

“Time gap of the impact of risk insurance, life insurance and reinsurance on social progress: The case of Ukraine”

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TIME GAP OF THE IMPACT OF RISK INSURANCE, LIFE INSURANCE AND REINSURANCE ON SOCIAL PROGRESS: THE CASE OF UKRAINE

Abstract

The paper examines, using the example of Ukraine from 2003 to 2020, how and to what extent the development of various segments of the insurance market (risk insurance, life insurance, and reinsurance) influences the overall level of social progress. It also identifies the time gaps through which this influence manifests. The study creates a single measure that looks at various aspects such as social class differences, spending patterns, income changes, and government social spending (their standardized values, weighed by the principal component method, integrated through additive convolution). Using VAR modeling, the impact of the development indicators of different segments of the insurance market (risk insurance, life insurance, and reinsurance) at the current moment and with lags of one, two, and three years is investigated, as well as the level of social progress in Ukraine in previous years. The modeling confirms that social reforms yield significant results for social progress only after three years, similarly to the increase in the number of insurance companies. Given insurers' assets and payout levels, their growth in life insurance has a faster impact on social progress than in risk, while the opposite is true for premiums. Insurance premiums transferred to Ukrainian reinsurers negatively and slowly (over three years) affect social progress, and to non-resident reinsurers – positively and faster (within a year). Across most indicators, life insurance not only influences Ukraine's social progress more quickly than others but also provides a more substantial social effect.

Keywords

insurance market, social progress, social stratification,
time gaps, VAR modeling, integrated indicator

JEL Classification

G20, G22

INTRODUCTION

The social situation of Ukrainians is becoming more complicated every year, given that more than 90% of household income in Ukraine is spent on consumption. The rate of increase in the primary source of income for the population (wages) is steadily declining, and there is a decrease in government allocations for social welfare.

In economically advanced nations, the insurance market enables a noteworthy decrease in state outlays for social protection, concurrently assuring an elevated capacity for social support for citizens.

Given the aforementioned obstacles, it becomes imperative to examine how insurance services – such as risk, life, and reinsurance – affect societal advancement in Ukraine. Because life insurance is designed to assist people and their families until a specific period (such as retirement age) or in the event of death, it is essential to societal progress. Comparing the figures for life insurance, risk insurance, and reinsurance for 2003 and 2022, one can note a significant increase in the vol-

ume of these types of insurance over this period. In 2003, life insurance amounted to UAH 72.9 million. However, in 2022, the volume of life insurance will have already grown to UAH 3.9 billion, despite a notable decline in the number of financial institutions and credit unions as well as variations in the volume of premiums and payments, according to the National Bank of Ukraine (2023). Given that natural catastrophes can leave people without a place to live, among the many different forms of risk insurance, medical, fire, and insurance against natural disasters have the biggest effects on social advancement. As of 2022, risk insurance reached an impressive UAH 4 billion, which is an extremely significant change compared to 2003, as described in the National Bank of Ukraine (2023) year reviews. Reinsurance arrangements, particularly when addressing socially relevant risks, facilitate the sharing of responsibility and help insurers maintain their financial stability. The National Bank of Ukraine (2023) also reported that in 2003, the volume of reinsurance premiums amounted to UAH 9.1 million, while in 2022, this figure increased to UAH 4.5 billion.

The activation of insurance services offers more chances to lessen the financial burden on the state budget and improve social service accessibility for individuals and businesses. Simultaneously, there are still unresolved issues regarding the exploration of empirically grounded and scientifically verified methods for figuring out the extent and direction of these insurance services' influence on social progress in Ukraine. This includes the formalization of the timelines within which these market changes will materialize into concrete social transformations, as well as the identification of important paths for restructuring the insurance market, which may be crucial in accelerating its development. In addition, one of the most important things is coming up with all-encompassing methods to assess social advancement in Ukraine and determining the periods of time in which social changes that have already been put into place have noticeable social effects.

1. LITERATURE REVIEW

For many years, social progress has been the focus of active attention of the academic community in various countries around the world. On the one hand, it is viewed as a determinant, analyzed through its impact on macroeconomic stability, economic growth, a country's competitiveness, and so on. On the other hand, it is seen as a predictor, involving the investigation of issues related to identifying relevant determinants that influence it.

Various studies explored the significance of social progress in the context of shaping sustainable economic growth models and the potential for economic advancement (A. Arfan & I. Arfan, 2021; Barannyk et al., 2021; Skrynnyk & Lyeonov, 2022; Duong, 2023; Machuca-Vílchez et al., 2023; Alsmadi et al., 2023). Vasilyeva et al. (2022) focus on devising a barycentric model using a center-of-mass approach across 127 countries and 17 indicators. Kuzior et al. (2022) investigates the impact of social determinants on financial inclusion across 93 countries, utilizing logit-probit modeling and principal component analysis. Moreover, Zolkover et al. (2022) examine social progress in European

nations, emphasizing transparency and tax burdens as factors influencing macroeconomic stability and growth.

