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BUDGET CROWDING-OUT UNDER RISING DEFENCE EXPENDITURES: THE FISCAL, LABOUR AND REGIONAL EFFECTS IN UKRAINE

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Artiushenko O. O., Tatarenkov O. V., Kopanytsia P. V., Zakharchuk O. V. Budget Crowding-Out under Rising Defence Expenditures: The Fiscal, Labour and Regional Effects in Ukraine

The full-scale war ongoing in Ukraine has sharply increased defence expenditures, intensifying pressure on the State budget and the relevance of budget crowding-out. This study examines budget crowding-out in Ukraine during 2012–2024 through descriptive and comparative analysis of defence expenditures, tax revenues, the economically active population and regional tax capacity. The methodology combines statistical, comparative and time-series analysis of official Ukrainian fiscal and labour-market data, together with authorial calculations of defence expenditure per economically active person and a newly proposed regional defence-quota coverage coefficient. The share of tax revenues absorbed by defence expenditure rose from about 120% in 2022 to 174% in 2023, easing to roughly 140% in 2024; defence expenditure per economically active person rose almost 300-fold over 2012–2024. By 2023, even Kyiv, the best-performing region, covered only about half of the national defence quota per person from its own tax base, while frontline regions covered less than 5%. Labour-force estimates for 2022–2024 are authorial approximations due to suspended official surveys; the analysis is descriptive rather than causal and specific to Ukraine's wartime context. Findings may help the Ministry of Finance assess fiscal sustainability, regional disparities and long-term defence-financing capacity. The results point to widening regional fiscal inequality, relevant to postwar recovery policy. The study integrates defence expenditure, labour-force dynamics and regional tax capacity into a single framework, including a new regional defence-quota coverage coefficient, quantifying national and territorial dimensions of wartime budget crowding-out.

Keywords: budget crowding-out; defence expenditures; defence procurement; tax revenues; labour force; regional tax capacity; fiscal sustainability.

Fig.: 5. **Tabl.:** 6. **Bibl.:** 44.

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Артюшенко О. О., Татаренков О. В., Копаниця П. В., Захарчук О. В. Бюджетне витіснення в умовах зростання оборонних видатків: фіскальні, трудові та регіональні ефекти в Україні

Повномасштабна війна різко збільшила оборонні видатки, посиливши тиск на державний бюджет і актуальність проблеми бюджетного витіснення. У статті досліджено бюджетне витіснення в Україні протягом 2012–2024 років шляхом описово-порівняльного аналізу оборонних видатків, податкових надходжень, економічно активного населення та регіонального податкового потенціалу. Методологія поєднує статистичний, порівняльний та аналіз часових рядів офіційних фіскальних і трудових даних України, а також авторські розрахунки оборонних видатків на одну економічно активну особу та запропонований регіональний коефіцієнт покриття оборонної квоти. Частка податкових надходжень, поглинута оборонними видатками, зросла з близько 120% у 2022 році до 174% у 2023 році, а в 2024 році знизилася до близько 140%; оборонні видатки на одну економічно активну особу зросли майже у 300 разів за 2012–2024 роки. У 2023 році навіть Київ – найкращий регіон – покривав власними податками лише близько половини оборонної квоти на особу, а прифронтові регіони – менше ніж 5%. Оцінки робочої сили за 2022–2024 роки є авторськими наближеннями через призупинення офіційних обстежень; аналіз описовий, а не причинно-наслідковий, специфічний для воєнного контексту України. Результати можуть бути використані Міністерством фінансів для оцінювання бюджетної стійкості, регіональних диспропорцій і спроможності фінансування оборони. Результати демонструють поглиблення регіональної фіскальної нерівності, що є актуальним для політики повоєнного відновлення. Оригінальність полягає в інтеграції оборонних видатків, динаміки робочої сили та регіонального податкового потенціалу в єдину аналітичну рамку, включно з новим регіональним коефіцієнтом покриття оборонної квоти, що кількісно відображає національний і територіальний виміри бюджетного витіснення в умовах війни.

Ключові слова: бюджетне витіснення; оборонні видатки; оборонні закупівлі; податкові надходження; робоча сила; регіональний податковий потенціал; фіскальна стійкість.

Рис.: 5. **Табл.:** 6. **Бібл.:** 44.

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INTRODUCTION

Background and rationale

Ukraine's full-scale war has fundamentally transformed the priorities of the country's fiscal policy. Ensuring sufficient financing for the security and defence sector has become a prerequisite for preserving national sovereignty while simultaneously creating unprecedented pressure on public finances, intensifying the need to balance military financing with the state's social and economic obligations. Under such conditions, the issue of budget crowding-out – a situation in which increasing expenditure in one area of public policy reduces the resources available for other priorities – has become increasingly relevant both theoretically and practically.

The relationship between military expenditure and economic development has long been discussed within the “guns versus butter” framework, which reflects the trade-off between financing national defence and civilian economic development. Contemporary studies primarily examine the impact of defence expenditure on growth, public debt, fiscal deficits and macroeconomic stability. The Ukrainian case considerably broadens this research agenda, as the fiscal system has been operating under conditions of rapidly increasing defence expenditure, changing revenue structures, extensive international financial assistance and a declining economically active population.

Despite the considerable body of international and Ukrainian research on military expenditure and fiscal policy, no existing framework integrates defence expenditure, domestic tax revenues, labour-force dynamics and regional tax capacity within a single assessment of budget crowding-out. To address this gap, the present study proposes an integrated analytical

framework combining these four dimensions, extending conventional fiscal analysis by incorporating demographic and territorial dimensions.

PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of this study is to examine budget crowding-out in Ukraine under conditions of rapidly increasing defence expenditure through a descriptive and comparative analysis of the dynamics and relative levels of defence expenditure, tax revenues, the economically active population and regional tax capacity during 2012–2024. To achieve this objective, the study: (1) analyses the dynamics of Ukraine's defence expenditure during 2012–2024; (2) examines changes in the structure of State Budget tax revenues; (3) calculates and compares the share of State Budget tax revenues absorbed by defence expenditure; (4) estimates defence expenditure per economically active person; (5) conducts a regional comparative analysis of tax capacity and defence-quota coverage; and (6) proposes an integrated descriptive framework for assessing budget crowding-out under wartime conditions.

