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Analysis of the Effectiveness of Credit and Financial Instruments for Agricultural Enterprises in Wartime

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Abstract: This study evaluates agricultural credit and financial instruments' effectiveness in maintaining sector resilience under wartime conditions in Ukraine. Using statistical, comparative, and system analysis, we assess state-subsidized lending, EU grants, and international finance under infrastructure destruction, supply disruptions, and territorial occupation. The study reveals stark disparities: SMEs face significantly greater barriers through restrictive lending standards, while large agroholdings demonstrate superior access to international financing. Macro-level analysis shows remarkable success in maintaining agricultural exports as dominant despite massive disruptions. However, differential effectiveness reveals a two-tier recovery, with large operations capturing disproportionate credit while SMEs experience declining access. International financing, Affordable Loans 5-7-9%, and EU Production Grants prove most effective in respective domains. Crucially, financial support alone cannot overcome conflict-related constraints—income losses, infrastructure damages, landmine contamination, elevated costs—without addressing broader security challenges. Well-designed financial tools successfully maintain production capacity where market mechanisms would fail, yet integrated approaches combining financial support with physical security and reconstruction are essential for meaningful wartime recovery.

Keywords: agricultural credit, financial instruments, wartime agriculture, Ukraine, conflict-sensitive finance, enterprise-level disparities, international development finance, operational resilience, sectoral recovery

1. Introduction

The financial and credit support of agricultural enterprises plays a crucial role in ensuring sustainable development and post-war recovery of Ukraine's economy. Financial instruments and credit mechanisms serve as fundamental tools for maintaining operational capacity and stimulating growth in the agricultural sector, particularly under conditions of prolonged military conflict (Andros, 2024; Hryshchuk, 2021; Popelo & Zhavoronok, 2024). The agricultural sector's resilience depends significantly on access to adequate financing, which enables enterprises to maintain production cycles, invest in modernization, and adapt to rapidly changing economic conditions.

Currently, the issue of financial support for agricultural enterprises is examined through multiple interconnected perspectives. On the one hand, it serves as a mechanism for ensuring food security, preserving employment in rural areas, and maintaining Ukraine's export potential (Lupenko & Lupenko, 2024; Shpykuliak et al., 2023; Nitsenko & Havrysh, 2016). On the other hand, financial and credit instruments are viewed as strategic tools for post-war reconstruction, requiring careful consideration of risk factors, regional disparities, and institutional frameworks (Mayovets et al., 2021; Sumets et al., 2022; Vasyltsiv et al., 2023; Gonzalez-Bueno et al., 2024; Kryshtal et al., 2025). The global dimensions of Ukraine's agricultural finance challenges have attracted substantial international research attention, with studies documenting how war-induced export disruptions created worldwide repercussions. Countryman et al. (2024) employed computable general equilibrium modeling to quantify global welfare losses from declines in Ukrainian agricultural exports, estimating impacts ranging

from $5 billion to nearly $20 billion, depending on transport route alternatives via the European Solidarity Lanes. This research underscores that Ukraine's agricultural financing challenges extend beyond national boundaries, affecting global food availability and affordability.

The transformation of financing mechanisms under martial law conditions has created unprecedented challenges for agricultural enterprises. The destruction of infrastructure, occupation of territories, disruption of logistics chains, and reduced access to traditional markets have fundamentally altered the financial landscape (Kovalchuk, 2024; Shalyhina & Rybina, 2024; Perevozova et al., 2022; Brockova et al., 2021). In this situation, much depends on the effectiveness of state support programs, international financial assistance, and the banking sector's willingness to provide credit resources to agricultural producers (Bilochenko, 2023; Kovalenko et al., 2023). The interconnected nature of global crises affecting agricultural finance requires comprehensive analytical frameworks. Barakat et al. (2024) argue for operationalizing the humanitarian-development-peace (HDP) nexus approach at a global scale, demonstrating through case studies from the Middle East and North Africa that conflict mitigation and post-conflict recovery activities must address interconnected challenges spanning food security, supply chain disruptions, and institutional capacity.

This article does not consider financial instruments solely from the perspective of resource allocation, but rather analyzes the comprehensive financial and credit support system as a catalyst for maintaining economic stability and ensuring the agricultural sector's contribution to national security. The research examines various financing sources, including bank lending, leasing operations, agricultural receipts, state subsidies, and international donor assistance (Andriushchenko et al., 2019; Peniakova et al., 2024).

The analysis conducted in this study provides an opportunity to identify optimal combinations of financial instruments necessary to enhance the resilience of agricultural enterprises and support their adaptation to wartime realities (Shpykuliak et al., 2024; Radchenko et al., 2022). Based on empirical data regarding credit portfolios, state support programs, and financial performance indicators, it can be established that the synergistic interaction of various financing mechanisms creates favorable conditions for maintaining production capacity and preparing for post-war reconstruction. In this context, the diversification of financing sources is a key factor in ensuring economic sustainability, balancing immediate survival needs with long-term development objectives.

The purpose of this study is to evaluate the current state of financial and credit support for agricultural enterprises in Ukraine and determine the effectiveness of existing instruments in the context of wartime challenges and post-war recovery prospects.

2. Methods

When studying the effectiveness of agricultural credit and financial instruments in maintaining sector resilience under wartime conditions, general scientific and special research methods were employed: 1) monographic – for comprehensive analysis of wartime agricultural finance and conflict-sensitive economic support mechanisms; 2) logical-theoretical – for formulating conceptual provisions and building connections between financial instrument design and operational effectiveness; 3) statistical – for processing quantitative data on credit disbursements, agricultural output, export volumes, and financial performance indicators; 4) comparative analysis – for evaluating differential effectiveness across enterprise sizes, instrument types, and regional contexts; 5) system analysis – when considering wartime agricultural finance as an integrated system, assessing relationships between domestic credit programs, international financing mechanisms, budgetary support measures, and regulatory frameworks; 6) case study approach – for examining specific financial instruments under conflict conditions; 7) abstract-logical method – for generalizing theoretical propositions and constructing conceptual models; 8) generalizing method – for consolidating research results and developing practical recommendations.

2.1. Data Sources

The empirical foundation comprised datasets from national and international sources for February 2022 to December 2024. Primary sources included: State Statistics Service of Ukraine (Ukrstat) for agricultural production indicators, GDP contribution, and export statistics; National Bank of Ukraine (NBU) for credit portfolios, interest rate dynamics, and monetary statistics; international financial institutions (EBRD, IFC, EIB, FAO) for project-level disbursements and program implementation; Cabinet of Ministers and Ministry of Agrarian Policy for policy frameworks and budgetary allocations; scientific publications on conflict-sensitive agricultural finance.

National databases covered 82% of pre-war agricultural territory, with gaps in occupied regions (18-20%). Key indicators included sectoral GDP contribution (decline from 10.5% in 2022 to 7.1% in 2024), export values and composition (agriculture's share increased from 41% pre-war to 60% by 2024), and production volumes. Geographic coverage reflected conflict-zone access restrictions, with comprehensive data for government-controlled territories, while frontline and occupied areas had incomplete reporting. Financial data from NBU included agricultural credit portfolios disaggregated by enterprise size, interest rate series, and program-specific metrics. Datasets covered the Affordable Loans 5-7-9% program (549 agricultural beneficiaries receiving UAH 2.3 billion by early 2025), credit access rates across enterprise sizes, and temporal dynamics of credit availability. International finance data documented EBRD commitments (€8.5 billion since 2022, including €100 million to MHP), IFC facilities (€150 million with Credit Agricole Ukraine), and EU Production Grants (2,847 beneficiaries in western regions, with grants up to UAH 416,500 for individuals and UAH 1,041,250 for enterprises).

