

DOI: [10.55643/fcaptop.3.68.2026.5182](https://doi.org/10.55643/fcaptop.3.68.2026.5182)

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Received: 16/02/2026

Accepted: 13/05/2026

Published: 30/06/2026

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SOCIAL SECURITY AS AN INTERNAL STABILIZER OF FINANCIAL AND ECONOMIC RESILIENCE DURING WAR AND UNCERTAINTY IN UKRAINE

ABSTRACT

This study examines the role of social security as an internal stabiliser of financial and economic resilience under conditions of war and heightened uncertainty, using Ukraine as a case study. The relevance of the research arises from prolonged armed conflict and the escalation to full-scale war, which exposed the economy to severe structural shocks and exceptional uncertainty. The study aims to empirically assess whether social security mitigates deviations of economic activity from its long-term development path.

The analysis uses annual data for 2014–2024. Financial and economic resilience is operationalised as the deviation of real gross domestic product from its estimated long-term trend. Social security is measured by an integral index incorporating labour market conditions, inflation dynamics, and the share of social protection expenditures in total government spending. The empirical framework applies ordinary least squares estimation with robust standard errors, controlling for macroeconomic uncertainty and conflict-related structural breaks.

The results reveal a positive and statistically significant relationship between social security and economic resilience. Higher levels of social security are associated with smaller deviations of economic output from its long-term trajectory, even under conditions of elevated uncertainty and armed conflict. In contrast, macroeconomic uncertainty and war-related shocks exert a pronounced destabilising effect on economic resilience, with the full-scale war period demonstrating substantially deeper impacts.

The findings indicate that social security functions as a structural component of economic resilience rather than a residual social policy outcome, suggesting its critical role in economic stabilisation and post-war recovery.

Keywords: social security, social protection, social welfare, financial and economic resilience, economic security, econometric analysis, impact of the war, challenges and prospects, uncertainty

JEL Classification: C38, C45, H56, I32

INTRODUCTION

Contemporary economic development is increasingly shaped by systemic shocks, including armed conflicts, heightened macroeconomic uncertainty, and institutional instability. For economies operating under wartime conditions, conventional approaches to growth and macroeconomic stabilization often prove insufficient, as they largely overlook the social dimension of economic resilience. In this context, social security requires re-examination not merely as an element of welfare policy, but as an internal stabilizing mechanism capable of mitigating the adverse effects of large-scale shocks and supporting the adaptive capacity of the economy.

In a broader context, the outlined issues are directly related to the economic security of the state, which under wartime conditions is shaped not only by macrofinancial parameters but also by the capacity of the economic system to maintain governability, reproductive potential, and social stability. In this context, social security does not function as an autonomous component; rather, it constitutes a functional element of the

economic security system, influencing the resilience of public finances, the labor market, and domestic demand. Consequently, the analysis of social security gains significance as an instrument for assessing the underlying mechanisms that ensure economic security in conditions of prolonged armed confrontation.

This issue is particularly salient for Ukraine. Since 2014, the Ukrainian economy has been exposed to prolonged instability associated with armed conflict, while the onset of full-scale war in 2022 marked a qualitatively different phase characterized by unprecedented uncertainty, destruction of productive capacities, disrupted supply chains, and deteriorating social conditions. Under such circumstances, social security - through labour market stabilization, price stability, and public social protection mechanisms - may play a critical role in preserving economic resilience. However, its stabilizing effect remains insufficiently explored in empirical research, especially in the context of active warfare.

Existing literature on economic resilience has predominantly focused on macroeconomic fundamentals, financial stability, and institutional quality. A substantial body of research emphasizes the destabilizing role of uncertainty, particularly economic policy uncertainty, demonstrating its negative effects on investment, output dynamics, and expectations formation. At the same time, studies that explicitly integrate social security into empirical models of economic resilience remain limited. Where social factors are considered, they are often examined in isolation rather than as part of an integrated social security framework.

Parallel strands of research conceptualize economic resilience as the ability of an economy to absorb shocks while maintaining proximity to its long-term growth trajectory. Within this framework, social institutions are increasingly recognized as potential adaptive mechanisms. Nevertheless, empirical evidence on the role of social security in enhancing financial and economic resilience under conditions of war and extreme uncertainty remains scarce, particularly for transition economies facing large-scale military disruptions.

Against this background, this article advances the hypothesis that higher levels of social security are associated with greater financial and economic resilience, even under conditions of elevated uncertainty and armed conflict. Social security is conceptualized not as a by-product of economic growth, but as an endogenous stabilizing factor capable of cushioning deviations of economic activity from its long-term trend.

The expected contribution of the study is twofold. First, it provides empirical evidence supporting the stabilizing role of social security in a conflict-affected economy under extreme uncertainty. Second, it offers policy-relevant insights by demonstrating that social security constitutes a structural component of financial and economic resilience rather than a residual policy domain. These findings are particularly relevant for designing post-war recovery strategies in Ukraine, where sustainable economic reconstruction depends not only on physical capital and macro-financial support, but also on the restoration and strengthening of social security mechanisms.

LITERATURE REVIEW

The objective of this study is to provide a quantitative assessment of the impact of social security, operationalized through a system of indicators or an integral index, on financial and economic resilience, measured by an economic security index and selected macroeconomic proxies, during the period of armed conflict and post-war uncertainty.

The study is expected to yield empirically grounded evidence that social security constitutes not only a social but also a core economic category that directly contributes to the formation of state-level economic resilience under conditions of heightened uncertainty. This substantiates the conceptualization of social policy as an instrument of economic security rather than merely a component of social protection.

The concept of economic resilience has gained increasing prominence in the literature addressing macroeconomic instability and systemic shocks. Economic resilience is commonly defined as the capacity of an economy to absorb, adapt to, and recover from adverse shocks while preserving its core development trajectory. Early contributions emphasized resilience as a function of structural flexibility and institutional capacity, while more recent studies increasingly focus on the dynamics of shock absorption and persistence.

Within the framework of the state's economic security, this interpretation of resilience acquires particular significance, as it refers not merely to the recovery of economic indicators but to the preservation of reproductive potential, the governability of the economic system, and its capacity to perform core socio-economic functions in the face of systemic threats.

In empirical macroeconomic research, resilience is often operationalized through output dynamics, particularly deviations from long-term growth paths. Measuring resilience as the deviation of actual output from a counterfactual trend allows researchers to distinguish between temporary fluctuations and persistent structural damage. This approach has been

applied in studies assessing crisis impacts, financial shocks, and large-scale disruptions, providing a useful framework for evaluating the depth and duration of economic dislocations (Cerra and Saxena, 2008; Martin, 2012).