Several studies delve into distinct aspects related to evaluating social imbalances, transformations, and stability in social development for European countries (Grenčíková et al., 2023; Panyagometh & Bian, 2023; Luchenko et al., 2023; Fu et al., 2023; Navia et al., 2023). Vasilyeva et al. (2019) examine these aspects using the bifurcation theory. El Fallahi et al. (2023) tackle measurement issues in transformations and effectiveness in developing economies, not solely based on financial-economic outcomes but also on social responsibility. Njegovanović (2023) explores the concept of "social finances," which frames the measurement and influence of social and financial transformations and interactions, including cultural, informational, and behavioral factors affecting social learning processes.

Several articles delve into diverse aspects of the social sector (Sotnyk et al., 2023; Voznyak et al., 2023; Onopriienko et al., 2023; Vávrová & Přečková, 2023; Soni, 2023; Danylyshyn et al., 2023; Kuzior

et al., 2023). Kuzior et al. (2020) focus on the inner workings of formal and informal social institutions, analyzing social risks amid intercultural competence imbalances in a global context. Lyeonov et al. (2021) investigate the institutional quality in the social sector across countries, challenging the idea of direct convergence based on institutional quality but demonstrating convergence in the development of informal social institutions. Meanwhile, Bhandari (2023) highlights the role of social progress in shaping societal dynamics and addressing global challenges, emphasizing a balanced approach to economic growth and social justice. Additionally, Kuzior et al. (2021) surveyed external and internal stakeholders to gauge their perceptions and expectations regarding socially responsible behavior formation in society.

Several studies delve into different facets of social progress and its implications. Tiutiunyk et al. (2022) examine social progress using VAR/VEC modeling, particularly exploring how the shadow economy affects social development across various European nations. Hakobyan et al. (2022) focus on the effects of geopolitical conflicts and related socio-psychological issues on people's social interactions and adaptability within business settings. In a separate study, Khushk et al. (2022) analyze the theory of social learning, emphasizing its role in maintaining social stability by considering social connectivism, constructivism, and role modeling.

While examining the role of life insurance in promoting social progress (Paska et al., 2020), Gentle (2023) identifies the function of social insurance in overcoming limitations in social welfare by analyzing transformations in US insurance legislation. Aliyeva (2023) compares the role and position of life insurance in the operation of Azerbaijan's social protection system with other nations. Wu and Wang (2018) utilize fixed-effect panel regression to reveal that despite life insurance in China being in its nascent stage with limited scope, penetration, and intensity, its development significantly impacts society due to a large population, growing middle class, and increased prosperity. In a separate study, Yu (2022) constructs a panel empirical model that determines the determinants of life insurance development in China, considering population aging and other social factors.

Situm et al. (2021) analyze the role of risk insurance in social progress, drawing a comparison between Ukraine and Austria, specifically through the lens of voluntary health insurance transforming the social security system. Koibichuk et al. (2023) investigate the efficacy of medical insurance in ensuring work efficiency using Multivariate Adaptive Regression Splines (MARS) in the context of the United States. Kuru and Bayraktar (2017) analyzed the interplay between cyber insurance and social security in the USA, the UK, and Turkey, affirming the potential risk reduction through precise risk strategy evaluation, fostering efficient IT market operations. Additionally, Kramer et al. (2019) explore the scaling of insurance for transferring climate risks from rural residents to financial markets in developing countries.

Several studies demonstrate the vital role of reinsurance in fostering social progress through empirical evidence. Kajwang (2022) indicates that without reinsurance, insurance companies would struggle to meet their obligations, impacting various social projects. Bäuerle and Glauner (2018) introduce the concept of "socially optimal reinsurance contracts" using specific risk evaluation approaches. Meanwhile, Bressan (2023) measures reinsurance resilience and social impacts using ESG criteria, highlighting the interconnectedness between insurer interactions and big data technology development. Belhadi et al. (2023) delve into the transformative processes in insurer interactions, particularly in reinsurance operations tied to large data processing technology, emphasizing significant social risks linked to data accessibility.

The analysis of these scholarly works highlights the importance of diverse insurance forms in fostering social dynamics, enhancing mechanisms for citizen social support, and ensuring the sustainability of social progress.

Based on this, the aim of this study is to identify the directions and magnitude of the influence of these insurance types on the overall level of social development in Ukraine, as well as the time gaps through which this influence manifests. These time gaps represent the period during which dynamic changes in Ukraine's insurance market will lead to the transformation of the country's social development.

