerability. So, this study deepens the understanding of the role of grants in blended models of external financing and creates an analytical basis for a policy of sustainable debt management in times of crisis.

Conclusion

The relevance of the study is determined by the transformation of the external financing architecture during the period of crisis challenges, in particular for Ukraine, which attracted an unprecedented amount of grant support in 2022–2024. The uniqueness of the situation is that the grant component ensured the maintenance of fiscal sustainability despite the rapid growth of public debt. The obtained empirical results confirmed the hypothesis of the positive impact of non-repayable assistance on the PFSI, which allowed to reduce the debt burden in the short term.

Comparative analysis proved: Ukraine, unlike other countries in the sample (Moldova, Georgia, Poland, Bulgaria, Latvia, Croatia, and Hungary), achieved the highest share of grants in the structure of official financing (up to 40% in 2022). Regression modelling confirmed that an increase in the share of grants by 10% increases the PFSI by 0.025, while an increase in the credit component, on the contrary, reduces sustainability. The scenario forecast for 2025–2027 showed: the share of grants in external financing should remain no lower than 25% to avoid fiscal destabilization. This result has practical value for budget planning, as it allows determining the minimum allowable level of non-repayable aid in the transition period.

The academic novelty of the study is in the combination of the Public Finance Sustainability Index, regression modelling, and scenario analysis taking into account the grant component as a key factor. The proposed methodology assesses the current state and predicts the impact of changes in the financing structure on macro-financial stability, which has applied value for authorities. The practical significance of the results is the possibility of their application during negotiations with microfinance organization and for developing lending planning standards. Prospects for further research include expanding the time frame, integrating political stability, the effectiveness of grant administration and modelling at the community level. It is also appropriate to study the impact of grants on social indicators and the connection with the UN SDGs, which will allow for a deeper understanding of the role of international assistance in transforming the public finance system.

Credit Authorship Contribution Statement

Conceptualization was carried out by Chemerys, M., Havrylyuk, R., and Patsurkivskyy, R. Data curation was performed by Chemerys, M. and Havrylyuk, R. Formal analysis involved Chemerys, M., Havrylyuk, R. and Patsurkivskyy, P. The investigation and methodology were conducted collaboratively by Chemerys, M., Havrylyuk, R., Patsurkivskyy, P., Sviatetskyi, D. and Rarytska, V. Project administration was managed by Chemerys, M. and Havrylyuk, R. Supervision was provided by Maksym Chemerys and Ruslana Havrylyuk. Validation was carried out by Chemerys M. and Havrylyuk, R. Visualization was prepared by Sviatetskyi, D. and Rarytska, V.

Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval Statement

This study is based exclusively on publicly available secondary data and firm-level financial information. No human participants, personal data, or confidential information were involved. Therefore, ethical approval was not required for this research. The authors confirm that the study was conducted in accordance with applicable research integrity and academic ethics standards.

References

Ali, A. & Audi, M. (2023). Analysing the Impact of Foreign Capital Inflows on the Current Account Balance in Developing Economies: A Panel Data Approach. *Journal of Applied Economic Sciences, Volume XVIII, Summer, 2(80),* 92–107. https://doi.org/10.57017/jaes.v18.2(80).04

Alekseieva, K., Maletych, M., Ptashchenko, O., Baranova, O., & Buryk, Z. (2023). State business support programs in wartime conditions. *Economic Affairs (New Delhi)*, *68*(1), 231–242. https://doi.org/10.46852/0424-2513.1s.2023.26

Association of Ukrainian Banks (AUB). (2024, June 4). *Business lending during the war: Challenges and opportunities*. Association of Ukrainian Banks (AUB). https://aub.org.ua/104/ekspertna-dumka/14550-kredytuvannia-ukrainskykh-pidpryiemtsiv-pid-chas-viiny-vyklyky-ta-mozhlyvosti