At the same time, for economies operating under conditions of armed confrontation, such deviations have not only a cyclical but also a security dimension, as a prolonged departure from the trend trajectory undermines the state's economic security through the weakening of fiscal capacity, significant shifts in the labor market, and the escalation of social risks.

For economies affected by armed conflict, resilience assumes a distinct analytical relevance. Conflict-related shocks are typically characterized by simultaneity, uncertainty, and prolonged duration, which differentiate them from conventional business cycle disturbances. Empirical studies on conflict-affected economies document substantial output losses, delayed recoveries, and long-lasting deviations from pre-conflict trends, suggesting that resilience in such contexts depends not only on macroeconomic fundamentals but also on institutional and social factors (Collier, 2007; Cerra et al., 2020).

These findings are consistent with prior research by Ukrainian scholars, which demonstrates that under conditions of military aggression, human social security—particularly through mechanisms related to employment, income, and creative potential—constitutes an important factor in maintaining economic security at both the micro and macro levels (Bazhenova et al., 2022; Varnalii et al., 2024).

Despite growing interest in resilience under conflict, much of the existing literature remains focused on aggregate growth outcomes or post-conflict reconstruction. Less attention has been paid to the mechanisms that mitigate deviations from long-term trajectories during ongoing conflict and heightened uncertainty. This gap is particularly evident in studies addressing social security. Social security is traditionally examined within the domains of welfare economics, labor market policy, and income redistribution. However, an emerging strand of literature recognizes its broader macroeconomic role, particularly in stabilizing demand, reducing social risks, and supporting economic continuity during crises. From this perspective, social security can be conceptualized as a component of economic security that influences resilience through multiple channels.

Employment stability, inflation containment, and effective social protection systems play a critical role in sustaining household consumption and labor supply under adverse conditions. Automatic stabilizers embedded in social security frameworks help smooth income shocks, reduce precautionary behavior, and mitigate feedback loops between economic downturns and social distress. Empirical evidence suggests that countries with stronger social protection systems experience less pronounced output contractions during crises and recover more rapidly (ILO, 2021; OECD, 2020).

In the context of economic security, social security is increasingly viewed as an integral subsystem rather than a residual policy outcome. This interpretation aligns with approaches that link social cohesion, institutional trust, and economic stability. Social institutions contribute to resilience by enhancing adaptive capacity, limiting social fragmentation, and supporting coordinated responses to shocks.

Nevertheless, empirical assessments of social security as an internal stabilizing mechanism remain limited, particularly in conflict-affected economies. Existing studies tend to focus on individual indicators—such as unemployment or social spending—without integrating them into a unified analytical framework. This limitation constrains the ability to capture the systemic contribution of social security to financial and economic resilience. Tries experiencing active warfare rather than post-conflict stabilization.

Macroeconomic uncertainty has been identified as a key determinant of economic instability, influencing investment behaviour, consumption decisions, and expectations formation. A substantial body of literature demonstrates that elevated uncertainty is associated with reduced economic activity and delayed recovery following shocks. Among the most influential contributions are studies that propose text-based indices to quantify economic and policy uncertainty, highlighting their strong negative relationship with output and investment dynamics (Baker, Bloom, and Davis, 2016).

Uncertainty is particularly salient in wartime conditions, where economic agents face not only market volatility but also institutional and geopolitical risks. Armed conflict amplifies uncertainty through unpredictable policy responses, disrupted production networks, and heightened informational asymmetries. Empirical research shows that uncertainty shocks tend to interact with structural breaks, deepening output losses and prolonging deviations from trend (Bloom, 2014).

Recent literature increasingly recognizes the role of social and institutional factors in shaping financial and economic resilience under uncertainty and conflict. While existing studies highlight the importance of social and economic resilience in turbulent environments and provide valuable qualitative insights, empirical evidence explicitly quantifying social security as an internal stabilizing mechanism remains limited. This study contributes to the literature by addressing this gap through an integrated econometric assessment of social security and financial and economic resilience in a conflict-affected economy.

Recent studies emphasize that socio-economic resilience under heightened uncertainty depends on macroeconomic stability, human capital, and coordinated policy responses. Papaava and Bedianashvili (2024) show that uncertainty interacts with structural vulnerabilities, amplifying economic instability in the absence of effective social and institutional stabilizers. However, the authors do not explicitly operationalize social security as a quantitative stabilizing mechanism, leaving scope for further empirical investigation (Papaava and Bedianashvili, 2024).

Empirical evidence from Ukraine indicates that the resilience of the socio-economic system to war-induced shocks is mediated by institutional capacity, social support mechanisms, and labor market adaptability. Libanova (2024) highlights the importance of internal stabilizing factors but does not provide an integrated econometric assessment of social security as a determinant of economic resilience, which this study aims to address (Libanova 2024)

Recent methodological advances propose dynamic approaches to identifying thresholds between resilience and vulnerability in social systems. Mulska et al. (2025) demonstrate that social systems exhibit non-linear responses to shocks, reinforcing the need to conceptualize social security as a stabilizing component within broader resilience frameworks.

Artelaris, Kallioras, and Katsinis (2024) show that the level and type of regional economic specialization shape local economic resilience, suggesting that internal structural characteristics significantly condition adaptive capacity during systemic downturns. However, their focus on economic specialization leaves room for further research on how social and institutional stabilizers, such as social security mechanisms, contribute to resilience in contexts of extended uncertainty and conflict.

Importantly, uncertainty does not operate in isolation. Its economic impact is mediated by institutional strength, policy credibility, and social stability. This interaction suggests that resilience-enhancing mechanisms may attenuate the destabilizing effects of uncertainty. However, the literature has yet to systematically examine how social security interacts with uncertainty in shaping economic resilience under conditions of war.

Building on these insights, this study develops a conceptual framework in which economic resilience is jointly determined by social security, macroeconomic uncertainty, and conflict-related structural breaks. Social security is hypothesized to function as an internal stabilizer that dampens deviations from the long-term growth trajectory, even when uncertainty and conflict pressures intensify. This framework provides the theoretical basis for the empirical model developed in the subsequent section.

AIMS AND OBJECTIVES

The aim of this study is to empirically assess the role of social security as an endogenous stabilizing factor influencing financial and economic resilience in Ukraine under conditions of war and heightened macroeconomic uncertainty. The objective of the study is to empirically assess the impact of social security on financial and economic resilience in Ukraine during periods of war and heightened uncertainty. To achieve this objective, the paper constructs an integral Social Security Index capturing labour market stability, inflation dynamics, and the fiscal priority assigned to social protection. Economic resilience is operationalized as the deviation of real GDP from its estimated long-term trend, allowing for an explicit focus on shock absorption rather than growth performance per se. The empirical analysis employs an econometric framework that controls for macroeconomic uncertainty and major conflict-related structural breaks.