2. METHODOLOGY

The assessment of social progress in Ukraine involves specific benchmarks:

1. Evaluates income disparities between the wealthiest and the least affluent citizens, contributing to the differentiation of living standards in Ukraine. This data point shows the percentage of income that the richest 20% of Ukrainians earn compared to the value of the least wealthy people in the nation. The quintile coefficient, in conjunction with indices such as the decile and Gini coefficients, creates a framework for dividing the living standards of Ukrainians. It is anticipated that as the insurance market grows, the disparity in the population's standard of living will close.
2. Explores household spending, indicating the potential for insurance product adoption. It reveals the relationship between spending patterns and the feasibility of social protection through insurance. With reference to the population's prospective usage of insurance goods, this metric is important. It is no longer viable for Ukrainians to rely on insurance products for social safety if they spend most of their money on consumption. On the other hand, if the connection under investigation proves to be inverse, this suggests changes in the direction of household expenditure.
3. Assesses the influence of insurance on entrepreneurial activities, affecting social security outcomes (monthly per household). Given that insurance is used worldwide as an instrument for individual investment or agency, it has an indisputable effect on private entrepreneurial activities, which in turn has an influence on social security.
4. Considers wage growth and its widespread impact on social transformations, highlighting the importance of insurance in job creation and wage levels. Since wages are the main social guarantee of well-being for most Ukrainians, wage growth has a considerable impact on most social developments. As

a separate sector of the Ukrainian economy, insurance surely influences job prospects and, consequently, wages in the nation.

5. Examines state spending on social welfare, emphasizing the potential of the insurance market to reduce government expenditure on social protection. Under the effect of dynamic shifts in the development of insurance, this indicator is considered to be a key feature of transformational changes in social development. The insurance market can reduce government spending on social safety and welfare for the nation's citizens by using market-regulated insurance systems.

These indicators were specifically selected as they effectively capture the evolving landscape of social progress while being responsive to the dynamic shifts within the insurance market's development.

The standards created, together with their characteristics and measurements, do not take into account the consequences of an incident of extreme importance for the entire Ukrainian state apparatus, which occurred in the form of military aggression by the Russian Federation. The ongoing conflict is bringing about significant changes and modifications that directly or indirectly affect many aspects of insurance and reinsurance activities around the world. Numerous scientific organizations are going to turn their attention to this intricate circumstance as a study focal point.

The same study recommends combining these indicators into a single composite index to fully assess Ukraine's socioeconomic advancement. The principal component approach is utilized to calculate the coefficients that make up this index, and a weighted arithmetic mean is employed in the process.

Standardization is essential since the measures used to assess the socioeconomic progress of Ukraine have different units of measurement. Using the Statistics/Data/Standardize function in the Statistica 12 application is part of the process of making these indicators similar.

An additive aggregation of standardized indicators weighted using the principal component

approach is required to generate the Integrated Social Progress indicator for Ukraine.

The following is the suggested grading scheme for the composite indicator: The levels are as follows:

- 1) critical, from $-\infty$ to -0.30 ;
- 2) low, from -0.30 to -0.00 ;
- 3) satisfactory, from 0.00 to 0.30 ;
- 4) moderate, from 0.30 to 0.60 ;
- 5) sufficient, from 0.60 to 0.90 ; and
- 6) high, from 0.90 to $+\infty$.

The number of non-life insurance companies or life insurance companies, the assets of non-life insurance companies or life insurance companies, the gross insurance premiums within risk insurance or life insurance, and the level of payments within risk insurance or life insurance are the indicators that have been chosen to describe risk insurance and life insurance.

The following terms are used to describe reinsurance: level of payments, premiums owed to non-resident reinsurers, and premiums payable to resident reinsurers. These indicators completely capture the underlying trends in the expansion of the insurance sector in Ukraine. Increasing their quantity will just make the model more complex rather than improve the modeling results.

Regression dependencies between three sets of insurance market development indicators and the integrated indicator of Ukraine's socioeconomic progress are generated using the EViews program, specifically the unrestricted VAR approach (Vector Autoregression Estimates).

Based on vector autoregressive modeling, the analysis of how changes in the insurance market have affected Ukraine's social development transformation will consider the lagged impacts of one, two, and three years. For these calculations, the EViews application was used, which includes capabilities such as Quick/Estimate VAR/VAR Type; Unrestricted VAR/Endogenous Variables; ISP, GP11, GP12, GP13, GP14/Lag Interval for Endogenous; 1-3.

3. RESULTS AND DISCUSSION

This study's VAR model is noteworthy not only for figuring out the correlation between shifts in social progress and rapidly changing trends in the insurance market but also for taking into account the historical social development levels of Ukraine in previous years. This makes it possible to determine if social changes from earlier eras had an impact on the present year's overall level of social advancement or not.

