DOI: 10.55643/fcaptp.4.63.2025.4879

ASSESSMENT OF THE IMPACT OF MACRO INDICATORS ON THE FINANCIAL SECURITY OF SMALL BUSINESSES UNDER MARTIAL LAW

Oleksandr Bondarenko
D.Sc. in Public Administration, Associate Professor of the Department of State Security and Administration, National Academy of the National Guard of Ukraine, Kharkiv, Ukraine;
e-mail: alexanderbondarenko7777@gmail.com
ORCID: 0000-0003-1755-3333
(Corresponding author)

Larysa Samoilenko
Candidate of Sciences in Public Administration, Associate Professor of the Department of Management and Civil Service, Bohdan Khmelnytsky National University of Cherkasy, Cherkasy, Ukraine;
ORCID: 0000-0002-0335-3077

Mariia Rossokha
Senior Research Fellow, Department of Management and Public Administration, Bohdan Khmelnytsky National University of Cherkasy, Cherkasy, Ukraine;
ORCID: 0009-0006-8103-3550

Volodymyr Kupchak
D.Sc. in Economics, Professor of the Department of Management and Administration, Ivano-Frankivsk Education and Research Institute of Management, West Ukrainian National University, Ivano-Frankivsk, Ukraine;
ORCID: 0009-0002-0231-5308

Anton Drobot
PhD Student of the Educational and Scientific Program "Management", Bohdan Khmelnytsky National University of Cherkasy, Cherkasy, Ukraine;
ORCID: 0009-0009-4716-871X

Received: 24/06/2025
Accepted: 10/08/2025
Published: 31/08/2025

ABSTRACT

The purpose of the study is to assess the impact of macro financial indicators on the financial security of small businesses in Ukraine and to develop an integral index to measure the level of financial stability of small businesses in wartime conditions. This involves a simultaneous analysis of the entrepreneurial and public dimensions of financial security, taking into account their interrelation and dynamics during 2018–2024. The article examines the financial security of small businesses and the public sector of Ukraine in martial law. The MSME_FSI indicator is proposed, built on the basis of the aggregation of six key financial indicators of small businesses during 2018–2024, by normalising data and averaging. Using the multiple regression method, the impact of macroeconomic factors on the resulting index was assessed. The modelling results confirmed the high degree of determination of the specified index by the specified macro indicators: growth in inflation and public debt statistically significantly reduce the level of financial security of small businesses. The most vulnerable year was 2022, when MSME_FSI fell sharply to a critical level of 0.16, reflecting the negative impact of a full-scale war. The findings emphasise the need for consolidated actions by public administration and business to maintain financial stability: macro-financial stabilization and effective support for small businesses are interdependent components of financial security at all levels.

Keywords: financial security, small business, martial law, integral index, macroeconomic factors, regression analysis, data normalization, public dimension

JEL Classification: F52, G32, M21

INTRODUCTION

The principles of ensuring economic security at both the micro and macro levels have undergone significant changes over the past thirty years. First of all, there was an awareness of the need to focus attention and allocate appropriate resources. The decisive stage was the transformation of the monolithic nature of security activities, which provided for giving preference to economic security in general in favour of detailing in terms of the main functional components, among which financial security was and remains a priority. Consequently, military actions became the basis for another transformation, which was provoked by the relevance of organizing remote workplaces, the need for business relocation, and the wider use of digital technologies with limited physical contact with counterparties. The current stage of activity is characterized by further high dynamics, when previously formed experience in security activities becomes insufficiently effective in use. The constant modernization of the principles of applying security measures with appropriate changes is urgent. Enterprises are faced with a sharp decline in production volumes, a shortage of working capital, logistical disruptions, and exchange rate fluctuations, which threaten their economic survival. On the other hand, the state is forced to make disproportionately large expenditures on the security sector, social support, and infrastructure restoration, while being limited in its financing capabilities due to the fall in budget revenues. In such conditions, financial security acquires not only an economic but also a strategic dimension, because it provides the basis for maintaining the manageability of the economy and the vital activity of society.

The issue of financial security is acute both at the business and public levels. The reason for such relevance is a number of objective and subjective factors. Among them, the main ones are the imperfection of tax administration, a high level of dependence on external financing sources, shadow income, as well as the rigidity of mechanisms for responding to various crisis situations. At the same time, if we consider each level separately, enterprises often cannot fully formulate and implement anti-crisis strategies due to limited access to financial resources. If we talk about the level of the public sector, problems can arise due to the complexity of the processes of compliance with budgetary norms and bureaucratic procedures, as well as, which has become relevant in recent years, the priority of defense spending. In such conditions, there is a multiple increase in the risk of budget deficit, insolvency, or a decrease in the investment attractiveness of the country. It should be noted that it is precisely because of the low level of budget support that the business sector can lose its functional capabilities for stabilization. This, in turn, will reduce the tax base and further worsen the financial condition of the state. Therefore, we can determine the presence of a strong interdependence between the entrepreneurial and public dimensions of financial security, since destabilization of the financial component in one link can lead to negative consequences in the other. Enterprises are sources of tax revenues, maintaining a consistently high level of employment and economic activity, which forms the basis for the financial stability of the public sector. In turn, the implementation of an effective financial policy will create favourable conditions for business development. This will occur through the formation and implementation of more modern instruments for regulating public procurement, preferential lending, protecting property rights, and security guarantees. The war has created an even greater need for a holistic model of financial security, which would be based on an optimized partnership between the state and business. In practice, such a model should help reduce costs, support critical sectors, and maintain socio-economic stability. Given all this, this topic is relevant and important for today's discourse on security in Ukraine, the sphere of economic security, and national development.