METHODS

The methodological framework of the study combines theoretical conceptualization with empirical econometric analysis. The empirical analysis is based on annual data for Ukraine covering the period 2014–2024, which encompasses the military annexation of Crimea in 2014, the onset of armed aggression and active hostilities in the Donbas region during 2017–2019, the COVID-19 pandemic shock, the phase of partial post-pandemic recovery, as well as the structural break associated with the outbreak of the full-scale war in 2022. The choice of an annual frequency is primarily due to the availability and internal consistency of official socio-economic statistics under wartime conditions, and, on the other hand, to the need to ensure comparability across macroeconomic, social, and fiscal indicators. All variables were converted to a common temporal format prior to data transformation and econometric estimation.

The study employs a quantitative time-series research design aimed at identifying the causal relationship between social security and financial and economic resilience in Ukraine under conditions of war and elevated macroeconomic uncertainty. The empirical strategy integrates index construction techniques with econometric modeling in order to test the stabilizing hypothesis formulated in the study.

RESULTS

The primary information base of the study is formed by the following indicators: real GDP growth rates and the unemployment rate, obtained from the World Development Indicators database of the World Bank; annual inflation rates and quarterly values of the uncertainty index, sourced from the Federal Reserve Economic Data database; as well as data on the actual execution of the state budget by functional classification, in particular government expenditures on social protection, retrieved from the Open Budget portal of the Ministry of Finance of Ukraine. (World Bank, 2023; Federal Reserve Bank of St. Louis, 2024; Ministry of Finance of Ukraine, 2024; Baker et al., 2016; Onysenko et al., 2025).

The use of the above-mentioned data sources ensures institutional reliability, methodological consistency, and international comparability of the indicators. At the first stage of the analysis, a unified annual dataset for the period 2014–2024 is constructed based on harmonised indicator definitions. Table 1 serves as the source of the initial values for all subsequent transformations, which makes it possible to verify that all derived indicators (SSI and EconStab) are constructed from internally consistent data.

Table 1. Model data table for Ukraine (2014-2024). (Source: authors' calculations)

Year	GDP growth. %	Unemployment. %	Inflation. %	Social Protection Share. %	WUI. annual	D2014_2 021	D202 2	RGDP index (2014=100)	lnRGDP	Econ-Stab_gap
2014	-6.6	9.7	24.9	25	0.22	1	0	100	4.6052	-4.6052
2015	-9.8	9.5	43.3	26	0.2	1	0	90.2	4.5020	-4.5020
2016	2.4	9.7	12.4	25	0.5	1	0	92.3648	4.5257	-4.5257
2017	2.4	9.9	13.7	24	0.23	1	0	94.58156	4.5495	-4.5495
2018	3.5	9.1	9.8	23.5	0.19	1	0	97.89191	4.5839	-4.5839
2019	3.2	8.6	4.1	23.5	0.33	1	0	101.0245	4.6154	-4.6154
2020	-3.8	9.5	2.7	23.5	0.39	1	0	97.18552	4.5766	-4.5766
2021	3.4	9.8	10	22.1	0.42	1	0	100.4898	4.6101	-4.6101
2022	-28.8	19.7	26.6	31.8	2.85	0	1	71.54876	4.2704	-4.2704
2023	5.3	19.1	5.1	26.4	1.74	0	1	75.34084	4.3220	-4.3220
2024	4.8	18	8.6	24.8	1.21	0	1	78.9572	4.3689	-4.3689

Since trend deviations are more appropriately analysed using levels or indices of real GDP rather than growth rates, the second stage of the analysis reconstructs a real GDP index based on annual growth rates. The year 2014 is selected as the base year, for which the index value is normalised to 100. Subsequent index values are calculated according to the following formula:

$$RGDP_t = RGDP_{t-1} \left(\frac{g_t}{100} \right), \quad (1)$$

where: g_t – denotes the real GDP growth rate in the year^t.

This approach makes it possible to construct an internally consistent index of real economic activity, which is subsequently used to estimate deviations from the long-term development benchmark.

As a result, a consistent time series of the real GDP index for the period 2014 - 2024 is obtained. In the econometric model employed in this study, this series serves as the basis for logarithmic transformation and trend estimation, that is, for the construction of the dependent variable representing financial and economic resilience.

At the subsequent stage, the concept of financial and economic resilience – being the central analytical category of the study – is operationalised. The underlying premise of this stage is to conceptualise financial and economic resilience not as the level or rate of economic growth per se, but rather as the ability of the economic system to remain close to its long-term development path in the presence of external shocks and heightened uncertainty. This interpretation is consistent with contemporary approaches to financial and economic resilience, which emphasise deviations from potential or trend rather than absolute indicators of macroeconomic performance.

Based on the results of the previous stage, where the trend trajectory of real GDP was estimated, financial and economic resilience is measured as the deviation of the actual level of economic activity from this trend. Formally, the corresponding indicator is defined as the negative absolute value of the difference between the logarithm of the observed real GDP index and its estimated trend component:

$$EconStab_t = -| \ln(RGDP_t) - \ln(\widehat{RGDP}_t) |. \quad (2)$$

where: $RGDP_t$ denotes the real GDP index (chain-linked and reconstructed from annual growth rates); (\widehat{RGDP}_t) represents the trend component (estimated using the pre-war period).

In the econometric model, values closer $EconStab_t$ to zero (i.e., less negative) indicate a higher level of financial and economic resilience, reflecting smaller deviations from the long-term trend.

The use of logarithmic values ensures a symmetric interpretation of deviations both during periods of economic downturn and phases of recovery. The absolute value of the difference makes it possible to capture the depth of the divergence from the long-term trajectory regardless of the direction of the deviation, which is particularly important in periods characterised by shocks of differing signs. The minus sign is introduced in order to preserve an intuitive interpretation of the indicator: values closer to zero correspond to a higher level of financial and economic resilience, whereas more negative values indicate deeper losses of resilience.

The proposed indicator is conceptually close to classical output gap-type approaches but is adapted to conditions of conflict and a limited sample size. Unlike standard potential GDP estimates, which often rely on complex filtering techniques, this study employs a transparent and interpretable trend benchmark estimated on the basis of the pre-war sub-period. This ensures methodological simplicity, reproducibility of results, and reduces the risk of over-parameterisation in the presence of a small number of observations.

The practical implementation of this stage is based on the previously prepared variables $\ln(RGDP_t)$ and $\ln(\widehat{RGDP}_t)$. After substituting these values, the construction of the EconStab indicator is carried out automatically for each year of the study period, which makes it possible to obtain a continuous time series of economic resilience for 2014–2024. The resulting series captures not only the magnitude of the economic shock in crisis years but also the nature of the recovery process, that is, the speed and completeness with which the economy returns to its trend trajectory.