Literature Review

The relationship between military expenditure and economic performance has remained a central issue in public finance and defence economics for several decades. Despite extensive theoretical and empirical research, no universally applicable conclusion has been reached. The debate is commonly framed through the “guns versus butter” trade-off: resources allocated to national security may strengthen the institutional and strategic conditions required for economic activity, but they may also reduce the funds available for productive investment, education, healthcare, infrastructure and social protection. The direction and magnitude of the effect therefore depend not only on the scale of defence expenditure, but also on its financing, composi-

tion, efficiency and interaction with the broader fiscal and institutional environment.

The absence of a stable empirical consensus is confirmed by meta-analytical and heterogeneity-focused studies. Alptekin and Levine [1], reviewing 169 estimates from 32 studies, and Yesilyurt and Yesilyurt [29] both found that the estimated relationship depends substantially on country composition, specification and estimation method rather than following a single universal pattern, which Emmanouilidis and Karpetsis [12] attributed largely to differences in lag structures and causality-testing procedures across time-series studies. Country-specific evidence reinforces this: Saba and Ngepah [22] found the relationship differs across African economies, Raifu and Aminu [19] across the growth distribution in MENA countries, Hanson and Jeon [13] across time and specification for the United Kingdom, and Dimitraki and Emmanouilidis [6] showed political instability further modifies the effect. Composition and efficiency also matter: Becker and Dunne [3] found personnel, equipment and research spending generate different fiscal multipliers, while Dimitriou et al. (2025) found adverse effects moderated by technological spillovers and efficient allocation. Within the guns-versus-butter framework, Carter et al. (2021) showed the defence-civilian trade-off is neither automatic nor linear, since governments may defer the burden to deficits or future taxation rather than cutting social spending immediately – directly relevant to Ukraine's deferred, externally financed wartime fiscal adjustment discussed below.

Potential positive effects operate through demand- and supply-side channels – military procurement can stimulate aggregate demand and employment, while defence-related research and infrastructure can generate civilian spillovers – but these depend on domestic production capacity and the economy's ability to absorb spending without excessive inflationary or debt pressure, so effects vary across countries and periods rather than following a uniform pattern. A substantial part of the literature emphasises the opposing crowding-out mechanism, whereby defence expenditure displaces private and public investment and increases taxation, borrowing and debt-service obligations. Dunne and Tian [11], using a large heterogeneous panel, showed that the military expenditure-growth relationship differs across national contexts, concealing important differences by income level and institutions behind average cross-country estimates. The causality problem compounds this: d'Agostino et al. (2019), addressing endogeneity through an instrumental-variable approach, found a stronger negative growth effect than conventional estimates, and Saeed

[21] similarly showed the estimated effect to be sensitive to identification strategy – together indicating that simple correlations should not be read as causal. The investment channel is particularly relevant: Dunne and Smith [10] showed that defence allocations may restrict productive investment even where short-term demand effects are positive, a concern reinforced by Azam [2] for non-OECD economies, Malizard [15] for France, and Karaki and Safieddine [14], who found defence-related shocks crowd out investment especially during economic slack.

Taken together, this literature supports treating budget crowding-out as a multidimensional process rather than solely a reduction in growth: its direct manifestation is expenditure reallocation toward defence, while indirect manifestations include higher deficits, increased debt, reduced public investment and weaker financing of social and regional development, with the scale depending on whether defence needs are financed through current revenues, borrowing, monetary financing or external assistance.

Although international studies provide a broad framework for the defence-growth relationship, Ukraine's full-scale war has radically transformed budget priorities, revenue mobilisation and labour-market conditions in ways that existing research only partly captures. Chugunov et al. (2023) documented the sharp deterioration of budget indicators in 2022 – weaker tax revenues, rapid expenditure growth, a wider deficit and greater reliance on borrowing – while Tsyhanenko et al. (2023) identified substantial changes in State Budget structure under martial law, Vagonova et al. (2025) examined fiscal policy's adaptation through revenue mobilisation, expenditure optimisation and international assistance, Radionov [20] stressed expenditure prioritisation and financial control, and Petrukha et al. (2025) showed that wartime budget functioning requires substantial fiscal restructuring and continued external-resource mobilisation.

Nevertheless, this literature remains focused mainly on aggregate budget indicators, deficits, debt and general fiscal adaptation, with considerably less attention to the long-term relationship between defence expenditure and the domestic tax base, or to the demographic dimension – although mobilisation, migration, displacement and employment contraction directly affect the population capable of generating tax revenue. The regional dimension is a further gap: occupation, destruction of productive assets, displacement and business relocation have altered the territorial distribution of economic activity, so growth in nationwide tax revenue may coexist with a weakening tax base in frontline territories and growing concentration in the capital and safer regions – a

restructuring that aggregate national indicators do not capture. This study addresses these combined gaps by proposing an integrated analytical framework that conceptualises budget crowding-out as a multidimensional phenomenon spanning defence expenditure, tax revenues, labour-force dynamics and regional tax capacity.

MATERIALS AND METHODS

Research Design and Data Sources

This study employs a quantitative approach integrating fiscal, labour-market and regional indicators – rather than defence expenditure as a share of GDP alone – to assess budget crowding-out in Ukraine during 2012–2024, spanning pre-war years and the full-scale invasion beginning in 2022. The empirical analysis relies exclusively on official statistical and financial information published by Ukrainian public authorities:

- ✦ annual Laws of Ukraine on the State Budget, providing approved defence expenditure allocations [30–42];
- ✦ the Ministry of Finance of Ukraine, for budget execution and consolidated fiscal indicators [16];
- ✦ the State Treasury Service of Ukraine, for budget execution statistics [26];
- ✦ the State Tax Service of Ukraine, for regional tax revenue data [25];
- ✦ the State Statistics Service of Ukraine, for macroeconomic and labour-market indicators, including the regional labour-force release [23; 24];
- ✦ the OpenBudget portal, for cross-validation of fiscal indicators [17].