Source: Based on the State Service for Special Communications and Information Protection of Ukraine (2023).

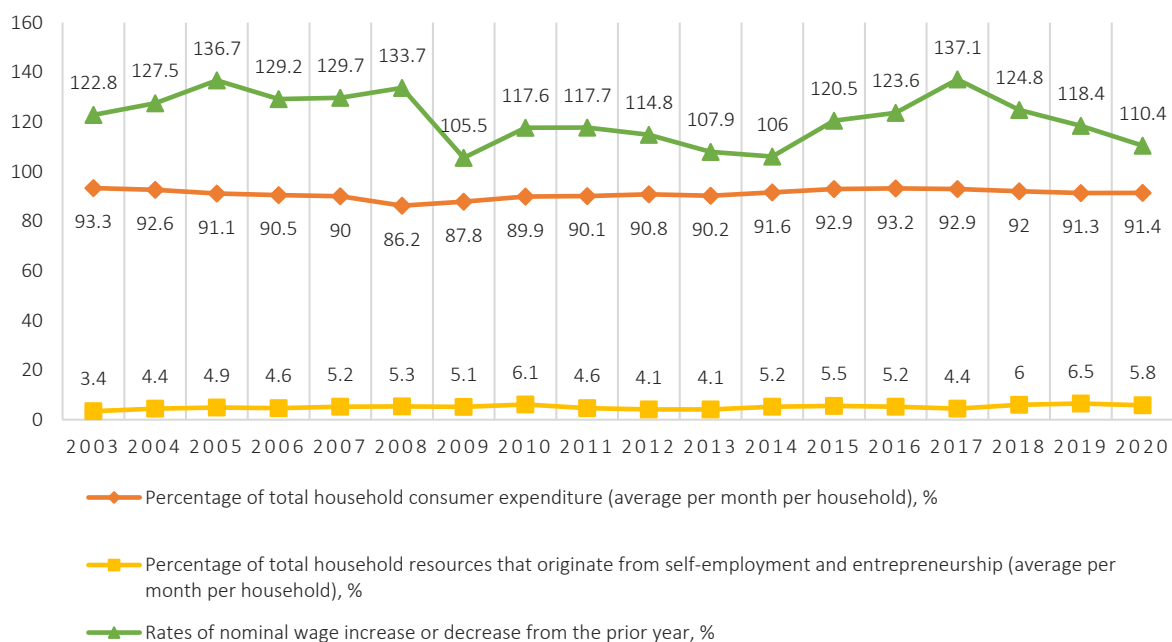


Figure 1. Dynamics of Ukraine's Social Development Indicators for 2003–2020

Data on the evolution of Ukraine's social development metrics from 2003 to 2020 are shown in Figure 1.

From 2003 to 2020, the richest Ukrainians' minimum income was on average 3.5 times greater than the maximum income of the country's lowest residents. It is noteworthy that the official data from citizen declarations is the basis for this research. Nonetheless, the income disparity is far greater even after taking into account the official estimate of 30% for Ukraine's shadow economy. In theory, this indication should be closer to 10 units.

Upon examining the trajectory of the percentage of total household consumer spending, it is noteworthy that, throughout the eighteen years, this metric averaged 91% and never fell below 86.2%. Less than 10% of Ukrainians' income is allocated to savings, insurance, and other non-consumer expenses; instead, practically all their income is spent on necessities.

Self-employment and entrepreneurial activity still account for a small percentage of family income. Between 2003 and 2020, the share of income obtained by Ukrainians themselves did not increase by more than 6.5%. This suggests that Ukrainians are not very enterprising and are not taking full

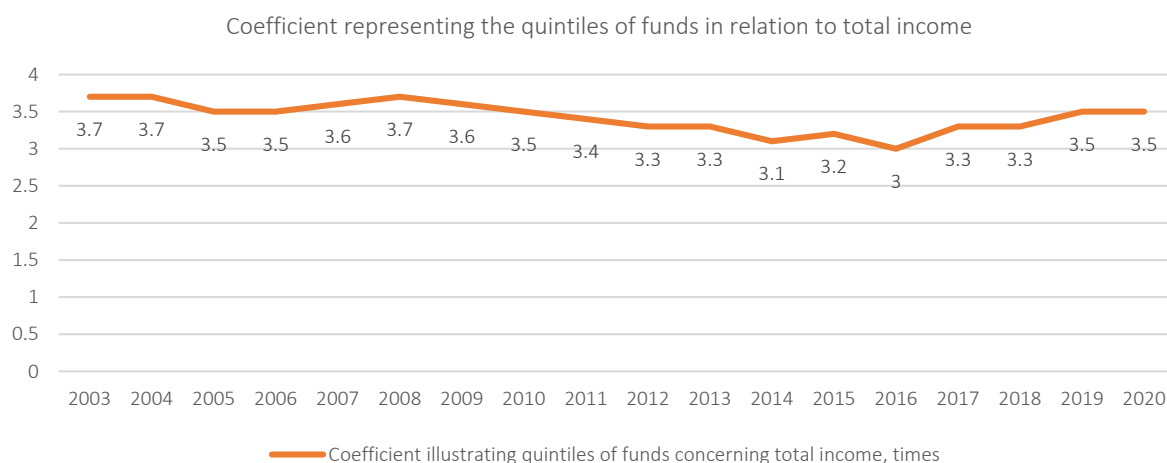
advantage of the chances presented by the insurance industry.