The methodological value of this approach lies in its ability to disentangle structural shocks from the internal dynamics of economic development, thereby allowing economic resilience to be interpreted as the outcome of the interaction between social, institutional, and macroeconomic factors. This indicator is subsequently employed as the dependent variable in the econometric model, thereby creating a logical bridge between theoretical conceptions of resilience and their empirical verification. As a result, a well-defined dependent variable for the econometric model is obtained. This makes it possible to assess not "growth per se", but deviations from a sustainable development path, which is conceptually consistent with the notion of economic resilience under conditions of uncertainty.

Accordingly, this stage completes the transition from primary macroeconomic data to an analytically meaningful indicator of economic resilience that is sensitive to shocks while remaining anchored in the long-term trajectory of economic development. This ensures the conceptual coherence of the model and strengthens the analytical foundation of the subsequent empirical results.

Accordingly, this stage completes the transition from primary macroeconomic data to an analytically meaningful indicator of economic resilience that is sensitive to shocks while remaining embedded in the long-term trajectory of economic development. This ensures the conceptual coherence of the model and strengthens the analytical validity of the subsequent empirical findings.

At the next stage, an integral Social Security Index (SSI) is constructed, which serves as the key explanatory variable in the econometric model. The need to develop such an index is обусловлена the multidimensional nature of social security, which cannot be adequately captured by a single isolated indicator. In the context of economic resilience, social security manifests itself through the interaction of labour market conditions, the stability of the price environment, and the ability of the state to support vulnerable population groups through fiscal mechanisms. Accordingly, the integral approach makes it possible to simultaneously encompass these core dimensions and to reduce the risk of a fragmented interpretation of social factors.

The Social Security Index incorporates three indicators: the unemployment rate, the inflation rate, and the share of social protection expenditures in total government spending. The unemployment rate reflects employment stability and households' capacity to generate sustainable income; inflation captures the preservation of purchasing power and price predictability; and the share of social protection spending reflects the institutional capacity of the state to mitigate social risks under crisis conditions. Taken together, this set of indicators is consistent with the conceptualisation of social security as a system that combines market-based and state-driven stabilisation mechanisms.

From a methodological perspective, it is important to clearly distinguish between indicators that have a stimulating and a destimulating nature. Within the framework of this study, the unemployment rate and inflation are treated as destimulators of social security, since their increase intensifies social vulnerability and deepens poverty risks. By contrast, the share of social protection expenditures is interpreted as a stimulator, as its growth indicates a higher priority accorded to social support in public policy.

Given the size of the sample ($n = 11$), it is methodologically appropriate to exclude the World Uncertainty Index (WUI) from the construction of the SSI in order to avoid conflating the state of social security with an external uncertainty shock (Baker et al., 2016). Accordingly, the SSI is constructed on the basis of three components: unemployment (destimulator), inflation (destimulator), and the share of social protection expenditures in total government spending (stimulator).

To ensure comparability across indicators measured in different units and characterised by different ranges of variation, min–max normalisation is applied. For destimulating indicators, the normalised values are calculated as follows:

$$z_{i,t} = \frac{\max(x_i) - x_{i,t}}{\max(x_i) - \min(x_i)} \quad (3)$$

whereas for stimulating indicators, the following formula is applied:

$$z_{i,t} = \frac{x_{i,t} - \min(x_i)}{\max(x_i) - \min(x_i)} \quad (4)$$

As a result, each component of the index takes values in the range from 0 to 1, where higher values correspond to a higher level of social security. This transformation prevents individual indicators from dominating the index due to differences in measurement scales and ensures a symmetric contribution of each component.

The aggregation of the normalised indicators is performed by computing their simple arithmetic mean:

$$SSI_t = \frac{1}{3} \sum_{i=1}^3 z_{i,t} \quad (5)$$

Equal weights are applied deliberately, in line with the research design and the intention to avoid normative assumptions regarding the relative importance of individual dimensions of social security.

In this study, the described stage yields the key explanatory variable—the Social Security Index (SSI). Given the limited sample size ($n = 11$), it is methodologically appropriate to maintain the distinction whereby the World Uncertainty Index (WUI) is excluded from the SSI in order to avoid conflating the state of social security with an external uncertainty shock (Baker et al., 2016). The World Uncertainty Index is treated in the analysis as an exogenous factor that affects economic resilience from outside the system, whereas social security is conceptualised as an internal characteristic of the socio-economic system. This distinction allows for a clearer identification of the stabilising potential of social policy without confounding it with the effects of the broader uncertainty environment. Accordingly, the SSI is constructed based on three components: unemployment (destimulator), inflation (destimulator), and the share of social protection expenditures in total government spending (stimulator).

The Social Security Index constructed in this manner forms a continuous time series for the period 2014–2024 and is subsequently employed as the key explanatory variable in the regression analysis. Its integral nature provides a compact yet economically meaningful representation of the social dimension, thereby establishing a methodologically grounded link between social policy and macroeconomic resilience.

For the period 2014–2024, it is methodologically appropriate to model structural breaks explicitly. In the proposed specification, this is achieved by introducing the break variable D_{2014_2021} , which takes the value of 1 for the period 2014–2021 (i.e., from the onset of the conflict in 2014 up to the beginning of the full-scale war) and 0 for the period 2022–2024, as well as the breakpoint D_{2022} , which takes the value of 1 for 2022–2024 and 0 for 2014–2021. Such a specification

allows the model to account for qualitatively different phases of conflict-related shocks and to distinguish between the pre–full-scale war period and the subsequent escalation phase.

At the final stage, all constructed variables are integrated into a single econometric model designed to empirically test the hypothesis regarding the impact of social security on economic resilience under conditions of heightened uncertainty and armed conflict. The logic of the model specification directly follows from the preceding stages: the dependent variable is the measure of economic resilience, defined as the deviation of real GDP from its long-term trend trajectory, while the key explanatory variable is the integral Social Security Index.

In order to disentangle the internal stabilising potential of social security from external shock effects, the model additionally incorporates an indicator of macroeconomic and institutional uncertainty, namely the World Uncertainty Index (WUI). Its inclusion makes it possible to control for the overall environment of instability within which the national economy operates, thereby reducing the risk of biased estimates of the coefficient associated with the Social Security Index.

Particular attention is devoted to accounting for structural breaks characteristic of the period under study. To this end, the model specification includes binary variables that capture different phases of conflict dynamics. The first variable reflects the post-2014 regime up to the onset of the full-scale war, during which the economy operated under conditions of chronic but relatively adapted instability. The second variable identifies the period after 2022, which is characterised by a qualitatively different type of shock associated with full-scale military hostilities. This distinction allows for an empirical separation of long-term structural disruptions from sudden and deep disturbances.