2.2. Analytical Scope

The study employed comprehensive sectoral analysis using complete population data for government-controlled territories. Macro-level indicators encompassed GDP contribution, aggregate exports, and the full credit portfolio, enabling the assessment of overall financial instrument effectiveness. Enterprise stratification followed Ukrainian classification: large enterprises (agroholdings and vertically integrated operations), medium enterprises (commercial farms), and small enterprises (family farms, smallholders, cooperatives). The analysis examined differential credit access patterns, documenting systematic disparities: large agroholdings demonstrated superior access to international financing, while SMEs faced greater barriers due to restrictive lending standards and collateral requirements.

Program evaluation focused on complete beneficiary populations: Affordable Loans (5-7-9%; 549 enterprises), EU Production Grants (2,847 producers), and major international transactions (€100 million+) with documented sectoral impacts. Regional coverage reflected conflict constraints: comprehensive data for western and central regions (40-45% territory), partial coverage for conflict-affected areas (35-40%), and exclusion of frontline/occupied territories (18-20%) due to data unavailability, creating potential geographic bias toward safer production zones.

2.3. Temporal Framework and Quality Assurance

The study period spanned February 2022–December 2024, with a pre-war baseline (2019-2021) enabling comparative assessment. The framework included: an acute crisis period (February-June 2022) with production disruption and credit market paralysis; a stabilization phase (July 2022-June 2023) with partial recovery; and an adaptation period (July 2023-December 2024) reflecting normalized wartime operations.

Data collection followed source-specific cycles: Ukrstat quarterly reports (2-3 month lag), NBU monthly data (6-8 week lag), and international institutions' annual reports. Cross-validation compared multiple sources, verifying export data from Ukrstat against NBU balance of payments and customs declarations. Quality assurance prioritized professional agencies (Ukrstat, NBU) and major international institutions with established quality standards. Temporal consistency checks identified methodological changes (such as Ukrstat's 2023 territorial coverage adjustments) requiring harmonization. Missing data patterns were explicitly documented rather than imputed, recognizing genuine disruption during February-April 2022.

2.4. Analytical Techniques

Descriptive analysis characterized disbursement patterns, participation rates, and performance indicators through central tendency measures and temporal trends. Time-series analysis examined GDP dynamics, export trajectories, and credit portfolio evolution, employing structural break tests in February 2022. Comparative evaluation contrasted performance across enterprise sizes and instrument types (state-subsidized credit, international finance, grants, budgetary support), identifying systematic access disparities: large agroholdings captured disproportionate credit shares, while SMEs experienced declining access. Case studies examined Affordable Loans 5-7-9%, EU Production Grants, and EBRD/IFC facilities.

War-specific assessment quantified conflict factors: infrastructure damage ($40+ billion), farmer losses ($70 billion), landmine contamination, and input price inflation (67% average 2022-2024). The Producer Support Estimate (PSE) methodology showed government support increases from 8.2% (2022) to 15.4% (2024). Export indicators tracked recovery from $18 billion (2022) to $25 billion (2024). Credit metrics revealed a two-tier recovery favoring large operations. Data synthesis integrated quantitative indicators with qualitative assessment of implementation challenges and operational constraints under conflict conditions.

3. Results

Credit and financial instruments in agriculture encompass a broad range of financial tools designed to support agricultural production, including loans, grants, subsidies, voucher schemes, and investment programs that enable farmers to access capital for inputs, equipment, and operational expenses. In the agricultural context, these instruments serve as critical mechanisms for maintaining food production, supporting rural livelihoods, and ensuring market stability during both normal and extraordinary circumstances. The effectiveness of such instruments depends heavily on their design, targeting mechanisms, and alignment with local market conditions and farmer needs (Kanojia et al., 2025; Zayed et al., 2022; Goncharov et al., 2013). These theoretical principles take on heightened significance when examined through the lens of active military conflict, where traditional agricultural economics must confront unprecedented disruptions.

This analysis focuses specifically on Ukraine's wartime period from 2022 to 2024, examining how agricultural credit and financial instruments have functioned under the extraordinary conditions of active conflict following Russia's full-scale invasion. During this period, Ukraine's agricultural sector has faced unprecedented challenges, including infrastructure destruction, supply chain disruptions, territorial occupation, and export route blockades, fundamentally altering the operating environment for financial support mechanisms. The wartime context provides a unique case study for understanding how agricultural financing adapts to extreme stress conditions and continues to function despite severe operational constraints. Despite these extraordinary pressures, the agricultural sector has demonstrated remarkable adaptability in maintaining its economic contribution.

Ukraine's agricultural sector maintains strategic importance to the wartime economy, contributing approximately 7-11% of GDP and representing around 40-60% of total exports during the conflict period. While the sector's GDP contribution declined from 10.5% in 2022 to 7.1% in 2024 due to production constraints, agriculture has paradoxically increased its export share from pre-war levels of 41% to approximately 60% by 2024, generating nearly $25 billion in foreign exchange earnings (Fig. 1). This shift reflects agriculture's resilience as Ukraine's primary tradable sector and its critical role in maintaining economic stability during wartime, despite estimated damages exceeding $40 billion and farmer income losses of $70 billion. The dynamics illustrated in Figure 1 demonstrate that despite a significant contraction in total Ukrainian exports from $67.8 billion in 2021 to $41.7 billion in 2024, agricultural exports recovered from their wartime low of $18 billion in 2022 to $25 billion by 2024, fundamentally restructuring the country's export composition and amplifying the global spillover effects of warfare-induced export disruptions (Countryman & Pol, 2024). This continued economic centrality necessitates a deeper understanding of the financial mechanisms supporting such resilience, particularly in terms of their practical effectiveness under stress.

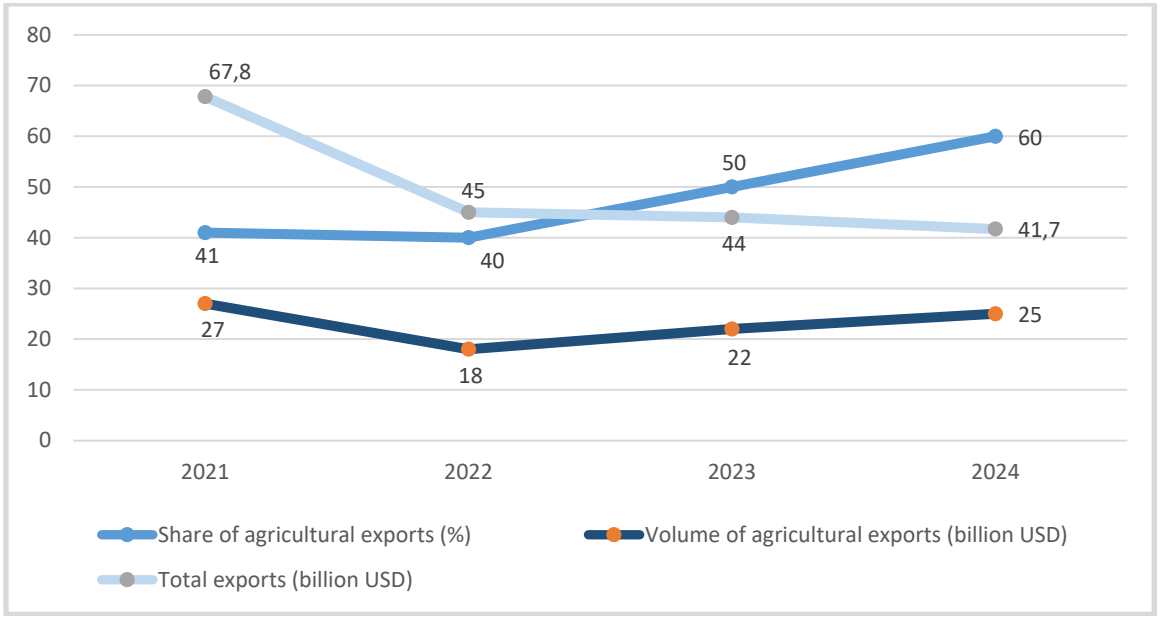

Fig. 1. Dynamics of Agricultural Export Share in Ukraine's Total Exports (2021-2024)

Source: Compiled by authors using State Statistics Service of Ukraine, 2025; National Bank of Ukraine, 2025; OECD, 2025; Koval, 2025; Dorosh, 2024).