The percentage of government spending on welfare and social protection fell sharply between 2016 and 2020. In 2016, it made up 30.1% of all state spending; by 2020, however, this percentage had dropped to 21.7% from 9%. This cutback in state support was neither the consequence of a rise in insurance-related activity nor the mitigating effect of personal, health, or pension insurance on society's risks. Rather, it was the outcome of lower funding allotments in the social orientation domain.

One of the key measures of the social changes in Ukraine, the growth rate of nominal wages, did not show a constant rising trend. The growth rate dropped to 110% during the next three years, from a peak of 137% in 2017. There is no denying that this tendency, along with the decline in state social spending, has a detrimental effect on the social welfare of Ukrainian residents. Without assistance from the state or on their own, households are unable to satisfy their social demands.

It is noteworthy that from 2003 to 2020, all of the variables that were examined changed cyclically rather than exhibiting a consistent pattern of rise or reduction.

Source: Excerpt from calculations made with Statistica 12 program.

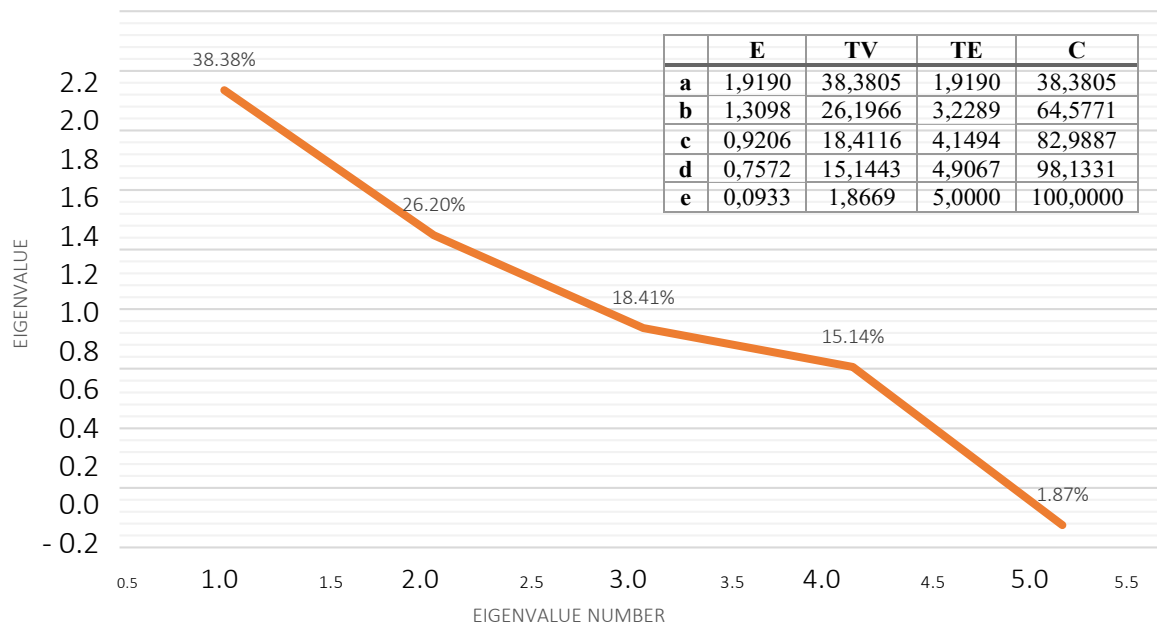


Note: In this context, the X-axis corresponds to factor numbers, while the Y-axis represents the eigenvalues derived from the correlation matrix. *a, b, c, d, e* are artificially created factors subsequently used for decomposing indicators in the system of base vectors (factors), value number refers to the factor number, eigen value denotes the eigenvalues of the correlation matrix, % total variance indicates the percentage of total variance, cumulative eigen value represents the cumulative eigenvalues, cumulative % refers to the cumulative percentage. *E* – Eigenvalue, *TV* – Total variance, %, *TE* – Total Eigenvalue, *C* – Cumulative, %.

Figure 2. Scree plot of the correlation matrix's eigenvalues

Source: Based in part on correlation estimates performed using Statistica 12.