The dataset comprises annual observations for 2012–2024. Regional tax statistics use comparable administrative-territorial units; territories temporarily occupied or directly affected by hostilities are identified separately given their significantly altered fiscal capacity.

Data Processing and Validation

For reproducibility, the authorial labour-force estimates for 2022–2024 were derived by extrapolating the pre-war (2019–2021) trend in the officially reported economically active population and adjusting it downward using publicly available indicators of population loss over the corresponding period, namely external migration and refugee outflows (UNHCR registration data), internal displacement (Ministry of Social Policy IDP registers) and military mobilisation (open-source estimates of armed-forces strength). The resulting annual estimates approximate the labour force remaining within government-controlled territory and are used solely to preserve analytical continu-

ity in the absence of official Labour Force Survey data; they are not official statistics and should be treated as approximations. This order of magnitude is broadly consistent with independent published assessments of Ukraine's wartime labour-force contraction: the International Labour Organization reports a 10.4% decline in the workforce since the start of the invasion [43], while Anastasia, Boeri and Zholud, drawing on National Bank of Ukraine data, estimate that the labour force in government-controlled territory has contracted by approximately one quarter relative to the pre-war level [44].

Financial indicators from different sources were harmonised into unified units and cross-checked between the Ministry of Finance, the State Treasury Service and official budget legislation to minimise discrepancies from revisions or reporting differences; all derived ratios and growth rates were independently recalculated for internal consistency. All monetary figures throughout this study are expressed in nominal UAH terms and are not adjusted for inflation or exchange-rate depreciation; part of the reported growth in defence expenditure and related indicators therefore reflects the substantial inflation and currency devaluation of 2014–2015 and 2022–2023, rather than real fiscal burden alone. Because the State Statistics Service suspended the Labour Force Survey after February 2022, labour-force values for 2022–2024 are authorial estimates used solely to preserve analytical continuity and are explicitly flagged as such throughout the study. Regional fiscal statistics are interpreted within the context of territorial control changes, population displacement and temporary occupation rather than as purely economic shifts.

Analytical framework and indicators

The analytical framework combines descriptive statistics with comparative fiscal analysis across four dimensions: defence expenditure dynamics, tax revenue mobilisation, labour-force potential and regional tax capacity, evaluating whether defence expenditure growth has outpaced the economy's effective revenue-generating and labour capacity rather than relying on defence expenditure as a share of GDP alone. Three principal indicators were calculated: the ratio of defence expenditure to total tax revenues (Section 4.3); defence expenditure per economically active person ($DL = DE / LF$, Section 4.4); and a regional tax-capacity and defence-quota coverage coefficient comparing regional tax revenue per labour-force participant with the national defence quota per person (Section 4.6).

Research Limitations

Official Labour Force Survey data are unavailable after 2021 because statistical observation was

suspended during the full-scale war, so labour-force estimates for 2022–2024 (and the regional denominator used in Section 4.6) are analytical approximations rather than official statistics; complete regional fiscal statistics for 2024 also remain unavailable for some administrative units. The study focuses on descriptive quantitative analysis rather than econometric or causal modelling, so results should be read as statistically observable fiscal trends rather than definitive causal effects, and findings are specific to Ukraine's wartime institutional context rather than directly generalisable to other conflict settings.

RESULTS

Dynamics of Ukraine's Defence Expenditures in 2012–2024

The analysed period divides into two stages: gradual growth in defence financing during 2012–2021 following the onset of Russian aggression in 2014, and an unprecedented expansion after the February 2022 full-scale invasion.

As shown in Table 1 and Figure 1, defence expenditures rose from UAH 14.5 billion in 2012 to UAH 127.5 billion in 2021 (an almost 8.8-fold increase), with annual growth rates stabilising within 6–31% af-

Table 1

Dynamics of the State Budget Defence Expenditures of Ukraine in 2012–2024

Year	Defence expenditures, UAH million	Annual growth rate, %
2012	14,485.7	-
2013	14,843.0	2.5
2014	27,363.4	84.4
2015	52,005.2	90.1
2016	59,350.8	14.1
2017	74,346.2	25.3
2018	97,024.1	30.5
2019	106,627.8	9.9
2020	120,374.1	12.9
2021	127,527.0	5.9
2022	1,143,163.6	796.4
2023	2,097,621.9	83.5
2024	2,305,242.7	9.9

Source: authors' calculations based on Ministry of Finance of Ukraine and State Treasury Service data (functional classification code 210, "Defence", narrower than the combined "defence and security" figures commonly cited in official communications).