Audretsch, D., Belitski, M., & Brush, C. (2025). How to secure an innovation grant for firms in new industries? Gender and resource perspectives. *International Journal of Entrepreneurial Behavior & Research*, *31*(2/3), 314-343. https://doi.org/10.1108/IJEBR-02-2022-0183

Batrakova, T. I., & Semibratova, E. S. (2023). International financial support as part of the budget of Ukraine during the war. *Economic Innovations*, *25*(3(88)), 59–65. https://doi.org/10.31520/ei.2023.25.3(88).59-65

Blanco-Oliver, A., Samaniego, A., & Palacin-Sanchez, M. J. (2024). How do loan officer-borrower gender-driven behavioural differences impact on the microfinance lending market? *Borsa Istanbul Review*, *24*(3), 435–448. https://doi.org/10.1016/j.bir.2024.02.004

Cham, Y. (2023). Inflation and Public Debt Reversals in the West African Monetary Zone (WAMZ) Economies. *Journal of Applied Economic Sciences,* Volume XVIII, Summer, 2(80), 84–91. https://doi.org/10.57017/jaes.v18.2(80).03

Christian, B., & Berkowitz, H. (2022). Enhancing returns from Opportunity Zone projects by combining federal, state, and local tax incentives to bolster community impact. *Cityscape*, *24*(1), 11–26. https://www.jstor.org/stable/48657938

Cornelli, G., Frost, J., Gambacorta, L., & Jagtiani, J. (2024). The impact of fintech lending on credit access for US small businesses. *Journal of Financial Stability*, *73*. https://doi.org/10.1016/j.jfs.2024.101290

Crawford, J., Cui, Z. Y. A., & Kewley, D. (2024). Government finance, loans, and guarantees for small and medium enterprises (SMEs) (2000–2021): A systematic review. *Journal of Small Business Management*, *62*(5), 2607-2637. https://doi.org/10.1080/00472778.2023.2246061

Crépon, B., El Komi, M., & Osman, A. 2024. Is it who you are or what you get? Comparing the impacts of loans and grants for microenterprise development. *American Economic Journal: Applied Economics*, *16*(1), 286–313. https://doi.org/10.1257/app.20210683

Epure, M., Mihai, I., Minoiu, C., Peydró, J.-L. (2024). Global financial cycle, household credit, and macroprudential policies. *Management Science*, *70*(11). https://doi.org/10.1287/mnsc.2024.4981

Gavkalova, N., Akimova, L., Zilinska, A., Lukashev, S., Avedyan, L., & Akimov, O. (2022). Functioning of united territorial communities and identification of main problems of organizational support of local budget management. *Financial and Credit Activity: Problems of Theory and Practice*, *2*(43), 107–117. https://doi.org/10.55643/fcaptp.2.43.2022.3708

Gong, D., Jiang, T., Li, Z., & Wu, W. (2022). Optimal loan contracting under policy uncertainty: Theory and international evidence. *Journal of International Financial Markets, Institutions and Money*, *77*. https://doi.org/10.1016/j.intfin.2021.101502

Hackney, J. (2023). Small business lending in financial crises: The role of government-guaranteed loans. *Review of Finance*, *27*(1), 247–287. https://doi.org/10.1093/rof/rfac002

Ionescu, L., Toma, M., & Founanou, M. (2022). Analysis of the financial leverage effect in the context of interest rates increase. *Valahian Journal of Economic Studies*, *13*(1), 15–24. https://doi.org/10.2478/vjes-2022-0002

Kärnä, A., & Stephan, A. (2022). Do firms in rural regions lack access to credit? Local variation in small business loans and firm growth. *Regional Studies*, *56*(11), 1919–1933. https://doi.org/10.1080/00343404.2021.2016681

Kiran, V. S., Reddy, B. T., Kumar, D. U., Varma, K. S. A., & Kiran, T. S. (2023). Loan eligibility prediction using machine learning. *International Journal for Research in Applied Science and Engineering Technology*, *11*(8), 55–60. https://doi.org/10.22214/ijraset.2023.55132