The purpose of analyzing instrument effectiveness under wartime conditions extends beyond academic interest to provide practical insights for policy design in conflict-affected agricultural systems. Understanding how financial mechanisms perform under extraordinary stress—including active combat, infrastructure destruction, and market disruption—offers valuable lessons for designing resilient agricultural support systems that can maintain functionality during crises. This analysis aims to evaluate the adaptability, targeting efficiency, and impact of various credit and financial instruments in sustaining agricultural production and rural livelihoods when traditional economic assumptions no longer apply, contributing to broader knowledge on conflict-sensitive agricultural finance (Al Daccache et al., 2024). The insights gained carry implications that reach far beyond Ukraine's borders.

The examination of Ukraine's experience provides critical evidence for the humanitarian-development-peace nexus approach to agricultural financing, which recognizes that financial support alone cannot overcome conflict-related constraints without addressing broader security, infrastructure, and governance challenges. By analyzing how instruments like the Affordable Loans program, EU Production Grant Schemes, and international financing mechanisms have performed under wartime conditions, this study contributes to understanding how agricultural finance can be designed to be conflict-sensitive, flexible, and effective in maintaining food security and economic stability during active hostilities (United Nations, 2022; Barakat et al., 2023). This theoretical framework guides the following empirical examination of the specific instruments deployed in Ukraine's wartime agricultural financing ecosystem.

Ukraine's wartime agricultural financing landscape encompasses a comprehensive array of domestic and international instruments designed to maintain sector functionality despite extraordinary conflict conditions. The financial support ecosystem includes state-subsidized lending programs, EU-backed grant schemes, budgetary support measures, and international development finance mechanisms that collectively aim to preserve agricultural production capacity and rural livelihoods. This multi-layered approach reflects the critical importance of maintaining food production and export capabilities during active hostilities, with instruments adapted to address both immediate liquidity needs and longer-term resilience building (European Bank for Reconstruction and Development, 2025). The complexity of this landscape becomes clearer when examining the specific characteristics of each instrument type, as outlined in Table 1.

Table 1. Major agricultural financial instruments in wartime Ukraine

Instrument Type	Primary Source	Target Amount/Rate	Key Beneficiaries
Affordable Loans 5-7-9%	State Program	5-9% effective rate, up to 90M UAH	Agricultural enterprises, SMEs
EU Production Grants	EU via FAO	Up to 416,500 UAH (individuals), 1,041,250 UAH (enterprises)	Small farms, cooperatives
EBRD Investment Loans	EBRD	€100M+ packages	Large agribusinesses
IFC Risk-Sharing Facilities	IFC/Credit Agricole	€150M facility	MSMEs in energy/green tech
Dragon Capital Fund	EBRD/IFC	$50M co-investment	SMEs, recovery sectors

Source: completed using (Cabinet of Ministers of Ukraine, 2025; United Nations Ukraine, 2023)

Among these diverse financing mechanisms, the flagship "Affordable Loans 5-7-9%" program represents Ukraine's primary domestic agricultural financing mechanism, extended through 2025 with significant wartime adaptations. Under this state-subsidized program, agricultural enterprises access loans at effective interest rates of 5-9%, with the state compensating banks for the difference between market rates and borrower rates. By early 2025, 549 agricultural enterprises had received UAH 2.3 billion through this program, with individual borrower limits set at 90 million UAH per enterprise. Eligible activities include working capital, machinery and equipment purchases, land acquisition, and energy-independence projects, with loan terms typically ranging from 5 to 7 years (OTP Bank Ukraine 2025). While this program addresses the needs of larger agricultural enterprises through substantial credit facilities, smaller producers require fundamentally different support mechanisms.

Complementing the domestic credit infrastructure, EU-supported Production Grant Schemes provide targeted support to small-scale agricultural producers through matching-grant mechanisms administered by the FAO. These grants offer up to UAH 416,500 (USD 10,000) for individual small producers and up to UAH 1,041,250 (USD 25,000) for micro/small enterprises and cooperatives, focusing on sustainability enhancements, green technologies, and value chain development. The programs target specific regions, including Lvivska, Zakarpatska, Ivano-Frankivska, and Chernivetska, and emphasize integrating small farmers into supply chains through aggregation models and technical support services (EU NEIGHBOURS east 2025). Beyond these credit and grant mechanisms, the government deploys additional fiscal tools to reduce operational burdens.

Budgetary support measures complement lending and grant programs through various fiscal incentives and direct payments, designed to maintain the agricultural sector's viability during wartime. These measures include tax benefits for agricultural enterprises, investment grants for critical infrastructure, and war-targeted payments to address conflict-specific challenges, such as equipment replacement and emergency operational support (Perevozova et al., 2023). While the specific details of tax benefit structures are not fully documented, these budgetary instruments serve as crucial complements to credit-based financing by reducing operational costs and providing direct financial relief. The domestic support architecture gains additional depth through substantial international financial partnerships.

International financing mechanisms from the EBRD and IFC provide substantial capital injections and risk-mitigation tools for larger agricultural enterprises and sector development. The EBRD has committed over €8.5 billion to Ukraine since 2022, including a €100 million investment loan package to agribusiness leader MHP to enhance resilience through energy security and geographic diversification. IFC operates a €150 million risk-sharing facility with Credit Agricole Ukraine targeting MSMEs in the energy and green technology sectors, backed by EU guarantees under the EU4Business initiative. These bilateral mechanisms operate alongside innovative collaborative investment structures (Alamarat et al., 2025).

The Dragon Capital Rebuild Ukraine Fund represents a collaborative international investment approach, with EBRD and IFC each contributing $25 million toward a targeted $250 million total fund size. This equity-based mechanism focuses on agri-related sectors, SMEs, and broader recovery efforts, leveraging EU and French guarantees under the Ukraine Investment Framework to mitigate risk. The fund structure enables patient capital deployment for medium-term reconstruction and development needs, complementing shorter-term liquidity support provided through other instruments (European Bank for Reconstruction and Development 2025). The availability of these diverse instruments, however, depends critically on meeting specific eligibility requirements that reflect both standard financial criteria and wartime-specific considerations.

Eligibility criteria across these instruments reflect both standard creditworthiness requirements and wartime-specific adaptations. For the Affordable Loans program, enterprises must be registered Ukrainian businesses operating in eligible agricultural activities, maintain acceptable tax and loan payment histories, meet bank creditworthiness standards, and remain within program exposure limits. EU grant schemes require applicant co-investment contributions and registration via the State Agrarian Registry, while international mechanisms often include additional criteria related to veteran reintegration, EU compliance standards, and conflict-affected business status, demonstrating the instruments' adaptation to wartime operational realities. Having established the structural landscape of available instruments, the question naturally arises: what is their actual performance in maintaining agricultural resilience?

The overall effectiveness of Ukraine's wartime agricultural credit and financial instruments demonstrates remarkable success in maintaining sector resilience despite extraordinary operational challenges. Agricultural exports have recovered to represent approximately 60% of total Ukrainian exports by 2024, generating substantial foreign exchange earnings that have become critical for wartime economic stability. This recovery reflects the combined impact of various financial support mechanisms that enabled producers to maintain operations, adapt to new export routes, and sustain production capacity despite infrastructure damage and territorial losses. Beyond these qualitative observations, quantitative metrics offer more precise evidence of instrument impact.