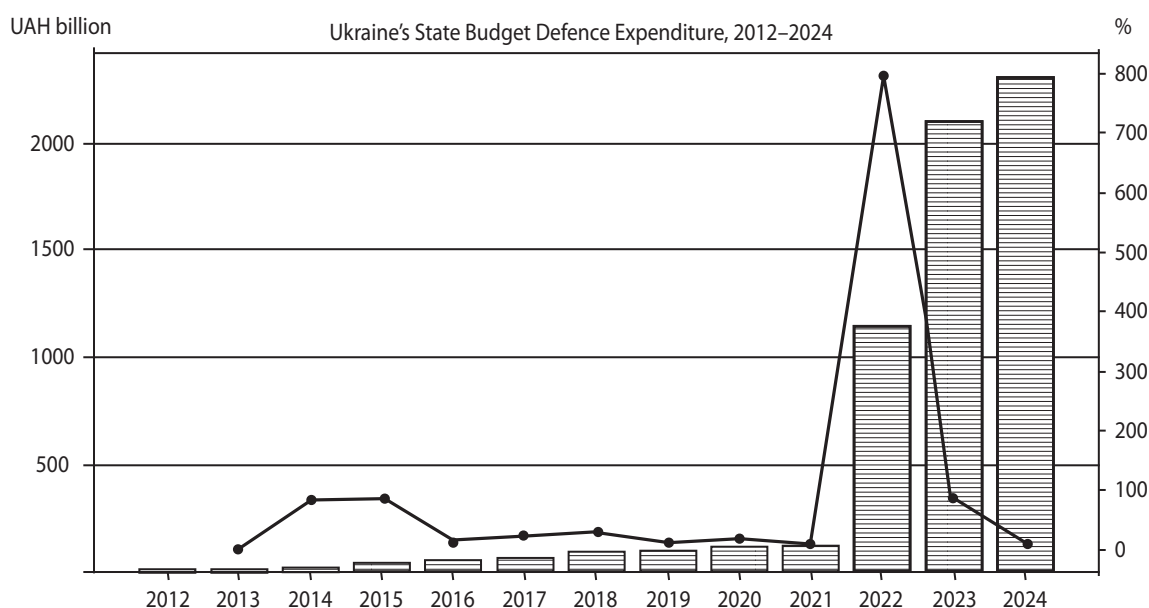


Fig. 1. Dynamics of Ukraine's State Budget Defence Expenditures in 2012–2024

Source: built by the authors based on Table 1 data.

ter the initial 2014–2015 acceleration. This pattern changed fundamentally in 2022, when defence expenditures reached UAH 1.143 trillion – a 796.4% annual increase – before rising further to UAH 2.098 trillion in 2023 (+83.5%) and UAH 2.305 trillion in 2024 (+9.9%).

These figures are in nominal UAH and are not adjusted for inflation or exchange-rate depreciation, both of which were substantial in 2014–2015 and again in 2022–2023; part of the reported growth therefore reflects price and currency effects rather than a purely real increase in fiscal effort.

The post-2022 period thus represents a structural transformation in which defence became the dominant

priority in public expenditure allocation, rather than one component among several. Absolute expenditure alone, however, does not indicate the corresponding fiscal burden; the following subsections therefore examine tax revenues, their relationship with defence expenditure, and the labour-force dimension of fiscal capacity.

Analysis of State Budget Tax Revenues of Ukraine in 2012–2024

Tax revenues constitute the principal domestic source of budget revenue and, unlike defence expenditure, depend on economic activity, tax administration efficiency and legislative change rather than policy priority alone; their dynamics indicate whether revenue growth matched the unprecedented rise in defence financing needs.

Table 2

Dynamics of State Budget Tax Revenues of Ukraine in 2012–2024

Year	Tax revenues, UAH billion	Annual growth rate, %
2012	274.715	-
2013	262.777	-4.3
2014	280.178	6.6
2015	409.418	46.1
2016	503.879	23.1
2017	627.154	24.5
2018	753.816	20.2
2019	799.776	6.1
2020	851.116	6.4
2021	1,107.091	30.1
2022	949.764	-14.2
2023	1,203.544	26.7
2024	1,647.190	36.9

Source: authors' calculations based on Ministry of Finance, State Treasury Service and OpenBudget data.

Tax revenues followed a broadly stable upward trend during 2012–2021, exceeding UAH 1 trillion for the first time in 2021 (UAH 1,107.1 billion). The full-scale invasion disrupted this trend: revenues fell to UAH 949.8 billion in 2022 (-14.2%) amid occupation, business relocation and declining economic activity, before recovering to UAH 1,203.5 billion in 2023 and UAH 1,647.2 billion in 2024 (+36.9%). Critically, this recovery lagged far behind defence expenditure growth: while defence spending rose almost ninefold in 2022 alone, tax revenue fell in the same year, indicating that defence financing after 2022 could no longer rely on domestic tax revenue alone and increasingly depended on external assistance and borrowing.

Defence Expenditures Relative to State Budget Tax Revenues of Ukraine in 2012–2024

To evaluate the fiscal pressure generated by defence financing, the Share of Defence Expenditures in State Budget Tax Revenues (SDE) was calculated as:

$$SDE = (DE / TR) \times 100\%,$$

where DE is State Budget defence expenditures (UAH billion) and TR is State Budget tax revenues (UAH billion). Values exceeding 100% indicate that defence expenditures exceeded total tax revenues, making additional financing sources indispensable.

During 2012–2021, financing defence required between 5.3% and 14.1% of State Budget tax revenues, a relatively balanced relationship sustained by parallel growth in the revenue base. This changed sharply

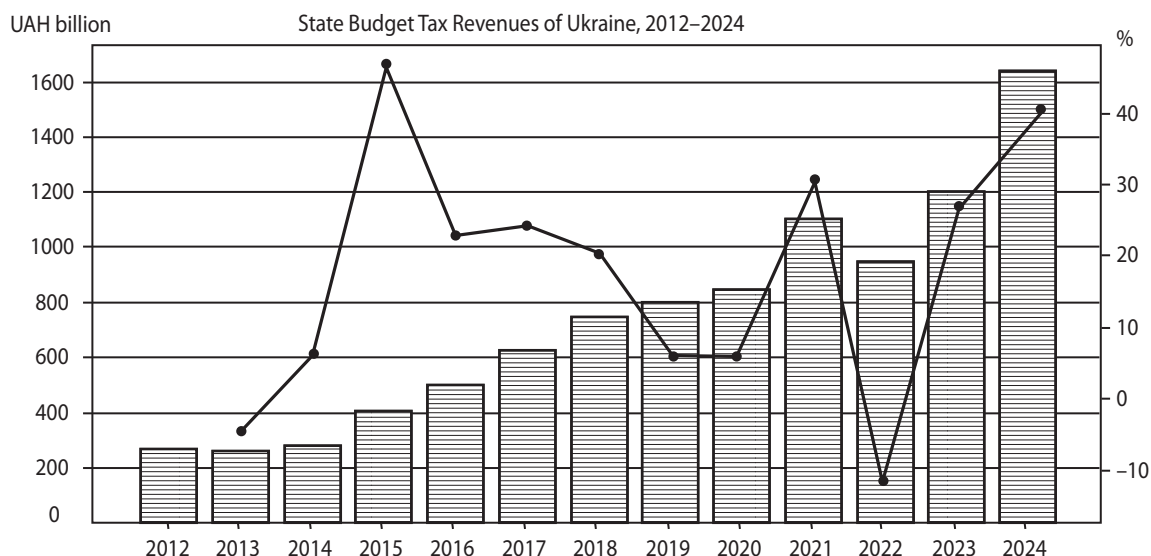


Fig. 2. Dynamics of State Budget Tax Revenues of Ukraine in 2012–2024

Source: built by the authors based on Table 2 data.