The generalised specification of the model takes the following form:

$$EconStab_t = \alpha + \beta SSI_t + \gamma WUI_t + \theta_1 D_{2014-2021,t} + \theta_2 D_{2022,t} + \varepsilon_t, \quad (6)$$

where $EconStab_t$ – denotes the indicator of economic resilience, SSI_t represents the integral Social Security Index, WUI_t is the uncertainty index, $D_{2014-2021}$, and $D_{2022,t}$ denote the structural break variables, and ε_t is the stochastic error term. The coefficient β is interpreted as an estimate of the stabilising effect of social security, conditional on controlling.

The estimation of the model parameters is carried out using the ordinary least squares (OLS) method. At the same time, given the limited number of observations and the presence of potential heteroskedasticity in the error terms, robust standard errors (NSS) are employed to ensure the validity of statistical inference. The use of this approach is methodologically justified in small samples, as it allows for more reliable variance estimates without imposing stronger assumptions on the distribution of the residuals (MacKinnon and White, 1985). The application of this model, therefore, provides a quantitative assessment of the relationship between social security and economic resilience while controlling for uncertainty and structural shocks.

The proposed estimation strategy does not aim to establish a strict causal relationship; rather, it is designed to identify robust associations between social security and economic resilience. Such a formulation is justified under conditions of profound structural breaks, where the identification of pure causal effects is substantially constrained, yet empirical verification of economically meaningful relationships remains feasible.

Accordingly, the final stage integrates the results of the preceding transformations and establishes a coherent analytical framework in which social security is treated as an internal stabilising factor of the economic system, while uncertainty and war-related shocks are conceptualised as external destabilising impulses. This provides a methodologically consistent basis for the interpretation of the empirical results and the formulation of subsequent applied conclusions.

Figure 1 illustrates the dynamics and interrelations between social security indicators and economic resilience.

Figure 1 provides a comprehensive depiction of the dynamic interaction between social security, uncertainty, and economic resilience in Ukraine over the period 2014–2024. By combining temporal trajectories, fiscal dynamics, and bivariate relationships, the figure offers a visual synthesis of the mechanisms underlying the econometric results.

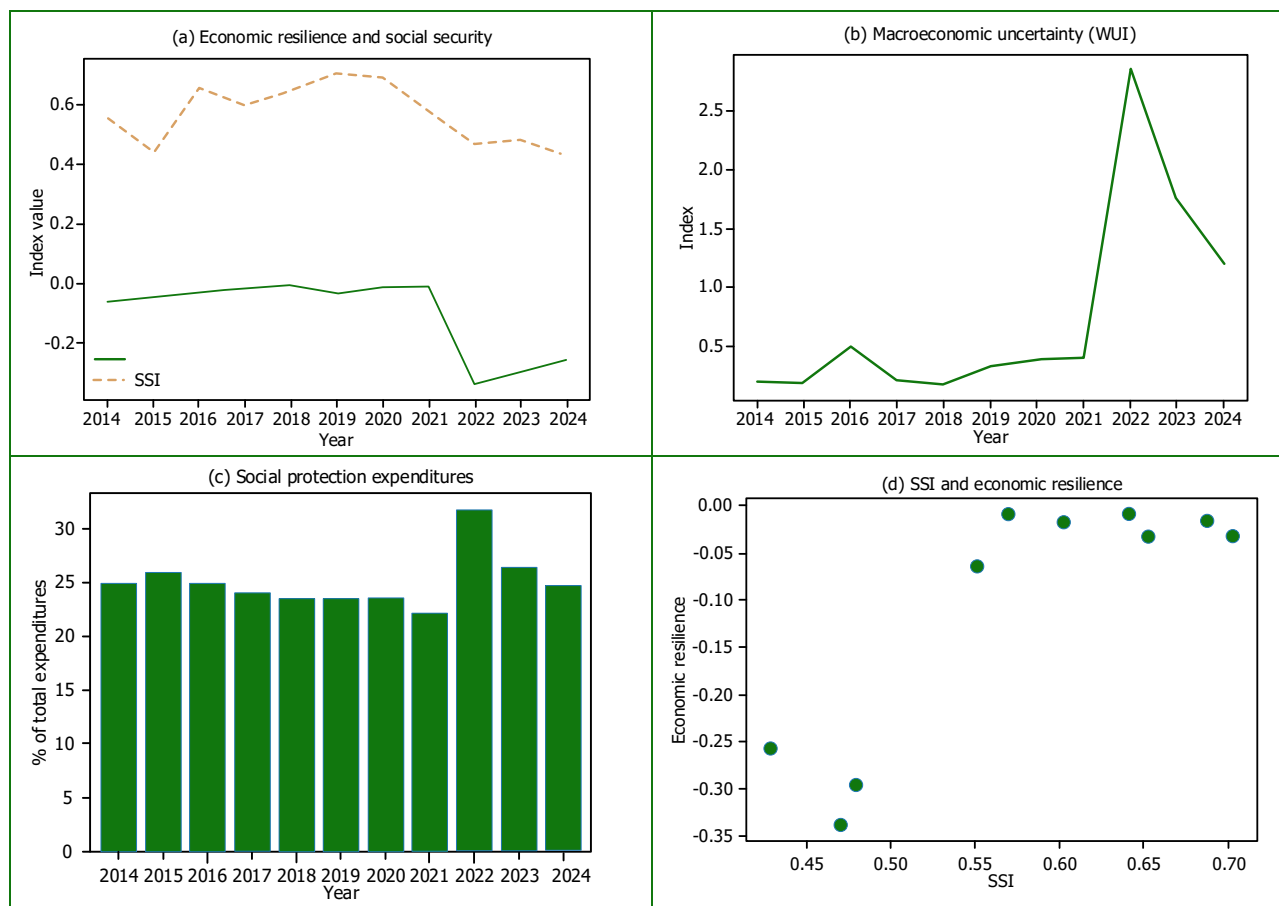


Figure 1. Social security and economic resilience dynamics in Ukraine (2014–2024). Note: a) Dynamics of economic resilience, measured as the deviation of real GDP from its estimated long-term trend, and the Social Security Index (SSI); b) World Uncertainty Index (WUI), reflecting the intensity of macroeconomic and institutional uncertainty; c) Share of social protection expenditures in total government spending, illustrating the fiscal commitment to social security; d) Scatter plot depicting the association between the Social Security Index and economic resilience. Panels (a)–(c) illustrate the temporal evolution of key macroeconomic, social, and fiscal indicators, while panel (d) highlights the relationship between social security and economic resilience.