LITERATURE REVIEW

When considering the scientific and practical literature, we consider it necessary to consider the issue of financial security in two dimensions: the public dimension and the entrepreneurial dimension. So, for example, Datsii et al. (2024) note that in conditions of martial law, the financial security of enterprises is subject to significant pressure due to changes in market conditions, reduced demand, disruption of logistics chains, and exchange rate instability. Scientific sources emphasize (Varnalii, 2023) that enterprises lose the ability to carry out long-term planning, face limited access to capital, and an increasing risk of insolvency. Financial instability forces businesses to focus on short-term survival, sacrificing investment activity and security development. Most scholars and practitioners (Kostenko, 2024) note that small and medium-sized enterprises are particularly vulnerable, as they do not have sufficient financial reserves to overcome prolonged crisis periods. The literature emphasizes that these business entities are often forced to close down their activities or move into the shadow sector, which, as a result, reduces the tax base and complicates overall economic stabilization. The problem of debt burden and lack of guarantees for loan repayment in conditions of high uncertainty is also growing.

Shtantsel, et al. (2024) and Makarchuk, et al. (2023) rightly note that the operating environment of Ukrainian small and medium-sized enterprises is characterized by a critically high level of dynamism, which is provoked by the influence of factors with different activity of manifestation and degree of influence. In such a situation, managing the financial security of an enterprise is possible only if information about the course of events regarding both internal processes and the activity of external entities is constantly updated. This applies not only to the nature of the influence of factors such as military operations on the territory of the country, but also to those that occur in a less intensive form over a longer period. As Kryshtanovych et al. (2023) rightly note, entrepreneurship and the public sector are very closely interconnected. According to the scientist, the current technological progress of economically developed countries, with a focus on the implementation of the Industry 4.0 concept, is ensured precisely at the micro level, in particular through the creation and production of high-tech products. Therefore, the post-war recovery of the national economy can only be ensured by the revival of the simultaneous modernization of enterprises.

In the scientific literature (Varnalii 2022; Stefanchishen et al., 2024), the financial security of the public sector under martial law is considered as the ability of the state to ensure the fulfillment of its fiscal and social obligations despite external threats, political instability, and a sharp increase in expenses. The authors note that the budget system under war conditions undergoes profound transformations: there is a prioritization of defense needs, a decrease in traditional revenues, and an increase in dependence on international financial assistance. The study by Voronova et al. (2023) notes that the key challenge to financial security is maintaining the solvency of the state in the face of a budget deficit and growing debt pressure. Consequently, the above-mentioned works emphasize the need to pursue a policy of strict expenditure control, reform the public financial management system, and ensure transparency in the allocation of funds.

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Public finances should be protected from external shocks, in particular through mechanisms of budget flexibility and increased efficiency of tax administration. At the same time, Melnyk (2022) emphasizes the role of international macro-financial support as a key resource for maintaining financial security in times of war. At the same time, the authors emphasize the exceptional importance of responsible management of these resources, taking into account the requirements of donors and long-term commitments to society. We agree with the thesis that an effective strategy for ensuring public financial security should include elements of adaptive planning, risk management, and anti-crisis instruments for mobilizing financial resources.

It is important that in the scientific and practical literature, there are no attempts to actively investigate the issues of interaction between the state and small business. Here, we would like to highlight the works of Lazar, Cioc, and Prioteasa (2023) and Synchak and Melnyk (2023), in which they demonstrate how macro factors affect the micro level. The works empirically prove that the same inflation and exchange rate fluctuations have a statistically significant effect on the activities of small enterprises, thus identifying a channel of direct dependence of their profitability on the monetary (in)stability of the state. Models are being formed that combine indicators of the banking, debt, budgetary, currency, and monetary spheres into a holistic index of financial security and emphasize the need to simultaneously take into account macro and micro factors to prevent systemic risks. Dubyna et al. (2023) emphasize that the financial security of small businesses is a category that depends on both the internal stability of enterprises and external macroeconomic conditions. Therefore, it is important to assess the impact of macro factors.

As a result of the literature review, it can be stated that scientific sources highlight financial security in martial law as a complex multi-level system in which both the entrepreneurial and public dimensions are critically important. Despite significant scientific interest in the issue, obvious gaps remain in the literature. There is a lack of comprehensive studies that simultaneously analyze both dimensions of financial security – entrepreneurial and public – in their interconnection and dynamic interaction in wartime.

AIMS AND OBJECTIVES

The purpose of the study is to assess the impact of macro-financial indicators on the financial security of small businesses in Ukraine and develop an integral index to measure the level of financial stability of small businesses in wartime conditions. This involves a simultaneous analysis of the entrepreneurial and public dimensions of financial security, taking into account their interrelationships and dynamics during 2018–2024. To achieve this goal, the following tasks are solved:

1. Formation of an assessment methodology - to justify the choice of indicators for assessing the financial security of small businesses at the micro level and methods for their normalization and aggregation into a single index.
2. Calculation of the index - to collect initial data for 2018–2024, normalize the performance indicators of small businesses and calculate the annual values of the index.
3. Modelling of interlevel influences - to build an econometric multiple regression model that describes the dependence of the calculated index on the selected macro-financial indicators.
4. Diagnostics and interpretation of results – check the adequacy of the model, analyze the presence of multicollinearity between factors and draw conclusions.