Table 3

Defence Expenditures Relative to State Budget Tax Revenues of Ukraine in 2012–2024

Year	Defence expenditures, UAH billion	Tax revenues, UAH billion	Defence expenditures as a share of tax revenues, %
2012	14.486	274.715	5.3
2013	14.843	262.777	5.6
2014	27.363	280.178	9.8
2015	52.005	409.418	12.7
2016	59.351	503.879	11.8
2017	74.346	627.154	11.9
2018	97.024	753.816	12.9
2019	106.628	799.776	13.3
2020	120.374	851.116	14.1
2021	127.527	1,107.091	11.5
2022	1,143.164	949.764	120.4
2023	2,097.622	1,203.544	174.3
2024	2,305.243	1,647.190	140.0

Source: authors' calculations based on Ministry of Finance, State Treasury Service and OpenBudget data.

after the full-scale invasion: the ratio reached 120.4% in 2022 – exceeding 100% for the first time, meaning tax revenues alone would have been insufficient even if allocated entirely to defence – rose further to 174.3% in 2023, the highest value in the series, and eased to 140.0% in 2024 as tax revenues recovered, though defence expenditure continued to exceed total tax revenues. These results provide direct evidence of budget crowding-out: whereas domestic tax revenues were generally sufficient to finance defence before the war, 2022 marks a turning point after which international financial assistance and borrowing became indispensable to sustaining defence financing.

Defence burden on the economically active population of Ukraine in 2012–2024

Unlike absolute defence expenditure, defence expenditure per economically active person accounts for changes in the country's labour potential and reflects the fiscal burden attributable to one economically active person, calculated as:

$$DL = DE / LF,$$

where DL is defence expenditure per economically active person (thousand UAH), DE is State Budget defence expenditure (UAH million) and LF is the labour force (thousand persons). Official State Statistics Service data were used for 2012–2024.

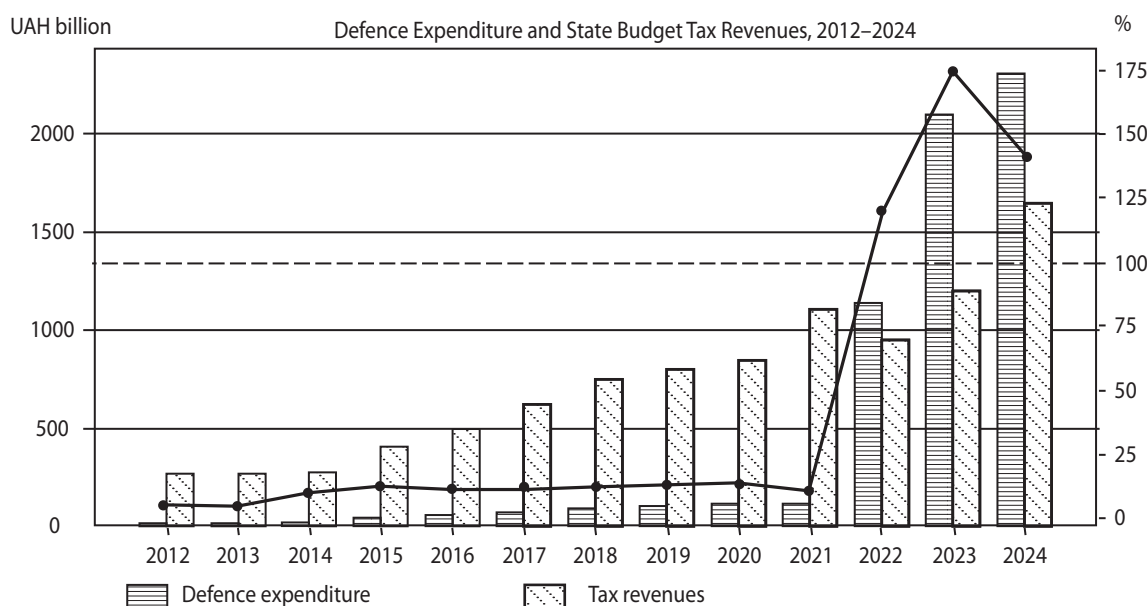


Fig. 3. Defence Expenditures Relative to State Budget Tax Revenues of Ukraine in 2012–2024

Source: built by the authors based on Table 3 data.

Table 4

Defence burden on the economically active population of Ukraine in 2012–2024

Year	Defence expenditure, UAH million	Labour force, thousand persons	Defence expenditure per person, thousand UAH
2012	14,485.7	20,851.2	0.695
2013	14,843.0	20,824.6	0.713
2014	27,363.4	19,920.9	1.374
2015	52,005.2	18,097.9	2.874
2016	59,350.8	17,955.1	3.306
2017	74,346.2	17,854.4	4.164
2018	97,024.1	17,939.5	5.408
2019	106,627.8	18,066.0	5.902
2020	120,374.1	17,589.5	6.844
2021	127,527.0	17,321.6	7.362
2022	1,143,163.6	12,500.0	91.453
2023	2,097,621.9	12,500.0	167.810
2024	2,305,242.7	11,700.0	197.029

Source: authors' calculations based on Ministry of Finance defence-expenditure data and State Statistics Service labour-force data.

Between 2012 and 2021, defence expenditure per economically active person increased more than tenfold, from UAH 0.695 thousand to UAH 7.362 thousand, driven by parallel growth in defence spending and decline in the economically active population.