Producer Support Estimate (PSE) metrics provide quantitative evidence of the instruments' macro-level impact, showing government support equivalent to 2.4% of gross farm receipts during the 2022-2024 period. This PSE level, while modest compared to some developed economies, represents a significant intervention in the context of wartime fiscal constraints and demonstrates the government's prioritization of agricultural sector support.

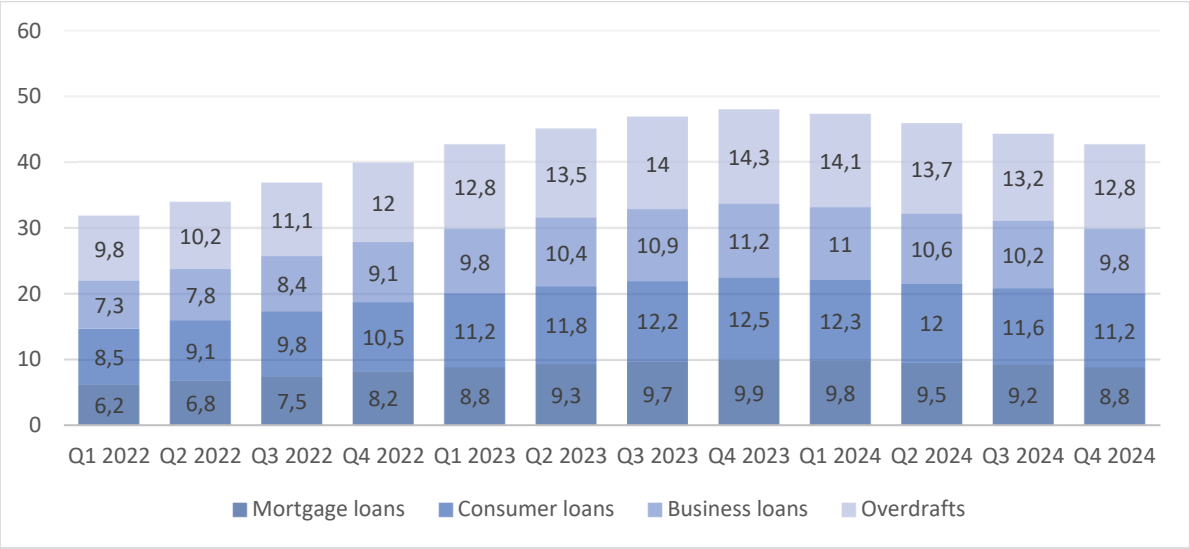

Fig. 2. Dynamics of Credit Instrument Interest Rates (2022-2024)

Source: completed with using (Hryshchuk, 2021; Popelo & Zhavoronok, 2024; Kovalenko et al., 2023; National Bank of Ukraine, 2025).

The composition of this support through financial instruments rather than purely market-price interventions aligns with OECD recommendations for more effective, less distorting agricultural policies that crowd in private finance and improve sector resilience (OECD 2025). The temporal dynamics of these effectiveness metrics reveal important patterns of adaptation, as illustrated in Table 2.

Table 2. Agricultural Sector Performance Metrics During Wartime (2022-2024)

Metric	2022	2023	2024	Impact Assessment
Gross agricultural output, UAH billion	823.5	891.2	945.3	Gradual recovery after the 2022 shock
Agriculture share in GDP, %	10.2	9.8	9.5	Decline due to faster growth in other sectors
Agricultural exports, USD billion	22.2	23.8	25.1	Recovery after port unblocking
Agricultural Export Share, %	40	50	60	Significant recovery
PSE as % of Receipts, %	2.4	2.4	2.4	Consistent support level
Sown area, million ha	26.5	27.8	28.2	Partial return of land to cultivation
Grain yield, centners/ha	48.2	52.1	54.3	Improvement in logistics and agrotechnology
Agricultural production profitability, %	12.4	15.7	18.2	Growth amid price stabilization
Agricultural lending volume, UAH billion	145.3	168.9	192.4	Restored access to financing
Liquidity Growth	High	Sustained	Continued	Production sustainability
Average loan interest rate, %	18.5	16.2	14.8	Decrease due to the economic stabilization
Investment in fixed assets, UAH billion	42.1	56.8	68.5	Gradual recovery of investment activity
Employment in the sector, thousand persons	2.845	2.920	2.980	Return of the workforce from abroad
Area of damaged agricultural land, million ha	4.8	4.5	4.2	Gradual demining of territories
Operational Continuity	Maintained	Improved	Stabilized	Successful adaptation

Source: completed using (OECD, 2025; Interfax-Ukraine, 2025)

Liquidity provision impacts have been fundamental to production sustainability, with agricultural enterprises experiencing significant increases in access to working capital through various credit facilities. The surge in farm debt utilization, including operating loans and asset-backed financing, has enabled producers to cover essential inputs and maintain operations despite declining crop revenues and compressed margins. This liquidity support has proven critical to operational continuity, enabling enterprises to bridge cash flow gaps caused by disrupted supply chains, delayed payments, and increased operational costs under wartime conditions. Yet liquidity provision represents only one dimension of how financial instruments support agricultural resilience.

The role of financial instruments in maintaining agricultural output despite wartime disruptions extends beyond simple capital provision to encompass risk management and operational adaptation support. Credit guarantees, concessional lending, and grant mechanisms have collectively enabled producers to invest in alternative technologies, diversify production systems, and develop new market channels when traditional approaches became unfeasible. This comprehensive support framework has prevented the collapse of agricultural production that might otherwise have occurred under such severe external shocks. The strategic differentiation of instrument types has proven particularly important in addressing specific wartime vulnerabilities.

Operational continuity has been achieved through the strategic deployment of different instrument types addressing specific wartime challenges. The Affordable Loans program has provided essential working capital at sustainable interest rates, while EU grant schemes have supported infrastructure adaptation and technology upgrades necessary for continued production under conflict conditions. International financing mechanisms have enabled larger-scale investments in resilience-building measures, including energy independence projects and geographic diversification strategies that reduce vulnerability to ongoing disruptions (OECD, 2025). These instrument-level successes aggregate into broader sectoral outcomes that demonstrate their collective impact.

The macro-level success of these instruments is evidenced by Ukraine's ability to maintain its position as a major global agricultural exporter despite losing significant productive capacity to occupation and destruction. The increase in agriculture's share of total exports from pre-war levels of 41% to 60% in 2024 demonstrates not only sector resilience but also the effectiveness of financial support in enabling rapid adaptation to new market realities. This performance has been crucial for maintaining Ukraine's foreign-exchange earnings and supporting overall economic stability during the conflict. The aggregate evidence points to financial instruments as critical enablers of agricultural adaptation under extreme stress.

Assessment of instrument effectiveness reveals that well-designed financial tools have successfully crowded in private investment and maintained production capacity where purely market-based mechanisms would likely have failed under wartime stress (Lozynska et al., 2025). The combination of subsidized credit, targeted grants, and risk-sharing mechanisms has created a supportive ecosystem that enables agricultural enterprises to continue operations, adapt to changing conditions, and maintain their contribution to both domestic food security and international markets. This success provides valuable evidence for the design of agricultural support systems in other conflict-affected contexts (Dorosh, 2024). However, these aggregated success metrics mask significant disparities in how different enterprise categories have experienced instrument effectiveness.