METHODS

The study used the multiple linear regression method. The latter is a classic tool used to analyze the influence of a number of independent variables on the dependent variable. Given the functionality of this method, it is often used in economic research due to the simplicity of the process of interpreting complex parameters. In addition, the use of the multiple (multifactor) regression method, as opposed to unified methods that analyze individual paired regressions, makes it possible to take into account a number of inter-factor effects. The multiple linear regression method also allows for control over each variable, while isolating it from the impact of others. This is especially relevant in the context of a high level of interdependence of macro indicators.

A multilevel analysis was carried out to determine the extent to which macroeconomic factors determine the level of financial security of small businesses. Based on a review of the literature and macroeconomic data from the war period, several indicators were selected that most clearly reflect the challenges for public finances and the economy of Ukraine in

2018–2024. In order to facilitate successful modeling, an aggregation method was chosen (arithmetic mean, weighted, multiplicative, etc.). We used an aggregated index (Canós, 2008), which we modified into MSME_FSI (Financial Security Index for Micro, Small and Medium Enterprises) to assess the financial security of small businesses in Ukraine under martial law. The MSME_FSI index was built to simplify the interpretation of complex data and provide a single metric for tracking the dynamics of small business financial security during 2018–2024 (1):

$$\text{MSME\_FSI} = \frac{1}{n}\sum_{i=1}^{n} N \quad (1)$$

The normalization method (Gil-Aluja, 1999) was also applied. Data normalization (in formula (1) denoted as N) is a critically important step in constructing an integral index, in particular, the aggregated index of financial security of small businesses (MSME_FSI), since it allows bringing all indicators to a single scale. In our case, all values were converted into a range from 0 to 1, which ensured their comparability despite the different nature, dimension, and units of measurement (percentage, billions of hryvnias, etc.).

Finally, we note that all statistical calculations were performed in the E-Views 13 environment. Such a choice of software guarantees compatibility of the results with classical econometric standards and facilitates further replication of the analysis by applied users.

RESULTS

In order to conduct a full and detailed analysis of financial security in the conditions of martial law, we have chosen the sphere of small and medium-sized businesses. The reason for choosing this category of enterprises is that the latter are most vulnerable to external destabilizing factors. At the same time, it is small and medium-sized businesses that play a critical role in maintaining economic sustainability and stability at the local level. Often, small businesses simply do not have full access to reserve financial resources, high levels of diversification, and government support. This determines the risk of insolvency and disruption of logistics chains. In addition, it is this type of enterprise that has the ability to quickly adapt to changes in market conditions, provide employment in the regions, and act as an indicator of the general state of economic well-being in the region in times of crisis. Given this, ensuring an adequate level of financial security in this area is not only a microeconomic, but also a strategic public issue.

It should be noted that we selected a number of indicators, some from the macro environment of the functioning of small and not only businesses in Ukraine, while others exclusively characterize the financial activities of small businesses. We believe that the choice of indicators is appropriate because it reveals a number of aspects of both the macro and micro environments. For example, the inflation index reflects the rate of depreciation of money and directly puts pressure on the costs, profitability, and liquidity of small businesses. The same exchange rate of the hryvnia to the US dollar demonstrates devaluation expectations, which affects the cost price. Or the volume of external financing characterizes the budget's dependence on international aid and determines the resource base of state programs to support small businesses. In conditions of martial law, military spending shows the priority of defense, reallocation of budgetary resources away from economic development priorities, cutting off funds from economic development. The same tax revenues from the profits of enterprises are an indicator of real business activity. An important indicator in the context of ensuring financial security is profit. It is also necessary to remember about current liabilities and collateral, which reflect the level of debt burden on small businesses. The share of enterprises with a sufficient level of liquidity characterizes the short-term solvency of the sector. The volume of products sold reflects market demand and the stability of cash flows, which is critically important for ensuring financial security. Of course, there are other indicators that in one way or another affect the financial security of small businesses, but in our collective opinion, all of the above also have their impact.

In the context of the public dimension, since 2022, there has been a sharp increase in the inflation index (126.6% in 2022 versus 110% in 2021), which directly reflects the shock of the war. This is accompanied by the devaluation of the hryvnia: the exchange rate from 26.29 in 2021 increases to 42.03 in 2024, which indicates a loss of confidence in the national currency. Of particular significance is the volume of defense spending: from UAH 455.2 billion in 2021 to UAH 2971.6 billion in 2024. This is the result of priority defense financing, which diverts resources from economic support for business. At the micro level, the profitability of small businesses after the war shock of 2022 (only 1.2%) is gradually increasing, but has not yet recovered to the pre-war level. The volume of capital investments, critical for the renewal of production, remains lower in 2024 than in 2019–2020. The share of enterprises with sufficient liquidity decreased from 33% in 2018 to 16% in 2024, which indicates increased financial instability and a decrease in the level of financial security (Table 1).