Kovpaka, A. (2022). Financial support of the Ukrainian economy during the war. *Economics. Management. Innovations*, *2*(31). https://doi.org/10.35433/issn2410-3748-2022-2(31)-5

Kravchuk, A., Oleshko, T., & Popyk, N. (2023). Analysis of the public debt of Ukraine for 2022. *Problems of Systemic Approach in the Economy*, *2*(91). https://doi.org/10.32782/2520-2200/2023-2-17

Lenka, S. R., Bisoy, S. K., Priyadarshini, R., & Sain, M. (2022). Empirical analysis of ensemble learning for imbalanced credit scoring datasets: A systematic review. *Wireless Communications and Mobile Computing*. https://doi.org/10.1155/2022/6584352

Le Van, C., Pham, N. S., & Pham, T. K. C. (2023). Effects of development aid (grants and loans) on the economic dynamics of the recipient country. *Mathematical Social Sciences*, *125*, 101–112. https://doi.org/10.1016/j.mathsocsci.2023.06.003

Manoharan, G., Durai, S., Rajesh, G. A., Ashtikar, S. P. (2023). Credit and risk analysis in the financial and banking sectors: An investigation. In S. H., Jafar, K. Hemachandran, H., El-Chaarani, S., Moturi, N., Gupta (Eds.), *Artificial Intelligence for Capital Markets*, (pp. 57–72). CRC Press. https://doi.org/10.1201/9781003327745-5

Ministry of Finance of Ukraine. (2025). *National revenue strategy.* Ministry of Finance of Ukraine. https://mof.gov.ua/uk/national_income_strategy-716

Organisation for Economic Co-operation and Development (OECD). (2024). *Official development assistance*. Organisation for Economic Co-operation and Development. https://www.oecd.org/en/topics/official-development-assistance-oda.html

Ortina, G., Zayats, D., Akimova, L., Akimov, O., & Karpa, M. (2023). Economic efficiency of public administration in the field of digital development. *Economic Affairs (New Delhi)*, *68*(3), 1543–1553. https://doi.org/10.46852/0424-2513.3.2023.21

Santos, A. M., Cincera, M., & Cerulli, G. (2024). Sources of financing: Which ones are more effective in innovation–growth linkage? *Economic Systems*, *48*(2). https://doi.org/10.1016/j.ecosys.2023.101177

Shuliuk, B. V. (2023). *Development of the financial mechanism of public-private partnership: Conceptual-theoretical, methodological and practical aspects,* [Monograph, Western Ukrainian National University]. ISBN 978-966-654-686-2. http://dspace.wunu.edu.ua/bitstream/316497/48107/1/Shuluk.pdf

State Statistics Service of Ukraine (SSSU). (2025, June). *Economic and financial indicators of Ukraine.* State Statistics Service of Ukraine (SSSU). https://www.ukrstat.gov.ua/imf/Pokaz.html

Statista. (2025). *Finance and Insurance*. Statista. https://www.statista.com/markets/414/finance-insurance/

Sych, O., & Kruhliakova, V. (2023). Application of EU programs and financial instruments for Ukraine. *Scientific Papers of the University of Pardubice, Series D: Faculty of Economics and Administration*, *31*(1). https://doi.org/10.46585/sp31011680

The World Bank Group. (2025). *International Debt Statistics*. The World Bank Group. https://databank.worldbank.org/source/international-debt-statistics

United Nations. (2024). *The 17 Sustainable Development Goals?* The United Nations. https://sdgs.un.org/goals

Wang, C., Jiang, H., Jin, X., & Zhou, Z. (2023). Customer credit rating by machine learning. *BCP Business and Management*, *36*, 387–395. https://doi.org/10.54691/bcpbm.v36i.3490

Yadav, N. (2024). Corporate social responsibility and financial risk: Exploring default risk in Indian firms. *Journal of Applied Economic Sciences*, Volume XIX, Fall, 3(85), 337–349. https://doi.org/10.57017/jaes.v19.3(85).09