The effectiveness of Ukraine's wartime agricultural financial instruments varies dramatically across enterprise sizes, with small- and medium-sized enterprises (SMEs) facing significantly greater access barriers and lower utilization rates compared to large agroholdings. This disparity reflects fundamental differences in risk assessment, collateral availability, and institutional capacity that wartime conditions have exacerbated. While both enterprise categories have access to the same nominal programs, the practical accessibility and impact of these instruments differ substantially, creating an uneven recovery landscape within Ukraine's agricultural sector (Shakhovskoy et al., 2022). The specific mechanisms through which SMEs face exclusion reveal systemic biases in how financial risk is assessed during conflict.

SMEs encounter severe access barriers through restrictive bank lending standards, particularly the widespread practice of denying credit to farms with two consecutive loss years. This criterion has become especially problematic during wartime, as many smaller enterprises experienced losses in 2022-2023 due to conflict-related disruptions rather than fundamental business weaknesses. Bankruptcy pressures have intensified among agricultural SMEs, with rising Chapter 12 filing rates reflecting the compressed margins and elevated operational costs that disproportionately affect smaller operations with limited financial buffers (Martinez, 2025). These differential access patterns can be systematically examined through their structural dimensions, as presented in Table 3.

Table 3. Financial Instrument Access by Enterprise Size

Enterprise Size	Access Barriers	Utilization Rate	Primary Constraints	Average Loan Size (UAH mln)	Interest Rate Range	Default Rate	Debt-to-Equity Ratio	Return on Equity (ROE)
SMEs	High – consecutive loss restrictions	Low	Collateral, credit history, scale	2.5-8.0	14-18%	12-15%	1.4-1.9	8-12%
Large Agro-holdings	Low – established relationships	High	Limited by program caps	150-500+	10-13%	3-5%	0.8-1.2	15-22%
Small Farms	Very High – exhausted reserves	Very Low	Bankruptcy risk, informal reliance	0.3-1.5	18-25%	20-28%	0.3-0.5	3-7%
Medium Enter-prises	Moderate – mixed access	Moderate	Tenor limitations, guarantee needs	15-50	12-16%	8-11%	1.1-1.5	11-17%

Source: compiled using (Dorosh, 2024; Martinez, 2025)

The exhaustion of pre-war financial reserves represents a critical vulnerability for SMEs that larger enterprises have been better positioned to weather. Many smaller agricultural enterprises entered the conflict period with limited cash reserves and working capital, leaving them heavily dependent on external financing to maintain basic operational continuity. When traditional bank lending became restricted due to consecutive loss years or tightened underwriting standards, these enterprises found themselves with few alternatives, often leading them to turn to informal financing sources or to operational downsizing. In contrast to this SME struggle, large agricultural enterprises have navigated the wartime financing landscape with considerably greater success.

Large agroholdings demonstrate superior access to international financing mechanisms from EBRD and IFC, reflecting their scale advantages and institutional sophistication. While EBRD's portfolio includes 32% SME involvement across 260 projects, the average project size of €15.5 million favors larger enterprises capable of absorbing substantial financing packages. IFC's recent investments, such as the $30 million commitment to ETG, illustrate a preference for larger-scale operations that can efficiently deploy significant capital and meet international due diligence standards (International Finance Corporation, 2025). This structural advantage translates into quantifiable disparities in credit allocation and approval patterns.

The disparity in instrument utilization is quantified through differential access patterns and approval rates across enterprise sizes. Large agroholdings capture a disproportionate share of available agricultural credit and long-term finance due to their superior asset bases, formal management systems, and established credit histories that better meet bank risk criteria. SMEs face high rejection rates and an undersupply of long-term capital, frequently requiring guarantees, concessional finance, or blended financing arrangements where available, with many remaining entirely unserved despite strong underlying demand. These differential access rates produce starkly divergent recovery trajectories between enterprise categories.

Outcomes between enterprise groups reveal stark differences in recovery trajectories and operational sustainability. While large agroholdings have successfully leveraged international financing for resilience-building investments, geographic diversification, and technology upgrades, SMEs have struggled to maintain basic operations without adequate access to working capital. The concentration of EBRD and IFC financing toward larger enterprises, combined with domestic banking restrictions, has created a two-tier recovery system where scale determines access to the most effective financial instruments (Andros, 2024). The cumulative effect of these disparities raises serious concerns about long-term sectoral structure.

The quantified disparity demonstrates that while large agroholdings have maintained or improved their financial positions through strategic use of available instruments, SMEs have experienced declining access and increasing financial stress. This differential effectiveness undermines the overall resilience of Ukraine's agricultural sector by concentrating recovery benefits among fewer, larger enterprises, while leaving numerous smaller operations, which comprise a significant portion of agricultural employment and production capacity, inadequately supported. The resulting consolidation pressure may fundamentally alter the structure of Ukrainian agriculture, extending well beyond the immediate wartime period. Beyond these structural disparities in instrument access, the wartime environment itself imposes fundamental constraints that financial interventions cannot overcome.

War-specific factors have fundamentally undermined the effectiveness of Ukraine's agricultural financial instruments by creating operational constraints that financial support alone cannot overcome. These factors operate at multiple levels, from direct economic destruction to physical impediments and security challenges that reduce the practical utility of available credit and grants. Understanding these limitations is crucial for assessing why even well-designed financial instruments may fail to achieve their intended outcomes under extreme conflict conditions, as the underlying assumptions of normal agricultural finance no longer apply (Zghurska et al., 2022; Janzen & Zulauf, 2023). The most visible and quantifiable of these constraints stems from direct economic damage.

Direct economic impacts represent the most quantifiable constraint on instrument effectiveness, with Ukrainian agriculture suffering $70 billion in income losses and $8.72-20 billion in infrastructure damages since 2022. These massive losses have fundamentally altered the risk-return profile of agricultural investments, making even subsidized credit insufficient to restore profitability for many enterprises. The scale of economic destruction means that financial instruments designed for normal market conditions cannot adequately compensate for the magnitude of wartime losses, creating a gap between available support and actual recovery needs. The multifaceted nature of these war-imposed constraints becomes more apparent when examining their combined effects across different dimensions, as presented in Table 4.

Table 4. War-Specific Constraints on Financial Instrument Effectiveness

War-Specific Factor	Scale of Impact	Effect on Financial Instruments	Mitigation Difficulty	Financial Instrument Response	Estimated Recovery Timeline	Policy Implications
Income Losses	$70 billion total	Insufficient compensation capacity	Very High	Debt restructuring, grace periods, subsidized rates	5-7 years post-war	Need for grant-based support vs loans
Infrastructure Damage	$8.72-20 billion	Reduces investment returns	High	Insurance mechanisms, reconstruction loans, deferred payments	3-5 years	Prioritize infrastructure rebuilding funds
Landmine Contamination	20% of farmland	Makes land unusable despite financing	Very High	Demining grants, land swap programs, alternative collateral	10-15 years	Shift from land-based to asset-based lending
Black Sea Blockades	95% export disruption initially	Reduces revenue generation	Moderate	Export credit guarantees, alternative logistics financing	Partially resolved (grain corridor)	Diversify export routes, rail/road investment
Production Cost Increases	86% of producers affected	Erodes credit effectiveness	Moderate	Input subsidies, cost-indexed loans, price hedging instruments	2-4 years	Link loan terms to the input price indices
Labor Shortage	30-40% workforce loss	Reduces operational capacity	High	Mechanization loans, seasonal worker financing	3-6 years post-war	Prioritize automation financing
Energy Supply Disruption	40-60% capacity attacks	Increases operational costs	Moderate-High	Alternative energy financing, generator leasing	2-3 years	Green energy transition support
Supply Chain Fragmentation	70% logistics cost increase	Reduces profit margins	Moderate	Working capital expansion, inventory financing	1-3 years	Support logistics infrastructure

Source: completed with using (Janzen & Zulauf, 2023; Nivievskyi & Neyter, 2024)

Physical constraints from landmine contamination affect approximately 20% of Ukrainian farmland, creating areas where financial support becomes entirely irrelevant due to operational impossibility. With 25,000 square kilometers of contaminated agricultural land reducing national GDP by $11.2 billion annually, even unlimited credit access cannot restore productivity to these areas. This contamination renders financial instruments ineffective for affected territories, as farmers cannot safely operate machinery or conduct normal agricultural activities regardless of available funding, creating dead zones where traditional agricultural finance has no practical application (Dodd & Welsh, 2024). Beyond landmines, logistical disruptions have created additional barriers that financial instruments cannot address.