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Table 1. Input data for modelling (MinFin Statistics; State Statistics Service of Ukraine).

Macro level							
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Inflation index, %	109.8	104.1	105	110	126.6	105.1	112
Exchange rate to USD as of the last month of the year	28.05	28.2	28.1	26.29	36.56	37.98	42.03
Volume of external financing, UAH billion	63.7	80.58	76.41	131.04	31.1	42.6	41.7
Volume of defense expenditures, UAH billion	170.5	102.4	368.1	455.2	1142.8	2652.2	2971.6
Tax revenues from corporate profits, UAH billion	96.8	107.1	108.6	147.7	117.1	143.8	271.1
Government debt, UAH billion	2168.6	1998.2	2551.9	2671.8	4071.6	5519.4	6982.1
Micro level							
Profitability of small enterprises, %	8.3	10.7	3.9	15.1	1.2	4.0	5.5
Current liabilities and collateral, UAH billion	2439.9	1892.2	2084.2	2618.3	2619.1	3313.4	3689.9
Volume of capital investments, UAH billion	59.9	80.4	84.4	44.6	54.6	77.1	75.4
Net profit/uncovered loss, UAH billion	31.8	89.4	-25.5	162.2	-93.1	-12.4	-13.6
Share of small enterprises that had a sufficient level of liquidity, %	33	31	28	27	18	15	16
Volume of products sold (goods, services), UAH billion	2496.9	2698.2	3051.2	3917.5	2156.9	2745.2	3103.6

As we can see, each indicator has its own value, and everything should be brought to a single normalized value in order to continue further modeling. We used two different normalization formulas because the indicators that we included in the calculation have different economic interpretations of the impact. For example, for indicators such as profitability, profit, sales volume, or the share of liquid enterprises, growth is a positive factor, so we used classical normalization (2):

$$N=(X-X_{min})/(X_{max}-X_{min}) \quad (2)$$

However, for the indicator "Current liabilities and collateral", growth, on the contrary, indicates a deterioration in the financial situation, that is, it is a negative factor. Therefore, for it, we applied the inverse normalization formula (2):

$$N=(X_{max}-X)/(X_{max}-X_{min}) \quad (3)$$

It should be noted that the above formulas (2) and (3) use the classic min–max normalization to reduce all multidimensional indicators to a single scale of 0–1, so that they can be averaged without distortion in the integral index MSME_FSI. If the value is "+", then we use formula (2); if negative, then formula (3). Let us show their application. Let's clearly demonstrate what normalization looks like in practice. Let's take the indicator "Profitability of small enterprises, %":

1. Current value:2018: 8.3; 2019:10.7;2020; 3.9;2021:15.1;2022:1.2;2023:4;2024:5.5
2. Minimum was: 1.2 (X_{min}); maximum was: 15.1 (X_{max}).
3. Normalization result:
   - 2018:(8.3 – 1.2) / 13.9 = 0.511
   - 2019:(10.7 – 1.2) / 13.9 = 0.683
   - 2020:(3.9 – 1.2) / 13.9 = 0.194
   - 2021:(15.1 – 1.2) / 13.9 = 1
   - 2022:(1.2 – 1.2) / 13.9 = 0
   - 2023:(4 – 1.2) / 13.9 = 0.2
   - 2024:(5.5 – 1.2) / 13.9 = 0.31

Thus, the calculation is carried out similarly for all indicators, and the results of the calculation are summarized in Table 2.

Table 2. Result of normalization.

	2018	2019	2020	2021	2022	2023	2024
Profitability of small enterprises, %	0.511	0.683	0.194	1	0	0.2	0.31
Current liabilities and collateral, UAH billion	0.695	1	0.946	0.476	0.472	0	0.243
Capital investment volume, UAH billion	0.384	0.897	1	0	0.251	0.191	0.185
Net profit/uncovered loss, UAH billion	0.489	0.625	0.264	1	0	0.096	0.189
Share of small enterprises with sufficient liquidity, %	1	0.888	0.722	0.666	0.166	0	0.055
Volume of products sold (goods, services), UAH billion	0.282	0.308	0.513	1	0	0.243	0.314

The next step after normalization is to calculate the aggregated index of financial security of small businesses (MSME_FSI) for each year. Using formula (1) and data from Table 2, we will suggest and determine this index for 2018:

$MSME\_FSI_{2018=}1/6(0.510+0.695+0.384+0.489+1+0.28)=0.56$

We do the same for the remaining years. As a result, we obtain values for all years (Figure 1). The values of the aggregated index of financial security of small businesses (MSME_FSI) demonstrate a clear change in the dynamics of the financial stability of this sector in Ukraine in the period from 2018 to 2024. The highest indicators are observed in 2019 (0.74) and 2021 (0.71), which indicate relatively favourable economic conditions for small enterprises in these periods. In particular, in 2019–2021, small businesses demonstrated stable profits, high profitability, and good results in terms of liquidity and investment activity. This indicates the existence of a certain strategic potential for the sustainable development of small businesses in peacetime. However, in 2022, with the beginning of Russia's full-scale armed invasion, the index sharply decreased to a critical level of 0.16. This is due to the fall in almost all normalized indicators. These data confirm that small businesses are particularly vulnerable to military shocks, and their financial security directly depends on the stability of the macroeconomic environment, access to resources, and the level of state support in crisis conditions.