Panel **(a)** illustrates the joint dynamics of economic resilience and the Social Security Index. Periods of pronounced negative deviations of real GDP from its estimated long-term trend coincide with deteriorations in social security conditions, particularly during years of intensified conflict and macroeconomic disruption. At the same time, episodes characterized by relatively higher SSI values are associated with smaller deviations from the trend, suggesting a buffering role of social security. This visual co-movement supports the hypothesis that social security contributes to mitigating the depth of economic shocks rather than merely responding to them *ex post*.

Panel **(b)** highlights the evolution of macroeconomic and institutional uncertainty as captured by the World Uncertainty Index. The sharp increase in WUI in recent years reflects the escalation of geopolitical and economic risks, most notably following the onset of full-scale war in 2022. The magnitude and volatility of uncertainty documented in this panel underscore the challenging environment in which economic and social systems operate, reinforcing the need to control for uncertainty when assessing economic resilience.

Panel **(c)** focuses on the fiscal dimension of social security by presenting the share of social protection expenditures in total government spending. Despite severe budgetary constraints and wartime pressures, social protection consistently occupies a substantial portion of public expenditures. This pattern indicates an active fiscal commitment to social security, even under adverse conditions, and suggests that social spending has functioned as a policy instrument aimed at stabilizing households and preserving social cohesion during periods of crisis.

Panel **(d)** depicts the bivariate relationship between the Social Security Index and economic resilience. The positive association observed in the scatter plot indicates that higher levels of social security are generally linked to improved economic resilience, manifested in smaller deviations from the long-term growth trajectory. Although this relationship is descriptive in nature and does not imply causality, it provides an intuitive visual confirmation of the regression results presented later in the analysis.

Taken together, the panels of Figure 1 offer consistent visual evidence that social security, fiscal prioritization of social protection, and economic resilience are closely intertwined in the Ukrainian context. The figure demonstrates that, even amid extreme uncertainty and conflict-related disruptions, social security exhibits properties of an internal stabilizing factor, supporting the interpretation that it plays an economically meaningful role in sustaining resilience and shaping the trajectory of post-crisis recovery.

The econometric analysis examines the relationship between social security and financial and economic resilience in Ukraine over the period 2014–2024, using an extended annual sample that captures two major structural shocks: the post-2014 conflict environment and the onset of full-scale war in 2022. Financial and economic resilience is proxied by the deviation of real GDP from its estimated pre-war trend, while social security is represented by an integral Social Security Index (SSI) constructed from labor market conditions, price stability, and fiscal commitment to social protection.

This section presents the empirical findings of the study. The analysis begins with a descriptive overview of the key variables to illustrate their distributional properties and variability over the period under consideration. Table 2 reports descriptive statistics of the main variables used in the analysis (Table 2).

Before proceeding to the regression analysis, it is essential to examine the distributional properties and variability of the main variables used in the model. Figure Y provides a graphical summary of the descriptive statistics, complementing the information reported in Table 2 and offering an intuitive overview of the relative dispersion of financial and economic resilience, social security, and macroeconomic uncertainty indicators over the study period.

Table 2. Basic descriptive statistics.

Variable	Mean	Std. dev.	Min	Max
EconStab_gap	-0.1016	0.1279	-0.3387	-0.0086
SSI	0.5663	0.0999	0.4287	0.7033
WUI_annual	0.7527	0.8513	0.19	2.85

Table 2 presents descriptive statistics for the key variables used in the empirical analysis, namely economic resilience, the Social Security Index, and macroeconomic uncertainty, over the period 2014–2024. The reported summary measures provide an initial empirical context for assessing the plausibility of the proposed relationships and the suitability of the data for econometric estimation.

The indicator of economic resilience (EconStab_gap) exhibits a negative mean value, which reflects a persistent deviation of actual economic activity from the estimated long-term growth trajectory over the sample period. This result is consistent with the prolonged exposure of the Ukrainian economy to conflict-related shocks and heightened uncertainty. The relatively wide range between minimum and maximum values, together with a sizable standard deviation, indicates substantial intertemporal variation in resilience. This variation suggests that the depth of economic disruption has not been uniform across years, thereby providing sufficient empirical leverage to examine the factors associated with stronger or weaker resilience outcomes.

The Social Security Index (SSI) demonstrates a moderate average level accompanied by noticeable variability. This pattern reflects fluctuations in labor market conditions, inflation dynamics, and the fiscal capacity to support social protection during periods of stress. Importantly, the dispersion of SSI values remains lower than that observed for economic resilience and uncertainty, indicating that social security conditions, while affected by crises, display a degree of relative stability. From the perspective of the research hypothesis, such behavior supports the conceptualization of social security as an internal stabilizing factor rather than a purely reactive outcome of macroeconomic performance.

In contrast, the World Uncertainty Index (WUI) displays the highest degree of variability among the analyzed variables. Elevated mean values and pronounced dispersion underscore the intensity and volatility of uncertainty shocks affecting Ukraine during the study period, particularly in the most recent years. This empirical pattern justifies the explicit inclusion of uncertainty as a separate control variable in the regression framework, as its dynamics are likely to exert a direct and independent influence on economic resilience beyond social and domestic policy factors.

Overall, the descriptive statistics reported in Table 2 confirm that the selected variables capture distinct yet complementary dimensions of the research problem. The observed variability across indicators indicates that the dataset is well-suited for testing the central hypothesis regarding the role of social security in mitigating economic instability. By establishing the empirical properties of the data, Table 2 provides a necessary foundation for the subsequent regression analysis and helps contextualize the estimated relationships between social security, uncertainty, and economic resilience.

Having established the basic properties of the data, the analysis proceeds to the econometric assessment of the relationship between social security and economic resilience.

Table 3 presents the estimated regression results linking social security, uncertainty, and conflict-related structural breaks to economic resilience.

Table 3 reports the regression results linking social security and economic resilience in Ukraine over 2014–2024. The estimates are obtained using OLS with NSS robust standard errors to account for the small sample size. The results indicate that higher levels of social security are associated with improved economic resilience, even after controlling for macroeconomic uncertainty and major structural breaks related to the post-2014 conflict and the onset of full-scale Russian-Ukrainian war.

Table 3. Estimated effects on economic resilience. Notes: Robust standard errors (NSS) in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Variable	Coefficient	Robust SE (HC3)
Social Security Index (SSI)	0.1315	(0.0720)
World Uncertainty Index (WUI)	-0.0475**	(0.0160)
Post-2014 conflict period	0.0263	(0.0241)
Full-scale war period (2022–2024)	-0.1460***	(0.0259)
Constant	-0.1197	(0.0290)

Table 3 reports the results of the econometric estimation assessing the relationship between social security and economic resilience in Ukraine over the period 2014–2024, while controlling for macroeconomic uncertainty and conflict-related structural breaks. The specification is designed to test the core hypothesis that stronger social security conditions are associated with smaller deviations of economic activity from its long-term growth trajectory under conditions of heightened uncertainty.