After the full-scale invasion the indicator rose sharply to UAH 91.453 thousand in 2022, UAH 167.810 thousand in 2023 and UAH 197.029 thousand in 2024 – an approximately 284-fold increase over the full 2012–2024 period. As with the aggregate expendi-

ture figures above, this is a nominal-UAH comparison spanning two major devaluation episodes (2014–2015 and 2022–2023) and is not deflated; the real increase in the fiscal burden per person, while still substantial, is smaller than the nominal multiple suggests. This indicator is a direct quantitative manifestation of budget crowding-out: as an increasing share of the country's limited financial and labour resources is directed to defence, the capacity to finance civilian development, social programmes and infrastructure becomes correspondingly more constrained.

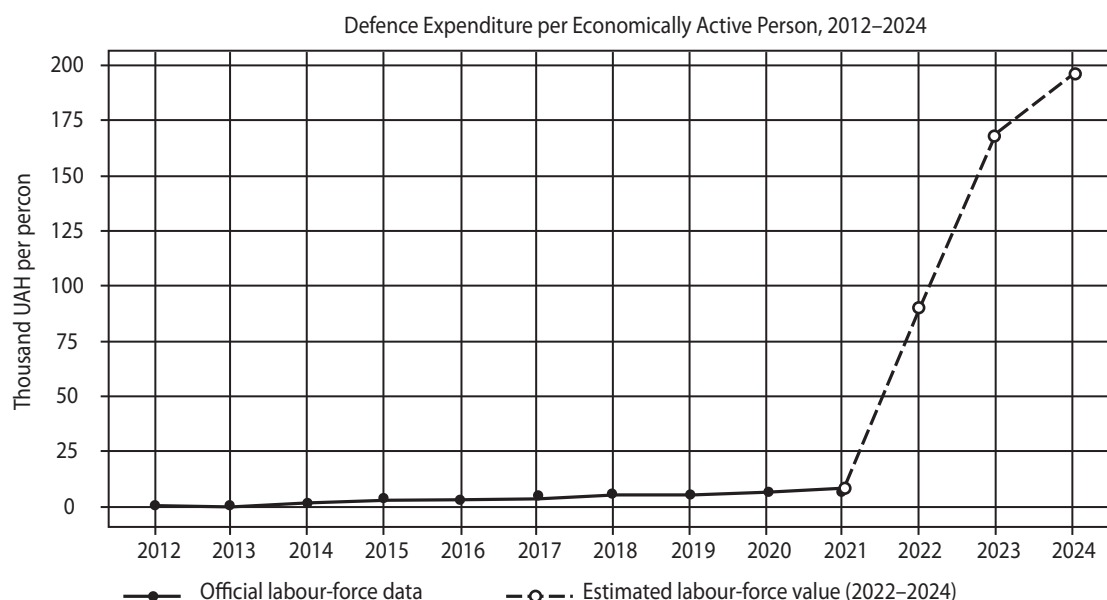


Fig. 4. Dynamics of the defence burden on the economically active population of Ukraine in 2012–2024

Source: built by the authors based on Table 4 data.

Regional Differentiation of Ukraine's Tax Potential under Wartime Economic Conditions

The State's capacity to finance defence needs depends not only on the national volume of tax revenue but also on its territorial structure, which wartime occupation, business relocation and population migration have substantially reshaped. Regional tax payments to the State Budget were compared for 2021 (pre-war baseline) and 2023 (wartime transformation),

based on official State Tax Service datasets as of 1 January 2022 and 1 January 2024, covering 24 regions and the city of Kyiv. Interregional offices for large taxpayers were excluded because their payments cannot be unambiguously attributed to a single region; figures for occupied and frontline regions (Donetsk, Luhansk, Zaporizhzhia, Kherson) should be treated as indicative rather than fully reliable, given the partial loss of territorial control.

Table 5

Tax payments to the State Budget of Ukraine by region in 2021 and 2023

Region	2021, UAH million	2023, UAH million	Change, UAH million	Growth rate, %
1	2	3	4	5
Vinnitsia	7,647.9	10,355.0	2,707.1	35.4
Volyn	4,591.4	6,128.7	1,537.4	33.5
Dnipropetrovsk	26,735.6	33,083.5	6,347.9	23.7
Donetsk*	17,083.9	9,979.9	-7,104.0	-41.6
Zhytomyr	5,374.4	8,891.5	3,517.1	65.4
Zakarpattia	2,383.1	3,783.8	1,400.7	58.8
Zaporizhzhia*	13,522.2	8,008.6	-5,513.7	-40.8
Ivano-Frankivsk	8,797.0	10,537.0	1,740.0	19.8
Kyiv Region	16,371.3	23,822.0	7,450.7	45.5
Kirovohrad	3,888.9	5,457.4	1,568.6	40.3
Luhansk*	3,536.3	911.7	-2,624.6	-74.2
Lviv	14,595.8	24,503.9	9,908.1	67.9
Mykolaiv	5,377.6	6,891.7	1,514.1	28.2
Odesa	11,125.7	17,890.5	6,764.8	60.8
Poltava	43,897.7	35,787.7	-8,110.0	-18.5
Rivne	3,092.8	5,877.2	2,784.4	90.0

1	2	3	4	5
Sumy	8,461.7	10,486.8	2,025.1	23.9
Ternopil	4,089.1	3,727.0	-362.1	-8.9
Kharkiv	42,167.8	35,560.6	-6,607.2	-15.7
Kherson*	4,492.2	1,984.8	-2,507.3	-55.8
Khmelnytskyi	4,967.3	6,296.9	1,329.6	26.8
Cherkasy	6,536.2	9,933.1	3,396.9	52.0
Chernivtsi	2,308.7	3,243.1	934.3	40.5
Chernihiv	5,262.5	7,327.1	2,064.5	39.2
City of Kyiv	87,209.7	131,369.9	44,160.3	50.6
Total for territorial regions	353,516.5	421,839.4	68,322.9	19.3

Source: authors' calculations based on official data of the State Tax Service of Ukraine as of 1 January 2022 and 1 January 2024. Interregional offices for large taxpayers excluded. * Occupied/frontline region; figures indicative rather than fully reliable given partial loss of territorial control.