The correlation matrix's eigenvalues



Note: SP1 is the quintile coefficient of funds (based on total income); SP2 is the percentage of total household consumption expenditure (monthly per household); SP3 is the share of income from entrepreneurial activity and self-employment in total household resources (monthly per household); SP4 is the growth/decrease rate of nominal wages compared to the previous year; SP5 is government spending on social protection and welfare of the population (% of total expenditure); variable represents the country's social development indicators, Factors 1, 2, 3, 4, and 5 are artificially created factors subsequently used for the decomposition of indicators in the system of basis vectors (factors).

Figure 3. Contribution of each social development indicator separately to the integrated indicator

Using the principal component approach, Statistica 11 software was used to calculate the weighting factors that combine each social development parameter within the framework of the social progress composite index. Using the Statistics/Principal Components and Classification command was required for this.

To calculate the results, the Advanced PCA Factor Analysis was utilized to determine the correlation matrix's eigenvalues and the associated statistics. The scree plot of the eigenvalues of the correlation matrix can be represented as in Figure 2.

The following calculation determines each variable's contribution to the integral indicator (in terms of the elements that were chosen based on correlation).

There are identified factors that account for at least 75% of the variation and should be taken into consideration in the process of further determining the weighting coefficients for each indicator char-

acterizing the transformation of Ukraine's social development based on the results of the calculations shown in Figures 1 and 2. These three variables in our instance account for 82.99% of the variance.

Figure 4 describes the process for determining each indicator's weight coefficient.

The standardized values of the social development indicators for Ukraine from 2003 to 2020 are displayed in Figure 5. These data were converted to a similar format using Statistica 12's Statistics/Data/Standardize tool. Looking at specific indicators, the quintile coefficient of funds (SP1) shows varying trends, indicating potential disparities in income distribution. The share of total household consumer expenditures (SP2) and the share of income from entrepreneurial activity and self-employment (SP3) present nuanced fluctuations, reflecting changes in consumption patterns and economic activities. The growth or decline in nominal wages (SP4) illustrates dynamic economic shifts,

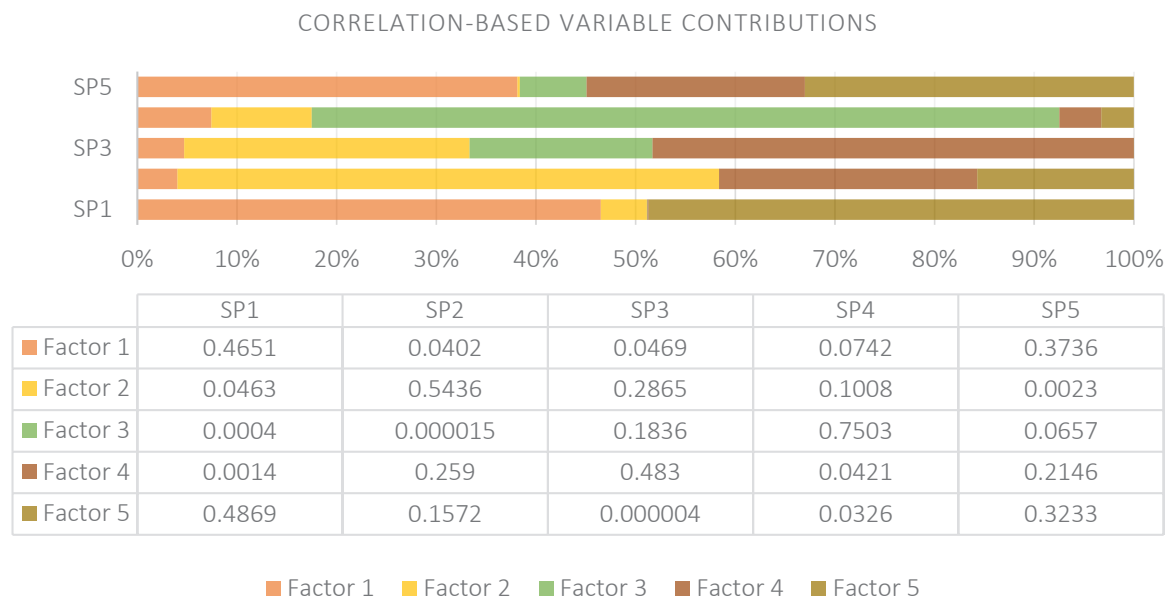


Figure 4. Procedure for calculating the weighting factors of the Ukrainian social development indicators in the combined indicator

while public expenditures on social protection and security (SP5) indicate changing priorities in government spending. These standardized values provide a valuable basis for comparative analysis and deeper insights into the socio-economic landscape of Ukraine over the considered timeframe.