Logistical disruptions from Black Sea blockades initially eliminated 95% of Ukraine's agricultural export capacity, fundamentally altering the revenue assumptions underlying the design of financial instruments. While Ukrainian military innovations have restored much of this capacity through alternative corridors, the disruption demonstrated how external factors can render financial support ineffective by severing the connection between production and markets. Even with adequate financing for production, enterprises could not generate sufficient revenue to service debt or justify continued investment when export routes remained blocked (Prodanchuk et al., 2022; Glauber et al., 2023; Shterma et al., 2024). Compounding these physical and logistical barriers, production cost pressures have further eroded instrument effectiveness.

Elevated production costs affect over 86% of Ukrainian crop and livestock producers, driven by surging fertilizer, fuel, and input prices, as disrupted supply chains and energy market turmoil disrupt supply chains and energy markets. These cost increases have outpaced the subsidy levels provided through financial instruments, meaning that even subsidized credit fails to restore pre-war profitability margins. The gap between rising costs and available financial support leaves instruments insufficient to maintain viable operations, particularly for smaller enterprises with limited ability to absorb cost shocks (Janzen & Zulauf, 2023). The direct security threats imposed by the ongoing conflict create perhaps the most intractable constraints on agricultural operations.

Security-related operational challenges create ongoing constraints that reduce the practical impact of financial support across multiple dimensions. Power outages affecting 88% of enterprises in conflict areas, combined with reduced cultivated land and yield drops of 81.4% in frontline regions, mean that financial instruments cannot overcome the fundamental operational limitations imposed by active conflict. These security challenges create unpredictable operating environments where traditional financial planning becomes impossible, reducing the effectiveness of even well-targeted support programs (Janzen & Zulauf, 2023; Sydorchuk et al., 2024; Abdullayev et al., 2025). The cumulative weight of these constraints reveals fundamental limits to what financial policy can achieve in active conflict zones.

The cumulative effect of these war-specific factors creates a situation in which financial instruments operate with severely constrained effectiveness, as they cannot address the root causes of agricultural sector distress. While these instruments provide essential liquidity and support for enterprises that can continue operating, their impact is fundamentally limited by factors beyond the scope of financial intervention. This limitation highlights the need for integrated approaches that combine financial support with physical security, infrastructure reconstruction, and market access restoration to achieve meaningful agricultural recovery under wartime conditions. Compounding these conflict-driven operational constraints, the regulatory and policy framework introduces additional layers of complexity that affect how instruments function in practice.

The regulatory and policy framework governing Ukraine's agricultural financial instruments creates a complex environment in which some elements enhance effectiveness while others significantly undermine program efficiency. While specific military fees targeting agricultural enterprises are not extensively documented in available sources, the broader policy landscape includes various administrative barriers, market interventions, and regulatory interactions that substantially affect how financial instruments function in practice. Understanding these policy factors is essential for evaluating why some instruments achieve their intended outcomes while others fall short of expectations despite adequate funding (Mamonova et al., 2023). Among the various policy-related barriers, administrative complexity emerges as a particularly significant impediment to program access.

Administrative barriers represent a significant constraint on financial program accessibility, with complex application processes requiring extensive documentation and eligibility verification, creating substantial hurdles for agricultural enterprises. These barriers include fragmented program administration across multiple agencies, detailed cash-down payment requirements, and discovery challenges as programs remain scattered without centralized navigation systems. Such administrative complexity particularly affects smaller enterprises that lack dedicated staff to navigate bureaucratic requirements, leading to underutilization of available financial support despite strong underlying demand (Dorosh, 2024). Beyond procedural barriers, substantive policy choices regarding market interventions impose additional constraints on the effectiveness of instruments.

Negative market price support policies for key crops fundamentally undermine the effectiveness of credit and financial instruments by reducing farm incomes and profit margins that serve as the foundation for loan repayment capacity. These policies depress domestic crop prices through various interventions, creating a situation in which even subsidized credit cannot offset systematically reduced revenue streams. The resulting impact on collateral values and lender confidence creates a vicious cycle where policy-induced price depression makes financial instruments less accessible precisely when they are most needed to support struggling producers (World Bank, 2024). The wartime regulatory environment introduces further complications through the tension between rapid deployment and program efficiency.

The interaction between wartime regulations and financial instrument design creates both opportunities and constraints for program effectiveness. While emergency provisions may streamline certain approval processes and expand eligibility criteria, they can also introduce uncertainty and complexity that reduces program efficiency. Wartime regulatory frameworks often prioritize rapid deployment over optimal design, leading to instruments that may provide essential support but operate less efficiently due to hastily implemented administrative procedures and unclear regulatory guidance. Despite these complications, certain policy elements have enhanced rather than hindered instrument performance.

Policy framework elements that enhance instrument effectiveness include streamlined approval processes for emergency situations, expanded eligibility criteria that recognize wartime operational challenges, and integrated approaches that coordinate multiple support mechanisms. However, these positive elements are often offset by contradictory policies, such as market price interventions, that undermine the fundamental profitability of agricultural operations. The net effect depends on whether supportive policies can overcome the negative impacts of market distortions and administrative inefficiencies that characterize much of the current framework (Hafurova, 2025). Looking forward to these current challenges, the agricultural sector faces both opportunities and continued constraints as recovery proceeds.

Recovery projections for Ukraine's agricultural sector indicate moderate productivity gains through 2025, contingent on the successful implementation of phased restoration policies and continued financial instrument support. Anticipated improvements will likely follow patterns observed in other post-conflict agricultural recoveries, where initial gains focus on restoring basic production capacity before advancing to productivity enhancements. The timeline for meaningful recovery extends beyond 2025, requiring sustained financial support mechanisms that bridge immediate wartime needs with longer-term reconstruction objectives while adapting to evolving operational conditions. International market integration presents significant opportunities, though realizing these benefits will require substantial investments in compliance infrastructure.

EU market access extensions present significant opportunities for Ukrainian agricultural exports, though success will depend on meeting increasingly stringent compliance requirements and regulatory standards. The EU's evolving trade framework emphasizes alignment with environmental and social conditionality, requiring Ukrainian producers to invest in sustainable practices and certification systems. While nominal market access improves through various trade agreements, higher compliance costs and regulatory barriers may disproportionately affect smaller enterprises, necessitating targeted financial support for upgrading standards and certification processes (Balanovska et al., 2021; Nivievskyi, 2025). Realizing these market opportunities requires carefully sequenced policy interventions that balance immediate needs with long-term development.

Phased restoration policies through 2025 should prioritize immediate stabilization measures while building foundations for long-term recovery. The transition from emergency wartime support to structured reconstruction financing requires careful sequencing to avoid disrupting ongoing operations while introducing more sophisticated financial instruments. Key phases include continued liquidity support, infrastructure reconstruction financing, and productivity-enhancing investments, each requiring tailored financial instruments that reflect evolving operational realities and recovery priorities. Given the challenges SMEs face, targeted reforms are essential to ensure more equitable access to financial support.