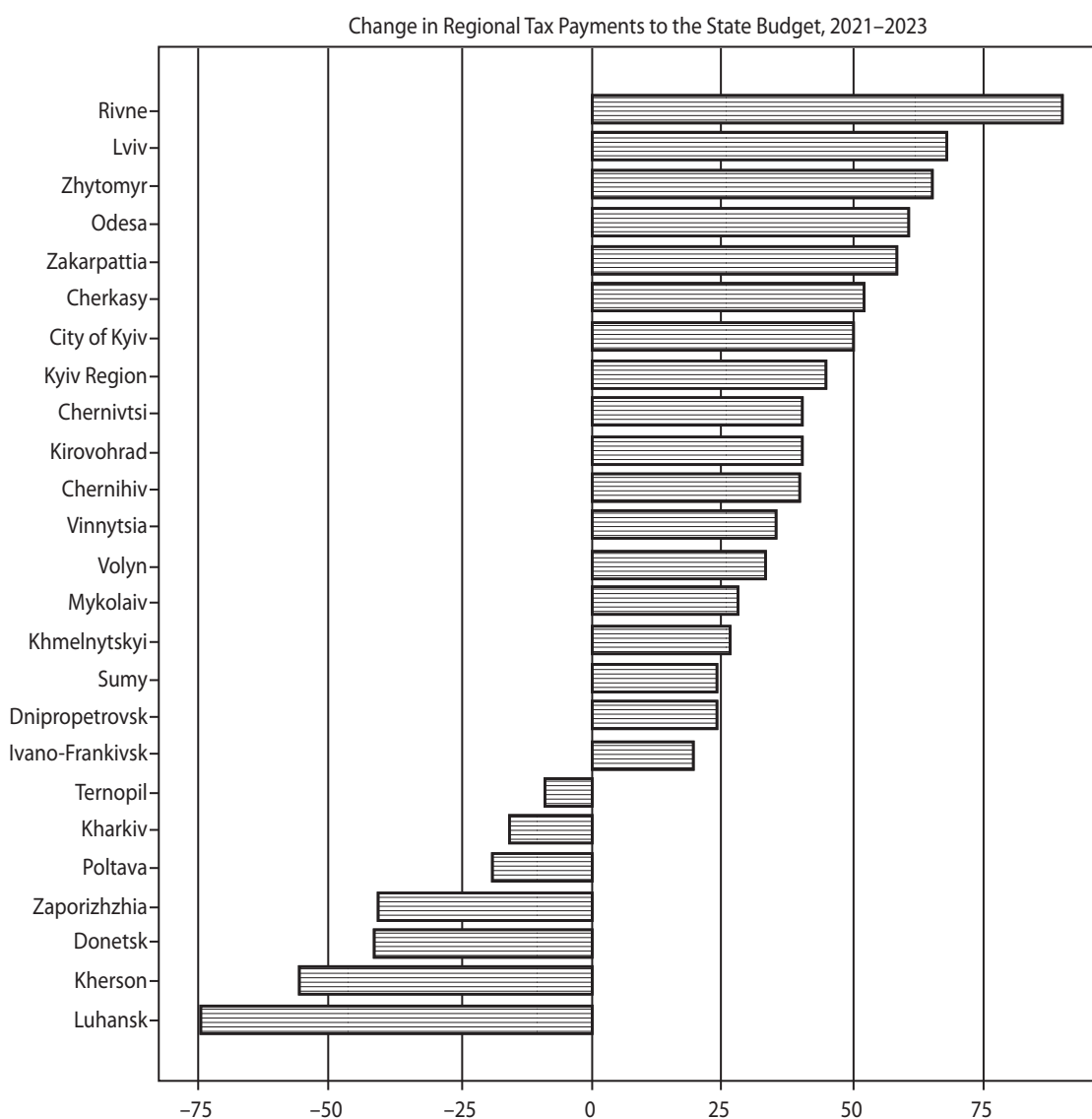


Fig. 5. Change in Regional Tax Payments to the State Budget of Ukraine, 2021–2023

Source: built by the authors based on Table 5 data.

Total tax payments generated by territorial regions, excluding interregional large-taxpayer offices, increased from UAH 353.5 billion in 2021 to UAH 421.8 billion in 2023 (+19.3%, or +UAH 68.3 billion). The city of Kyiv remained the largest revenue centre, growing by 50.6% (+UAH 44.2 billion) and accounting for almost two-thirds of total growth; considerable increases also occurred in Rivne (+90.0%, the highest rate), Lviv (+67.9%), Zhytomyr (+65.4%), Odesa (+60.8%), Zakarpattia (+58.8%), Cherkasy (+52.0%) and Kyiv Region (+45.5%) – plausibly linked to business relocation and internal displacement toward safer territories, though this should be read as an analytical inference rather than direct evidence of causality. Conversely, the largest declines occurred in regions directly affected by occupation or hostilities: Luhansk (-74.2%), Kherson (-55.8%), Donetsk (-41.6%) and Zaporizhzhia (-40.8%), with more moderate declines in Poltava (-18.5%), Kharkiv (-15.7%) and Ternopil (-8.9%).

This spatial restructuring shifted the fiscal base toward the capital and western Ukraine, deepening dependence on a narrow group of regions while reducing frontline and formerly occupied territories' capacity for self-financed recovery.

Regional Coverage of the Defence Quota per Economically Active Person

Sections 4.4 and 4.5 characterise, respectively, the national defence burden per economically active person and the territorial redistribution of nominal tax payments, but neither shows whether a region's own tax base is sufficient, per capita, to cover the national defence expenditure attributable to one economically active person. To close this gap, the study introduces a regional defence-quota coverage coefficient (RC):

$$RC = (TR / LF) / DL,$$

where TR is regional tax payments to the State Budget (UAH million), LF is the regional labour force (thousand persons), and DL is the national defence expenditure per economically active person for the corresponding year (Table 4). LF uses the State Statistics Service's regional release for January-June 2021 [24] – the last complete official regional breakdown before the survey was suspended – held constant as the 2023 denominator; RC(2023) is therefore an upper-bound estimate, since actual regional labour force in frontline/occupied territories has plausibly declined further, which would push the true coefficient lower still. Donetsk and Luhansk already exclude pre-2021 occupied territory; Zaporizhzhia and Kherson reflect full pre-occupation territory (same caution as Table 5).