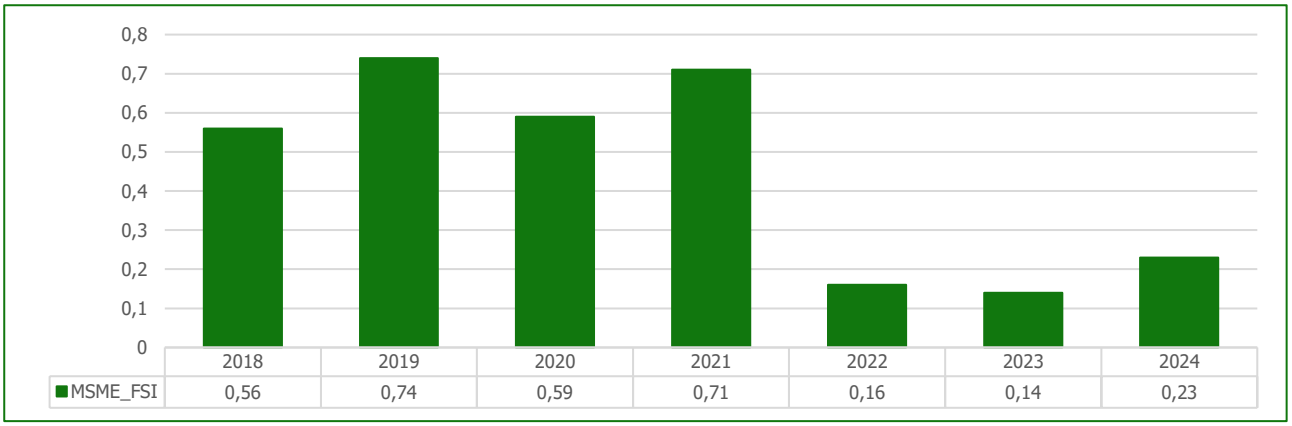

Figure 1. Value of the aggregate index of financial security of small businesses.

To assess the impact of macro financial indicators on MSME_FSI (Figure 1), a multiple linear regression model was built. Initially, all 6 factors were included, but a multicollinearity problem was identified: some indicators are highly correlated with each other (for example, defense spending and public debt, hryvnia exchange rate and public debt - correlation coefficients ~0.93–0.99) and lead to unstable estimates. The VIF value for public debt exceeds 700, for defense spending ~488, and for the exchange rate ~115, which indicates critical multicollinearity. Of course, external public debt affects the financial security of small businesses indirectly. Therefore, its increase provokes devaluation expectations, which make imported resources and foreign currency loans more expensive. At the same time, grant or preferential programs for small businesses, which are extremely important for their survival under martial law, may suffer. The impact of debt on small businesses is usually moderate but statistically significant due to the increase in overall macro instability. Therefore, the model was simplified by removing the defense factor (due to its almost complete correlation with the government debt in 2022–24) and external financing (the smallest contribution correlated with the others). Thus, the final regression model includes the inflation index, income tax, and government debt, which turned out to be the most significant factors.

DOI: 10.55643/fcaptp.4.63.2025.4879

As we can see from the above equation and Table 3, the inflation index has a negative coefficient, given that each increase in inflation by 1 subpoint (for example, from 110% to 111%) will lead to a decrease in MSME_FSI by an average of 0.008 (provided that inflation is 0.008). The increase in prices and inflation expectations will negatively affect the level of financial stability of small businesses. This is consistent with the stated logic: the higher the inflation, the greater the costs and uncertainty. Such a situation will aggravate the financial security of enterprises. At the same time, tax revenues from enterprise profits have a positive effect. The coefficient +0.0037 will mean that each additional UAH 1 billion of paid profit tax (indirectly reflecting the growth of business profits) will increase the MSME_FSI index by 0.0037. Taking this into account, improving the level of profitability and financial results of enterprises will contribute to the growth of their financial security. Here, it should be additionally noted that the positive effect of tax revenues in the model is not traced as a result of state support for business, but is a statistical reflection of the fact that large tax payments determine business profits.

Table 3. Modelling results.

Factor (variable)	Estimation of the coefficient	SE-deviation	Significance criterion (t)	Probability level (p)
Intercept	1,5693	0,204	7,695	0,005
Inflation index, %	–0,0080	0,0018	–4,362	0,022
Profit tax, UAH billion	0,0037	0,0004	8,562	0,003
Government debt, UAH billion	–0,0002	0,000014	–14,736	0,001

Other factors (hryvnia exchange rate and external financing volumes) did not show independent significance in the model (p>0.1) after taking into account the impact of inflation and debt. Bivariate analysis, however, demonstrates the expected directions of their influence (Figure 2): an increase in the USD/UAH exchange rate (hryvnia devaluation) is associated with a fall in MSME_FSI, and an increase in external financing (loans, aid) is associated with an increase in FSI. During the 2022 shock, the hryvnia devalued (from 26.3 to 36.6 UAH/USD) amid panic and war, which coincided with the collapse of the FSI. However, in the presence of other variables, the exchange rate did not statistically affect the FSI, since its effect was already taken into account through inflation and debt indicators. Thus, the graphs show the dependence of the values of the small business financial security index (vertical axis) on each of the macroeconomic factors (horizontal axis) for 2018–2024 (Figure 2).