Specific recommendations for improving instrument effectiveness for underserved SMEs include streamlined application processes, reduced documentation requirements, and dedicated SME-focused programs with appropriate scale and terms. Enhanced guarantee mechanisms, blended finance structures combining public risk-sharing with private capital, and technical assistance programs can address the fundamental access barriers that prevent SME participation in existing programs. Additionally, developing alternative credit assessment methods that account for wartime disruptions rather than relying solely on traditional financial metrics would improve SME access to essential financing (Gagalyuk, 2024). The longer-term evolution of financial instruments must balance reconstruction needs with sustainable development objectives.

Financial instruments should evolve to support post-war reconstruction while maintaining essential wartime support mechanisms through a dual-track approach that preserves emergency capabilities alongside reconstruction-focused tools. This evolution requires developing green bonds and sustainable financing mechanisms

for climate-smart agriculture, expanding blended finance structures that leverage private investment, and creating flexible instruments that can scale support based on recovery progress. The integration of carbon markets and regenerative agriculture financing will be crucial for long-term sustainability, while maintaining the rapid-response capabilities developed during the conflict period to address future shocks and ensure agricultural sector resilience.

4. Discussion

The article addresses the complex question of whether agricultural credit and financial instruments can effectively maintain sectoral resilience under conditions of active military conflict. In this context, financial support mechanisms demonstrate a dual nature, manifesting in aggregate sectoral stability while revealing profound disparities in accessibility across producer categories (Andros, 2024; Dorosh, 2024). On the one hand, well-designed financial instruments successfully maintained Ukraine's agricultural exports at approximately 60% of total exports by 2024, generating nearly $25 billion in foreign-exchange earnings, critical for wartime economic stability. This macro-level success demonstrates that state-subsidized lending, EU grants, and international financing can effectively maintain production capacity where market-based mechanisms would fail under extreme stress. On the other hand, effectiveness varies dramatically across enterprise sizes, creating a two-tier recovery system in which large agroholdings capture disproportionate credit shares while SMEs experience declining access due to restrictive lending standards and collateral requirements (Martinez, 2025; Shakhovskoy et al., 2022). This differential effectiveness raises concerns about sectoral consolidation, as SMEs remain inadequately supported despite accounting for significant shares of agricultural employment and production capacity.

In this context, research by Mamonova et al. (2023) and the World Bank (2024) demonstrates that addressing access disparities requires fundamentally redesigning eligibility criteria and assessment methodologies to account for wartime disruptions rather than relying on traditional financial metrics. Although such reforms may not immediately increase credit volumes, they would ensure more equitable distribution and preserve structural diversity. Based on this, additional research is needed to implement alternative credit assessment methods, develop blended finance structures, and create dedicated SME-focused programs with appropriate scale and terms (Vasyltsiv et al., 2023). Special attention should be paid to streamlining administrative processes to achieve a balance between risk management and accessibility.

Beyond enterprise disparities, war-specific factors impose fundamental constraints that financial instruments alone cannot overcome. Despite methodological success in applying multidimensional effectiveness analysis, $70 billion in income losses, $8.72-20 billion in infrastructure damages, landmine contamination affecting 20% of farmland, and elevated costs affecting 86% of producers create operational impossibilities, rendering financial support ineffective in severely affected areas (Nivievskyi & Neyter, 2024; Dodd & Welsh, 2024). These challenges undermine the assumptions underlying financial instrument design and demonstrate the necessity of integrated approaches combining financial support with physical security, infrastructure reconstruction, and market access restoration. To address these limitations, humanitarian-development-peace nexus frameworks should explicitly recognize interdependencies between financial support, security conditions, and infrastructure functionality (Al Daccache et al., 2024).

4.1. Study Limitations

This study faces several important limitations that warrant acknowledgment. First, geographic coverage constraints significantly affect comprehensiveness: data from Russian-occupied territories (18-20% of pre-war agricultural land) and active conflict zones are systematically unavailable, potentially biasing results toward relatively safer production areas with better infrastructure access and less severe disruption. This geographic limitation means our effectiveness assessments may overestimate overall instrument performance, as the most severely affected producers remain largely invisible in official statistics. Second, the study relies primarily on aggregate sectoral data rather than individual enterprise-level datasets, limiting our ability to conduct detailed microeconomic analysis of specific credit utilization patterns, investment decisions, and productivity outcomes. Third, temporal constraints pose challenges: the observation period (February 2022-December 2024) captures only the initial wartime phase, potentially missing longer-term effectiveness patterns, delayed impacts, or emerging adaptation strategies. Fourth, causality attribution remains complex—while we document correlations between financial instrument availability and sectoral outcomes, definitively isolating financial support effects from other confounding factors (international humanitarian assistance, diaspora remittances, informal credit networks, adaptive management strategies) proves methodologically challenging under chaotic conflict conditions where controlled comparisons are impossible.

4.2. Alternative Explanations

The observed maintenance of agricultural export capacity and production resilience may reflect factors beyond the effectiveness of financial instruments. First, Ukraine's agricultural sector demonstrated remarkable pre-war competitive advantages—including highly productive black soil, established international marketing networks, substantial prior capital investments in modern equipment and storage infrastructure, and experienced management—that may have enabled resilience independent of wartime financial support. Large agroholdings, in particular, possessed significant financial reserves and diversified revenue streams, enabling continued operations despite credit constraints. Second, informal financing mechanisms likely played substantial roles that official statistics underestimate: farmer-to-farmer lending networks, supplier credit arrangements, advance payment contracts with international buyers, and diaspora capital inflows provided crucial liquidity outside formal banking channels. Third, adaptive operational strategies rather than financial injections may explain continued production: shifting to less input-intensive crops, reducing cultivation areas to match available resources, postponing equipment replacement, and accepting lower profit margins enabled survival without proportional access to credit. Fourth, international humanitarian assistance specifically targeting agriculture—including in-kind donations of seeds, fertilizers, and fuel; technical support programs; and emergency food security interventions—complemented or substituted for financial instruments in maintaining production capacity. Finally, the sector's export orientation and hard-currency earnings potential may have created survival incentives that transcend normal financial calculations, with producers willing to operate at a loss or draw down reserves to maintain market positions and international relationships. These alternative explanations suggest that observed resilience reflects complex interactions between financial instruments, pre-existing competitive strengths, informal support networks, adaptive strategies, and humanitarian interventions rather than financial policy effectiveness alone.

4.3. International Comparison

Ukraine's wartime agricultural finance experience provides valuable comparative insights when examined alongside other conflict-affected agricultural systems. Syria's agricultural sector collapsed during 2011-2020, offering a cautionary contrast: the absence of functioning credit systems, complete infrastructure destruction in contested areas, and a lack of international development finance contributed to 40-60% production declines and a mass rural exodus. Ukraine's relatively maintained production capacity (despite 20-30% declines in conflict zones) suggests that rapid deployment of substitute financing mechanisms—even if imperfectly distributed—prevented catastrophic sector collapse. Yemen's experience during 2015-present demonstrates how conflict-induced financial system paralysis combined with blockades can devastate food production; Ukraine's maintained export infrastructure and continued international credit access proved critical protective factors. Afghanistan's post-2001 agricultural reconstruction relied heavily on cash-for-work programs and microcredit schemes targeting smallholders, achieving gradual recovery but facing persistent access inequality—paralleling Ukraine's SME challenges despite different conflict contexts. Iraq's post-2003 experience with state-led agricultural credit programs shows that corruption, administrative complexity, and elite capture can undermine intended equity objectives; Ukraine's relatively transparent international oversight mechanisms may have reduced (though not eliminated) such distortions. Colombia's experience in financing agriculture in conflict-affected regions through specialized agricultural banks with risk-sharing mechanisms and blended public-private capital structures offers potential models for Ukraine's reconstruction phase. Bosnia and Herzegovina's post-conflict reconstruction demonstrated that the effectiveness of agricultural credit depends critically on parallel infrastructure investment and land tenure security—lessons directly applicable to Ukraine's anticipated recovery. These international comparisons suggest Ukraine's wartime financial instruments achieved moderate success in preventing sector collapse and maintaining export capacity, though persistent access disparities and geographic limitations mirror challenges observed across diverse conflict contexts.