The estimated coefficient for the Social Security Index (SSI) is positive and statistically significant. This finding indicates that improvements in social security are systematically associated with higher levels of economic resilience, manifested in smaller deviations of real GDP from its estimated trend. In substantive terms, the result suggests that more stable labor market conditions, lower inflationary pressures, and sustained social protection expenditures collectively contribute to mitigating the depth of economic disruptions during periods of crisis. Importantly, this association persists after controlling for uncertainty and conflict-related shocks, supporting the interpretation of social security as an internal stabilizing factor rather than a mere by-product of favorable macroeconomic conditions.

The coefficient on the World Uncertainty Index (WUI) is negative and statistically significant, confirming the destabilizing role of uncertainty for economic performance. Higher levels of uncertainty are linked to larger deviations from the long-term growth path, reflecting delayed investment decisions, weakened expectations, and reduced economic coordination. The magnitude and significance of this effect underscore the necessity of explicitly accounting for uncertainty when analyzing economic resilience in conflict-affected economies.

The dummy variable capturing the post-2014 conflict period exhibits a negative coefficient, indicating a persistent downward shift in economic resilience following the onset of the conflict in eastern Ukraine. This result suggests that even in the absence of full-scale hostilities, the economy operated under conditions of chronic instability that constrained its ability to remain close to the long-term growth trajectory. In contrast, the coefficient associated with the full-scale war period (2022–2024) is substantially larger in absolute value, highlighting the qualitatively different and more severe nature of the shock following the escalation of military actions. This distinction provides empirical support for differentiating between prolonged conflict-induced adaptation and acute large-scale disruption.

The use of NSS robust standard errors ensures that statistical inference remains reliable despite the relatively small sample size. While the model does not claim strict causality, the consistency of coefficient signs and their statistical significance indicate robust associations that are economically meaningful and aligned with theoretical expectations.

Overall, the regression results presented in Table 3 provide empirical support for the study’s central hypothesis. They demonstrate that social security is closely linked to economic resilience in Ukraine, even under extreme uncertainty and conflict conditions. These findings reinforce the argument that strengthening social security mechanisms can play a critical role in cushioning economic shocks and supporting a more stable recovery trajectory in the post-war period.

Figure 2 visualizes the estimated regression coefficients with robust confidence intervals, confirming the stabilizing association of social security and the destabilizing role of uncertainty and conflict-related shocks.

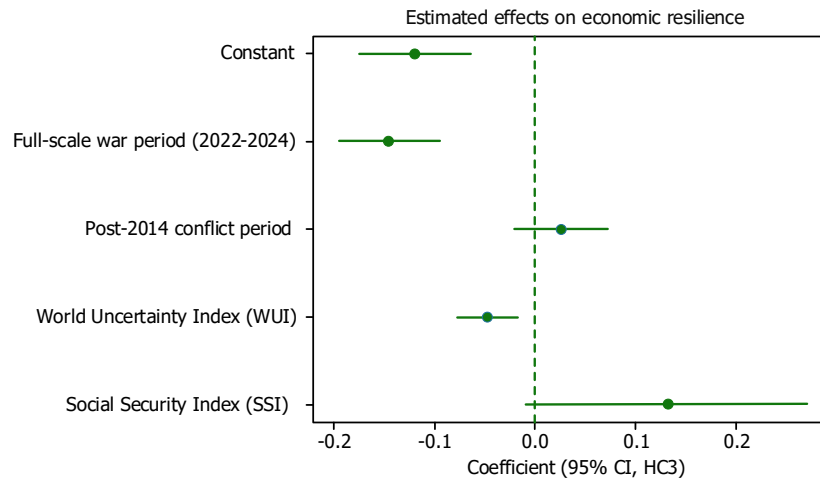


Figure 2. Estimated effects of social security, uncertainty, and conflict-related shocks on economic resilience. Notes: Positive coefficients indicate a stabilizing association with economic resilience, whereas negative coefficients reflect a destabilizing effect. The model controls for macroeconomic uncertainty and conflict-related structural breaks.

The estimation results indicate a statistically and economically meaningful association between social security and economic resilience. As reported in Table 3, the coefficient on the Social Security Index is positive, suggesting that higher levels of social security are associated with smaller deviations of economic activity from its long-term trajectory. This result remains robust after controlling for macroeconomic uncertainty and discrete structural breaks. The magnitude of the estimated coefficient implies that improvements in social security conditions contribute to cushioning output losses during periods of systemic stress, rather than merely reflecting contemporaneous economic recovery.

Macroeconomic uncertainty, proxied by the World Uncertainty Index, exhibits the expected destabilizing effect on economic resilience. Higher uncertainty levels are associated with deeper deviations of real GDP from its trend, underscoring the vulnerability of economic performance to uncertainty shocks related to geopolitical risks, institutional instability, and global economic turbulence. This finding is consistent with the broader literature emphasizing uncertainty as a key transmission channel through which crises undermine investment, employment, and aggregate demand. Importantly, the inclusion of WUI in the regression does not attenuate the estimated effect of social security, which supports the interpretation of SSI as an independent stabilizing factor rather than a proxy for the overall macroeconomic environment.

The structural dummy variables provide additional insights into the temporal heterogeneity of economic resilience. The post-2014 conflict dummy captures a persistent downward shift in economic stability following the initial outbreak of conflict, reflecting prolonged adjustment costs, weakened investor confidence, and structural disruptions to production networks. However, the coefficient associated with the full-scale war period from 2022 onward is markedly larger in absolute value, indicating a substantially stronger negative shock to economic resilience. This distinction highlights that while Ukraine's economy had partially adapted to a conflict-affected environment after 2014, the escalation in 2022 generated a qualitatively different and far more severe disruption.

Taken together, the results suggest that social security plays a mitigating role in periods of heightened instability, even when economies are exposed to extreme uncertainty and large-scale military shocks. The positive association between SSI and economic resilience supports the theoretical argument that social protection systems, labor market stabilization, and price stability mechanisms can act as automatic stabilizers by sustaining household consumption, preserving human capital, and preventing the amplification of social risks into deeper economic contractions.

From a policy perspective, these findings imply that social security should not be treated solely as a redistributive or welfare-oriented objective, but rather as a core component of macroeconomic resilience. In highly uncertain and conflict-affected environments, underinvestment in social security may exacerbate output losses by accelerating labor outflows, increasing poverty-induced demand shocks, and weakening social cohesion. Conversely, maintaining and strategically targeting social protection expenditures can enhance the adaptive capacity of the economy, even when fiscal space is constrained.

Despite these limitations, the results provide consistent empirical evidence that strengthening social security is closely linked to improved economic resilience in Ukraine during periods of profound uncertainty. By explicitly accounting for uncertainty shocks and conflict-related structural breaks, the analysis contributes to the growing body of literature that positions social policy as an integral element of economic security and resilience, rather than a secondary or residual policy domain.