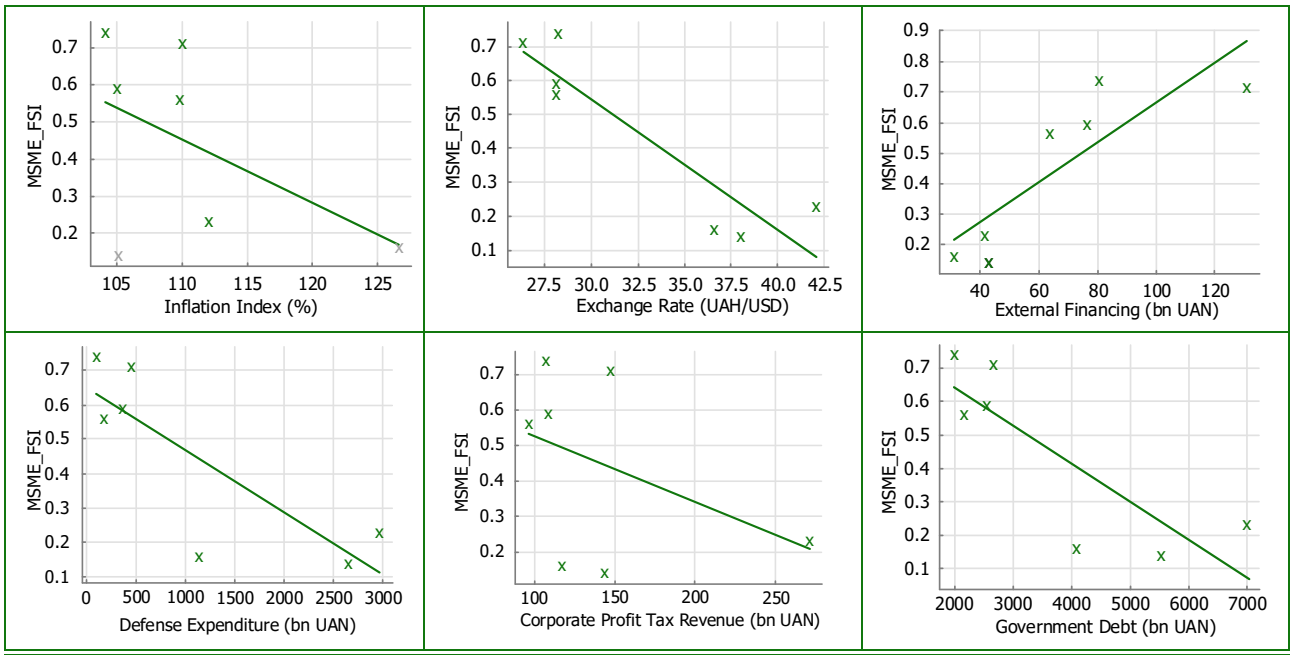

Figure 2. Connections between macro indicators and MSME_FSI index (Imported after modelling in the appropriate software).

The final regression model is characterized by a very high explanatory power: the coefficient of determination $R^2 = 0.792$, adjusted $R^2 = 0.784$. This means that ~79.2% of the variation in the MSME_FSI index is explained by the included macro indicators. Fisher's statistics confirm the significance of the model as a whole: $F = 121.8$, $p = 0.00124$, i.e., the model is reliable (the null hypothesis of the absence of the influence of all factors is rejected) at a significance level of over 79%.

Thus, we have that the sharp deterioration of macroeconomic conditions in 2022–2024 (high inflation, devaluation of the hryvnia, rapid growth in public debt) had a negative impact on the financial security of small businesses. Although the direct effect of external financing (international aid, loans) did not become statistically significant in the model, its positive correlation with FSI indicates potential benefits. Excessive public debt and military spending create fiscal risks that weaken small businesses. At the same time, high tax revenues from businesses are an indicator of their health and contribute to filling the budget.

Multivariate regression showed that ≈79% of the fluctuations in the MSME_FSI integral index in 2018–2024 are explained by three macro factors, namely inflation, debt, and income tax (Table 3). The largest collapse of the index occurred after February 2022, when a sharp increase in inflation and debt almost instantly "knocked out" primarily liquidity and profitability (Table 2) of enterprises from among the six micro indicators. Thus, it is necessary to highlight the key, in our opinion, areas of improvement, based on the modelling results obtained above in the text. We believe that it is precisely the achievement of macroeconomic stabilization (low and predictable inflation, moderate debt burden, balanced public finances) that creates favourable conditions for small business activities. At the same time, it is precisely targeted support for entrepreneurs through accessible financing, tax breaks, grants, and other tools that directly improve their liquidity and profitability. Taken together, these measures reinforce each other: a strong macrofinancial framework enables small enterprises to develop successfully, and viable small businesses generate tax revenues and support budget sustainability, which is especially important in wartime conditions (Figure 3).