Figure 6 displays the values of the integral indicator of social advancement that were derived by applying the principal components approach to a weighted additive convolution of standardized indicators.

For nineteen of the study's eighteen years (2003–2020), Ukraine's social improvement was insufficient. It can only be considered moderate in 2017 and adequate in 2005. Except for 2009,

a crucial phase was noted from 2012 to 2014, during which the composite index fell to a minimum of -0.54 units in 2014. This was impacted by a persistent pattern of nominal wage growth rates that were lower than those of the prior year, as well as a decrease in the percentage of state spending on welfare and social protection. The composite index of social development in Ukraine was found to be at a moderate level in the study's last year, 2020, but since 2017, its trend has been dropping, making it impossible to predict an upward trend.

The subsequent modeling phase has created a foundation of knowledge that describes how different insurance market sectors have developed (Figure 7).

The integral indicator as the product of each SP indicator within the context of a specific factor				Weighting factors
SP1	0,465101	0,046302	0,000350	0,229793
SP2	0,040233	0,543590	0,000015	0,190203
SP3	0,046866	0,286523	0,183641	0,152862
SP4	0,074172	0,100785	0,750292	0,232574
SP5	0,373629	0,022799	0,065701	0,194568
Evaluation of the factor's weight quantitatively				
38.38053		26.19659	18.4116	

Figure 5. Ukraine's 2003–2020 standardized values for social development indicators

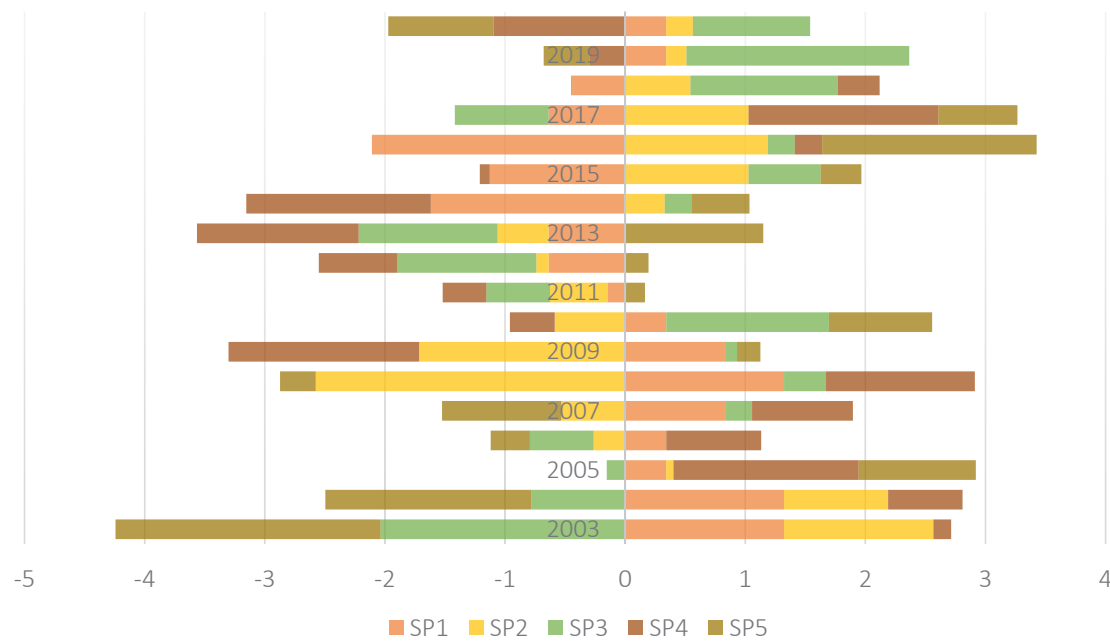


Figure 6. Ukraine's integral social progress indicator: dynamics from 2003 to 2020

The integrated indicator of Ukraine's social growth must then have its regression dependencies established on three sets of data related to the development of the insurance market. One-, two-, and three-year-time gaps are taken into account when doing this. Using time delays, their standard errors, and the significance t-statistics, the target is to utilize the capabilities of the EViews program to determine the unknown parameters of the VAR model (Vector Autoregression) that depicts the

relationship between the integrated indicator of Ukraine's social development and relevant insurance risk factors.

With a probability of 0.95, the built-in model's statistical significance is validated using the computed Student's t-test result, which is displayed in Figure 1a and Figure 1b for every VAR model parameter. Furthermore, at the 90.89% level, the determined coefficient of determination R-squared

Source: Based on the National Bank of Ukraine (2023).