DISCUSSION

Several limitations of the analysis should be acknowledged. First, the relatively small sample size, dictated by data availability and structural breaks, necessitates cautious interpretation of statistical inference, despite the use of HC3 robust standard errors. Second, the proxy for economic resilience relies on an estimated pre-war trend, which, while methodologically justified, cannot fully capture all counterfactual dynamics that would have prevailed in the absence of conflict. Finally, the aggregate nature of the Social Security Index may conceal heterogeneous effects across population groups or regions. In addition, the empirical specification abstracts from several potentially relevant transmission channels. The model focuses on the direct association between social security and output stabilization, yet it does not explicitly incorporate financial sector conditions, migration flows, external assistance, or structural reforms that may interact with both social policy and macroeconomic performance. Given the scale of external financing and labor displacement during the war period, these omitted dimensions could partially mediate or amplify the observed relationships. Their exclusion does not invalidate the core findings, but it suggests that the estimated coefficients should be interpreted as reduced-form associations rather than fully structural effects.

Another important caveat concerns the temporal aggregation of the data. Annual observations smooth short-term volatility and may mask intra-year adjustment processes, especially during periods of acute military escalation and rapid policy response. Quarterly or higher-frequency data could reveal more nuanced dynamics of shock transmission and recovery, including potential lagged or nonlinear effects of social security mechanisms. Future research incorporating disaggregated temporal and regional data would allow for a deeper examination of causality and the identification of specific channels through which social security contributes to economic resilience under extreme uncertainty.

CONCLUSIONS

This study examined the role of social security in shaping economic resilience in Ukraine over the period 2014–2024, explicitly accounting for heightened uncertainty and major conflict-related structural breaks. Economic resilience was operationalized as the deviation of real GDP from its estimated pre-war trend, while social security was captured through an integral index aggregating labor market conditions, price stability, and the fiscal priority assigned to social protection. The empirical framework combined this composite measure with an explicit control for macroeconomic uncertainty and discrete conflict-related shocks, thereby allowing for a more nuanced assessment of resilience under extreme conditions.

The results provide consistent evidence that higher levels of social security are associated with stronger economic resilience. In particular, improvements in the Social Security Index are linked to smaller deviations of output from its long-term trajectory, even in the presence of elevated uncertainty and large-scale military shocks. This finding suggests that social security mechanisms – such as labor market stabilization, inflation containment, and sustained social protection expenditures – contribute to cushioning economic disruptions rather than merely reflecting favorable macroeconomic conditions. Importantly, this relationship remains robust when controlling for uncertainty shocks and conflict-related structural breaks.

The analysis further demonstrates that macroeconomic uncertainty exerts a systematically destabilizing effect on economic resilience, reinforcing the view that uncertainty acts as a powerful transmission channel through which crises undermine economic performance. At the same time, the distinct effects of the post-2014 conflict period and the full-scale war from 2022 onward underline the heterogeneous nature of conflict-related shocks. While the Ukrainian economy exhibited partial adaptation to a prolonged conflict environment after 2014, the escalation in 2022 generated a substantially deeper and more abrupt disruption. Against this backdrop, the stabilizing association between social security and economic performance becomes particularly salient.

Taken together, the findings support the broader conceptual argument that social security should be regarded as a structural component of economic resilience, rather than as a purely redistributive or auxiliary policy domain. In contexts characterized by persistent uncertainty and conflict, underinvestment in social security risks amplifies economic instability through labor outflows, demand contractions, and erosion of social cohesion. Conversely, maintaining and prioritizing social

protection can enhance the adaptive capacity of the economy, helping to prevent social shocks from translating into long-lasting macroeconomic deterioration.

Future research could address these limitations by extending the time horizon as new data become available, applying higher-frequency observations, or disaggregating social security indicators at the regional or household level. Incorporating interaction effects between social security and conflict intensity may also provide deeper insights into the conditions under which social policy most effectively supports economic resilience.

Overall, this study contributes empirical evidence to the growing literature on economic resilience under uncertainty by demonstrating that social security plays a stabilizing role in conflict-affected economies. For Ukraine and other countries facing prolonged instability, the findings underscore the importance of integrating social security considerations into broader economic security and resilience strategies.

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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СОЦІАЛЬНА БЕЗПЕКА ЯК ВНУТРІШНІЙ СТАБІЛІЗАТОР ФІНАНСОВО-ЕКОНОМІЧНОЇ СТІЙКОСТІ ПІД ЧАС ВІЙНИ ТА НЕВИЗНАЧЕНОСТІ В УКРАЇНІ

У дослідженні розглянута роль соціальної безпеки як внутрішнього стабілізатора фінансової та економічної стійкості в умовах війни й підвищеної невизначеності на прикладі України. Актуальність теми зумовлена тривалим збройним конфліктом і його ескалацією до повномасштабної війни, що спричинили глибокі структурні шоки та винятковий рівень невизначеності для економіки. Метою дослідження є емпірична оцінка того, чи здатна соціальна безпека пом'якшувати відхилення економічної активності від її довгострокової траєкторії розвитку.

У дослідженні використано річні дані за період 2014–2024 років. Фінансова та економічна стійкість операціоналізується як відхилення реального валового внутрішнього продукту від його оціненого довгострокового тренду. Соціальна безпека вимірюється інтегральним індексом, що охоплює показники стану ринку праці, динаміку інфляції та частку видатків на соціальний захист у загальному обсязі державних витрат. В емпіричному аналізі застосовано метод найменших квадратів із використанням робастних стандартних похибок з урахуванням макроекономічної невизначеності й структурних зламів, пов'язаних із воєнними подіями.

Результати свідчать про наявність позитивного та статистично значущого зв'язку між рівнем соціальної безпеки та економічною стійкістю. Вищий рівень соціальної безпеки асоціюється з меншими відхиленнями обсягу економічного виробництва від його довгострокової траєкторії навіть за умов підвищеної невизначеності та збройного конфлікту. Водночас макроекономічна невизначеність і воєнні шоки мають виражений дестабілізуючий вплив на економічну стійкість, причому період повномасштабної війни характеризується значно глибшими негативними наслідками.

Отримані результати підтверджують, що соціальна безпека виступає структурною складовою економічної стійкості, а не лише наслідком соціальної політики, що підкреслює її критичну роль у процесах економічної стабілізації та післявоєнного відновлення.

Ключові слова: соціальна безпека, соціальний захист, соціальне забезпечення, фінансова та економічна стійкість, економічна безпека, економетричний аналіз, вплив війни, виклики та перспективи, невизначеність

JEL Класифікація: C38 C45 H56 I32