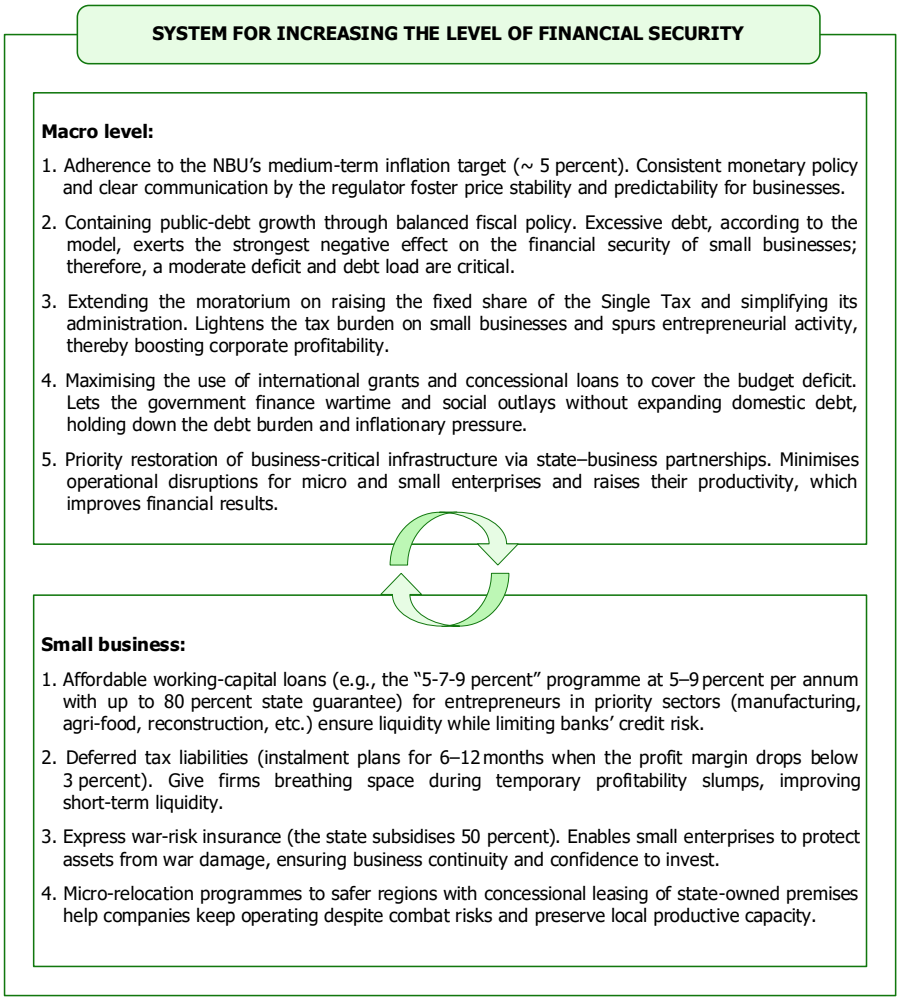

Figure 3. Directions for increasing financial security for small businesses and the public sector.

The complex we have formed consists of six measures for small businesses and a similar number for public finances. Consequently, the latter addresses three key channels that were identified by our model as the most powerful determinants of the MSME_FSI index. These determinants are inflation, the country's debt overload, and the profitability of companies. First of all, it should be noted that it is cheap working capital loans, tax installments, grant vouchers for energy-saving technologies, war risk insurance, cooperative clusters, and preferential relocation that can allow small businesses to most

DOI: 10.55643/fcaptp.4.63.2025.4879

quickly restore their own liquidity, profitability, and investment activity. This, in turn, will directly increase the level of financial security components and therefore will increase its average value.

As a result of the study, it was determined that, during 2018–2024, 79 percent ($R^2 = 0.784$) of the variation in the integral Financial Security Index for small businesses (MSME_FSI) was driven by three macro-financial factors—the inflation index, corporate profit-tax revenue, and public debt. The most critical period began after February 2022, when the MSME_FSI dropped to 0.16 amid peak inflation and a debt shock. Consequently, long-term macro-financial stabilization (curbing inflation and slowing debt growth, see Table 3) must be paired with targeted instruments that bolster the short-term liquidity and profitability of small enterprises (the indicators from Table 2 that form the core of the MSME_FSI), because these two micro-indicators react most quickly to changes in the external environment and are embedded in the MSME_FSI's structure.

DISCUSSION

If we compare previous studies, Onyshchuk et al. (2020) and Ganushchak (2018) noted that the financial stability of business and the state are interconnected elements of national economic security. But to this day, there is no holistic quantitative model in the scientific discourse that would simultaneously include two dimensions and be effective in martial law. Despite the large number of scientific papers in this area, most of them remain focused on large businesses or financial institutions. At the same time, we are trying to form an aggregated, financially secure index specifically for the small business level, which is based on six fundamental indicators of small business performance, while bringing its applicability to the challenges of wartime.

Our study has shown that the sharp increase in inflation and public debt in 2022-2024 has become a key channel for transmitting shocks at the macro level, which leads to the financial vulnerability of small businesses. These findings only confirm the theses regarding the "debt burden of war" (Roy, 2024) and the need to develop innovative financial competencies in the public sector (Zaporozhets et al., 2024). Thus, the findings of the study bring a holistic quantitative model of "macro to micro" financial security to the modern scientific discourse. The latter will improve the understanding of the concept of economic security, demonstrating that the sustainability of small businesses is not only an internal corporate task, but also critically depends on the current fiscal and monetary policy of the state and the effectiveness of military administrations.