The results reveal a fundamental shift in regional fiscal self-sufficiency. In 2021, when the national defence burden per person was still low, nearly every re-

gion generated tax revenue per capita well above the quota, from 60% in Zakarpattia to 950% in Poltava and 821% in Kyiv. By 2023, coverage collapsed across the board: even Kyiv, the strongest region, covered only 54%, Poltava 34%, most other regions 5-18%, and Luhansk (1.6%), Kherson (2.5%) and Zakarpattia (4.2%) under 5%. No region fully self-financed its share of the quota in 2023, confirming that crowding-out operates jointly at national and territorial levels, with every region's tax revenue requiring supplementation through redistribution, borrowing or external assistance.

DISCUSSION

The findings suggest that rising defence expenditure reflects not only wartime necessity but a structural reallocation of public resources that reduces the government's flexibility to finance civilian priorities, consistent with prior evidence that defence spending's macroeconomic consequences depend on institutional quality and fiscal capacity rather than spending levels alone [11; 21]. Even France's gradual "war economy" transition since 2022 has strained a fiscal trajectory already limited by long-standing pressures [8], underscoring that Ukraine's invasion-driven adjustment is of a fundamentally different order. The Ukrainian case extends this literature by showing how large-scale external financial assistance has partially offset immediate fiscal pressure while deepening dependence on external financing – the deferred, rather than eliminated, crowding-out mechanism identified by Carter et al. (2021).

The regional findings add a spatial dimension largely absent from existing literature on Ukraine's wartime public finances. Tax revenue concentration in Kyiv and western regions reflects business relocation and internal migration rather than organic growth, and should be read as an analytical inference rather than causal evidence. More importantly, the regional defence-quota coverage coefficient (Section 4.6) shows this concentration is insufficient: even the best-performing regions cover only about half of the wartime defence quota per person from their own tax base, confirming that crowding-out operates jointly at the national and territorial levels and is not resolved by relocation toward safer regions alone.

Consistent with Emmanouilidis and Karpētis [12] and Yesilyurt and Yesilyurt [29], these results are context-specific rather than universal: they describe a particular wartime fiscal configuration rather than a general defence-growth relationship, and the study identifies statistical association rather than causal effects. The labour-force estimates for 2022-2024 and the 2021-fixed regional labour-force denominator

Table 6

**Regional coefficient of coverage of the national defence quota per economically active person,
2021 and 2023**

Region	Tax per person, 2021, th. UAH	RC, 2021, %	Tax per person, 2023, th. UAH	RC, 2023, %
City of Kyiv	60.47	821	91.10	54.3
Poltava	69.90	950	56.99	34.0
Kharkiv	33.24	452	28.03	16.7
Kyiv Region	20.50	278	29.82	17.8
Sumy	17.13	233	21.23	12.7
Zaporizhzhia	17.31	235	10.25	6.1
Donetsk	20.72	281	12.10	7.2
Ivano-Frankivsk	14.80	201	17.73	10.6
Lviv	13.13	178	22.04	13.1
Chernihiv	11.57	157	16.11	9.6
Luhansk	10.70	145	2.76	1.6
Volyn	11.07	150	14.78	8.8
Vinnitsia	10.93	148	14.80	8.8
Kherson	9.35	127.0	4.13	2.5
Mykolaiv	10.28	140	13.18	7.9
Ternopil	9.23	125.4	8.42	5.0
Kirovohrad	9.57	130.0	13.43	8.0
Odesa	10.58	144	17.01	10.1
Khmelnyskyi	9.00	122.3	11.41	6.8
Zhytomyr	9.93	134.9	16.44	9.8
Cherkasy	12.03	163	18.28	10.9
Rivne	6.18	84.0	11.74	7.0
Chernivtsi	5.68	77.2	7.98	4.8
Zakarpattia	4.39	59.6	6.97	4.2

Source: calculated by the authors based on Table 4, Table 5 and the regional labour-force release of the State Statistics Service of Ukraine for January-June 2021. RC = 100% means the region's own tax payments per economically active person exactly cover the national defence expenditure per economically active person for that year.

used in Section 4.6 are explicit limitations that should be borne in mind when interpreting the magnitude, though not the direction, of the reported trends.

CONCLUSIONS

This study examined budget crowding-out in Ukraine during 2012-2024 by analysing defence expenditure, tax revenues, labour-force dynamics and regional tax capacity. Wartime defence financing has substantially transformed the country's fiscal structure: the share of tax revenues absorbed by defence rose from single digits before 2022 to over 170% in 2023, defence expenditure per economically active person increased almost 300-fold over the study period, and even the strongest regional economies covered only about half of the national defence quota per person from their own tax base by 2023. These find-

ings indicate that budget crowding-out under wartime conditions is a multidimensional fiscal process shaped jointly by defence financing, labour-force contraction and regional fiscal capacity, rather than a single aggregate ratio.

The scientific contribution lies in integrating these four dimensions – defence expenditure, tax revenues, labour-force dynamics and regional tax capacity, including the newly proposed regional defence-quota coverage coefficient – within a single, reproducible framework. From a practical perspective, it may support the Ministry of Finance and other public institutions in assessing defence-financing sustainability, identifying regions with the weakest fiscal self-sufficiency, and informing evidence-based budget planning.

The study has clear limitations: labour-force estimates for 2022–2024, and the 2021–fixed regional labour-force denominator used for the 2023 regional coefficient, are authorial approximations necessitated by the suspension of official labour-force surveys, and results should not be generalised beyond Ukraine's specific wartime institutional context. Future research should extend the framework through econometric modelling of causal relationships, comparative application to other conflict-affected economies, and analysis of post-war fiscal recovery and the restoration of regional tax capacity. ■

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