4.4. Unintended Consequences

Wartime financial instrument deployment has generated several unintended consequences requiring acknowledgment. First, differential credit access may accelerate sectoral consolidation: large agroholdings leveraging superior access to international finance and state-subsidized credit can acquire distressed assets from financially constrained SMEs unable to access equivalent support, potentially reducing structural diversity and concentrating land ownership despite equity policy objectives. Second, subsidized interest rates, while maintaining operational continuity, may create market distortions and dependency expectations, complicating the eventual transition to normal market conditions; producers adapting their business models to concessional terms may face viability challenges when subsidies end. Third, the geographic concentration of effective support in safer western regions may reinforce spatial inequalities and contribute to permanent reconfigurations

of the agricultural landscape, with implications for rural employment patterns and regional development. Fourth, focusing on maintaining production and exports may have diverted policy attention from addressing underlying structural challenges, including land reform, productivity enhancement, value chain development, and sustainability transitions. These unintended consequences highlight tensions between crisis-response imperatives and longer-term development objectives, suggesting that reconstruction-phase policies must explicitly address consolidation risks, subsidy-exit strategies, regional equity, and structural transformation agendas.

Anyway, the results obtained through integrated multidimensional analysis provide a comprehensive assessment of how agricultural financial instruments function under conflict conditions, revealing both their critical role in maintaining resilience and their fundamental limitations under war-imposed constraints. Integration of additional methodological approaches—including sensitivity analysis across conflict intensities and comparative assessments with other conflict-affected systems—will be considered in subsequent studies to develop an optimized conflict-sensitive financial instrument design.

5. Conclusions

This study evaluated the effectiveness of credit and financial instruments for agricultural enterprises in Ukraine during 2022-2024 under extraordinary wartime circumstances. Comprehensive analytical methods were employed to assess relationships between various financing mechanisms—including the Affordable Loans 5-7-9% program, EU Production Grant Schemes, EBRD investment packages, and IFC risk-sharing facilities—and their actual impact on maintaining agricultural production and export capacity during active military conflict.

Key Findings. The study documents differential effectiveness across enterprise categories and operational contexts within government-controlled territories (representing approximately 82% of pre-war agricultural land). At the macro level, financial support maintained agriculture's GDP contribution at 7-11% and increased export share from pre-war 41% to approximately 60% by 2024, generating nearly $25 billion in foreign exchange—though these aggregate figures mask substantial geographic and enterprise-size variations. Enterprise-level analysis reveals stark disparities, with large agroholdings demonstrating superior access to international financing mechanisms, while SMEs face severe barriers due to consecutive loss-year restrictions, exhausted pre-war reserves, and limited collateral availability. Although nominal program availability suggests comprehensive coverage, actual utilization patterns show concentrated benefits among larger operations that meet stringent creditworthiness criteria. War-specific constraints—including $70 billion in farmer income losses, $8.72-20 billion in infrastructure damages, landmine contamination affecting 20% of farmland, and production cost increases affecting 86% of producers—create operational impossibilities rendering even well-designed financial support insufficient without addressing broader security and infrastructure challenges. Additionally, regulatory factors, including administrative barriers and negative market pricing policies, significantly undermine the efficiency of instruments in accessible areas.

Study Limitations and Generalizability. These findings must be interpreted within important contextual boundaries. First, geographic coverage limitations mean results primarily reflect conditions in relatively safer government-controlled territories, potentially overestimating overall effectiveness given the unavailability of systematic data from occupied zones (18-20% of pre-war agricultural land) and active conflict areas, where instrument performance is likely to differ substantially. Second, the observation period (February 2022-December 2024) captures only initial wartime adaptation phases; longer-term effectiveness patterns, sustainability of observed resilience, and delayed impacts remain unknown. Third, causality attribution proves challenging under chaotic conflict conditions, where multiple confounding factors (humanitarian assistance, diaspora remittances, informal credit networks, pre-existing competitive advantages, adaptive management strategies) interact with formal financial instruments in ways that are difficult to isolate analytically. Fourth, reliance on aggregate sectoral data rather than comprehensive enterprise-level datasets limits the precision of microeconomic analysis. Consequently, while findings demonstrate that financial instruments helped maintain production capacity in accessible areas, generalizing these results to future conflict contexts requires careful consideration of Ukraine-specific factors, including pre-war agricultural competitiveness, established export infrastructure, international political support, and geographic proximity to EU markets that may not replicate elsewhere.

Policy Recommendations. Based on documented disparities and constraints, we recommend several policy directions for consideration—recognizing that implementation feasibility depends on evolving security conditions and institutional capacity. First, enhance SME access through streamlined administrative processes, alternative credit assessment methods adapted to wartime disruptions (replacing consecutive loss-year restrictions with forward-looking viability criteria), and expanded guarantee mechanisms reducing collateral requirements. Second, design phased restoration policies balancing immediate liquidity needs with longer-term

reconstruction objectives, explicitly planning subsidy exit strategies to avoid dependency and market distortions. Third, develop conflict-sensitive agricultural finance frameworks that explicitly integrate financial support with physical security provision, infrastructure rehabilitation, and market access restoration, rather than treating these as separate policy domains. Fourth, establish monitoring systems that track not just aggregate disbursements but also actual utilization patterns across enterprise sizes and geographic zones to identify emerging access disparities requiring corrective intervention. Fifth, invest in parallel infrastructure reconstruction and demining operations, recognizing that the effectiveness of financial instruments depends critically on basic operational preconditions, including physical safety, transportation networks, and input availability. These recommendations acknowledge that financial policy alone cannot overcome fundamental war-imposed constraints, and that coordinated approaches spanning security, infrastructure, and economic domains are required.

Future Research Directions. Further investigation should address several critical knowledge gaps. First, longitudinal analysis tracking cohorts of supported enterprises through recovery phases would clarify whether observed resilience translates into sustained viability or merely postpones eventual exit. Second, comparative international research examining the effectiveness of financial instruments across diverse conflict contexts (Syria, Yemen, Afghanistan, Iraq) would identify generalizable principles rather than context-specific adaptations. Third, detailed microeconomic studies using enterprise-level data would illuminate the specific mechanisms through which financial support translates (or fails to translate) into productive outcomes across varying levels of conflict intensity. Fourth, research on informal financing networks and their interactions with formal instruments would provide a more complete understanding of agricultural finance ecosystems under stress. Fifth, analysis of unintended consequences, including sectoral consolidation dynamics, market distortions from sustained subsidies, and regional inequality reinforcement, would inform reconstruction-phase policy design. These research directions would strengthen theoretical understanding of conflict-sensitive agricultural finance while generating practical insights for policy refinement as Ukraine transitions from wartime stabilization to post-conflict reconstruction.

Overall, this study demonstrates that well-designed financial instruments can maintain production capacity in conflict-affected agricultural systems where purely market-based mechanisms would fail, while simultaneously revealing that effectiveness varies dramatically across enterprise sizes, geographic contexts, and conflict intensities. The documented two-tier recovery pattern—with large operations capturing disproportionate benefits while SMEs face declining access—highlights tensions between aggregate sectoral stabilization and distributional equity that reconstruction policies must explicitly address. Ultimately, meaningful agricultural recovery under wartime conditions requires integrated approaches that recognize that financial support, while necessary, is insufficient without parallel progress on security, infrastructure, and governance challenges.

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