Summing up, we believe that, unlike previous studies, our study attempts to improve a number of aspects, in particular: forms a holistic "macro-to-micro" basis specifically for small businesses under martial law, integrating indicators of both levels in one econometric equation. At the same time, the author's vision of a modernized index is proposed, which is now adapted to take into account the specifics of the financial security of small businesses. Also, a number of improvement measures are proposed, based on the analysis conducted with the author's vision of how to improve the situation at the macro and micro levels.

CONCLUSIONS

As a result, we believe that financial security has become a key survival factor for both individual enterprises and public institutions. In difficult wartime conditions, the risk of financial instability increases, which can paralyze both public administration and private initiative. In our opinion, it is at the intersection of business and state interaction that new approaches to maintaining economic stability are being formed, which require scientific assessment, conceptualization, and practical recommendations. The multiple regression model demonstrated that in the period 2018–2024, macroeconomic and financial indicators significantly determined the financial security of small businesses in Ukraine. The relative stability of 2018–2021 contributed to the high level of MSME_FSI, while the war upheavals of 2022–2024 led to a sharp decline in the index itself. The most influential factors were inflation, public debt (negative impact), and business profitability (positive impact). To increase the financial security of small businesses, macro-financial stabilization (inflation control, exchange rate stability, moderate debt levels) and direct measures to support small businesses that improve their financial results are necessary.

The article by Hryshchuk (2022) explores the conceptual principles of ensuring the financial security of small business representatives in an unstable external environment. The author focuses on the critical role of micro-entrepreneurship as a basic element of the national economy and considers key macro threats that violate the financial stability of small businesses. We also agree with this; however, our study is distinguished by a different approach, in which we assess the impact of macro factors on a single generalized indicator, MSME_FSI.

Activities at the macro and micro levels always take place under the influence of a diverse number of both external and internal threats. And the thing is that this influence is not always positive or neutral for the relevant institution or organization. The destabilizing influence is especially noticeable for small and medium-sized businesses and the public sector. Today, such influences include the instability of the national currency and a number of problems in the market, but all this cannot be compared with the war, which, since February 24, 2022, has turned the idea of security on all possible levels. The financial activities of the enterprise have become particularly vulnerable, which, without new, modern, and to some extent innovative security measures, cannot maintain and create the necessary safe conditions. The fact is that problems in the field of financial activities lead to the destruction of all internal business processes at the enterprise. Thus, further research will be closely linked to a critical analysis of the impact of external and internal threats on the level of financial security for both the business and the public sector. The threats were not fully disclosed in this study; therefore, they require more careful attention in the future. It is necessary to propose a methodological approach for their correct assessment and timely response.

Prospects for further research may be the expansion of the model, where spatial effects and scenario forecasting will be integrated. All this will allow public sector representatives and private entrepreneurs to use more effective tools for making anti-crisis decisions. Taking this into account, the study solves the problem of gaps between macro- and micro-approaches to financial security management, and also provides qualitatively new vectors for further interdisciplinary work, in which econometrics would be combined with public-administration frameworks. As a result, this will contribute to maintaining security development and strengthening national security in conditions of protracted crises.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

FUNDING

The Authors received no funding for this research.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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Бондаренко О., Самойленко Л., Россоха М., Купчак В., Дробот А.

ОЦІНКА ВПЛИВУ МАКРОПОКАЗНИКІВ НА ФІНАНСОВУ БЕЗПЕКУ МАЛОГО БІЗНЕСУ В УМОВАХ ВОЄННОГО СТАНУ

Метою дослідження є оцінювання впливу макрофінансових показників на фінансову безпеку малого підприємництва в Україні та розробка інтегрального індексу для вимірювання рівня фінансової стійкості малого бізнесу в умовах воєнного часу. Це передбачає одночасний аналіз підприємницького й публічного вимірів фінансової безпеки з урахуванням їхнього взаємозв'язку та динаміки протягом 2018–2024 рр. У роботі досліджено фінансову безпеку малого бізнесу та публічного сектора України в умовах воєнного стану. Запропоновано показник MSME_FSI, побудований на основі агрегування шести ключових фінансових показників діяльності малих підприємств протягом 2018–2024 рр. шляхом нормалізації даних та усереднення. За допомогою методу множинної регресії оцінено вплив макроекономічних факторів на отриманий індекс. Результати моделювання підтвердили високий ступінь детермінації визначеного індексу заданими макропоказниками: зростання інфляції та державного боргу статистично значуще знижують рівень фінансової безпеки малого бізнесу. Найбільш уразливим був 2022 рік, коли MSME_FSI різко впав до критичного рівня 0,16, що відображає негативний вплив повномасштабної війни. Висновки підкреслюють необхідність консолідованих дій публічного управління та бізнесу для підтримання фінансової стійкості: макрофінансова стабілізація та дієва підтримка малого бізнесу є взаємозалежними компонентами фінансової безпеки на всіх рівнях.

Ключові слова: фінансова безпека, малий бізнес, воєнний стан, інтегральний індекс, макроекономічні фактори, регресійний аналіз, нормалізація даних, публічний вимір

JEL Класифікація: F52, G32, M21