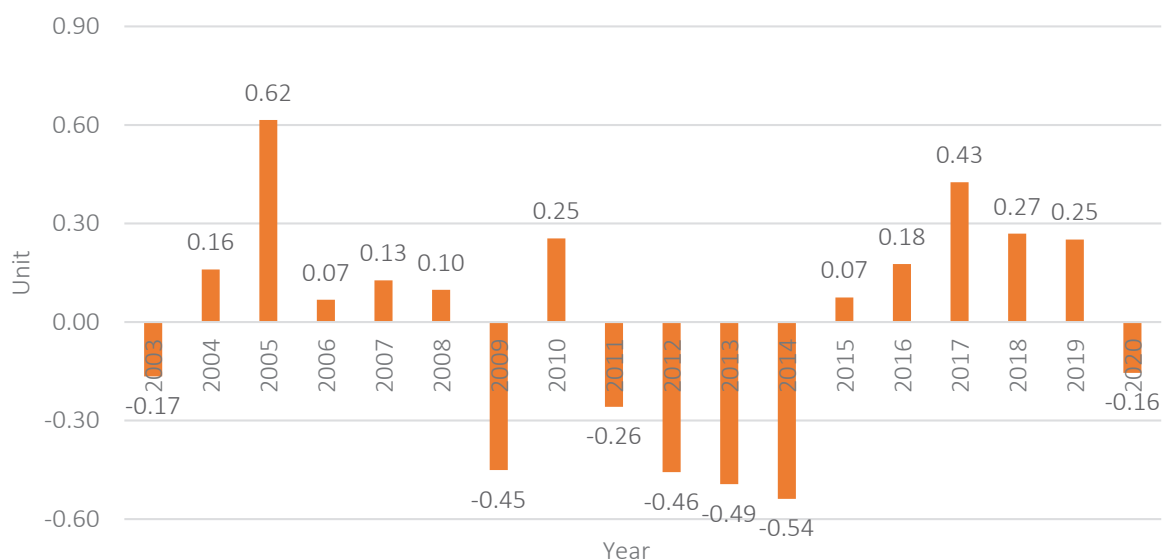


Figure 7. Ukraine's non-life, life, and reinsurance indicator dynamics from 2003 to 2020

Table 1. Dynamics of the vector autoregression results of the integral indicator of Ukraine's social progress's (ISP) dependency on pertinent risk insurance variables in relation to time gaps

Source: Sidelnyk (2023).

Vector Autoregression Estimates					
Sample (adjusted): 4 162					
Included observations: 159 after adjustments					
Standard errors in () & t-statistics in []					
indicator	ISP	A	B	C (Premium)	C (Payouts)
ISP(−1)	0.818528	−19.17840	−55121.18	152.0506	0.049807
	(0.07259)	(4.13386)	(2594.77)	(1454.48)	(0.00964)
	[11.2754]	[−4.63935]	[−21.2432]	[0.10454]	[5.16779]
ISP(−2)	1.139331	11.64949	−30729.39	5090.417	0.086861
	(0.09320)	(5.30700)	(3331.13)	(1867.24)	(0.01237)
	[12.2252]	[2.19512]	[−9.22490]	[2.72617]	[7.02015]
ISP(−3)	0.830121	−26.25343	4882.402	15935.41	0.202733
	(0.06466)	(3.68195)	(2311.11)	(1295.47)	(0.00858)
	[12.8387]	[−7.13031]	[2.11258]	[12.3008]	[23.6167]
A(−1)	−0.008721	−0.414403	251.1525	120.0160	0.001117
	(0.00077)	(0.04361)	(27.3725)	(15.3435)	(0.00010)
	[−11.3878]	[−9.50278]	[9.17535]	[7.82196]	[10.9891]
A(−2)	0.012290	−1.201753	116.5387	220.8148	0.002594
	(0.00104)	(0.05938)	(37.2742)	(20.8938)	(0.00014)
	[11.7852]	[−20.2372]	[3.12653]	[10.5685]	[18.7366]
A(−3)	0.008799	0.247961	−2.483000	−52.16194	−0.000722
	(0.00054)	(0.03074)	(19.2932)	(10.8147)	(7.2E−05)
	[−16.3020]	[8.06718]	[−0.12870]	[−4.82326]	[−10.0762]
B(−1)	3.67E−05	−0.000221	−1.267941	0.092274	−4.33E−07
	(2.9E−06)	(0.00017)	(0.10509)	(0.05891)	(3.9E−07)
	[12.4691]	[−1.32081]	[−12.0649]	[1.56638]	[−1.10801]
B(−2)	2.96E−05	0.000401	−0.831827	−0.005244	5.99E−06
	(2.1E−06)	(0.00012)	(0.07662)	(0.04295)	(2.8E−07)
	[13.7862]	[3.28121]	[−10.8571]	[−0.12210]	[21.0592]
B(−3)	2.58E−05	−0.003169	1.107426	0.995556	4.37E−06
	(1.5E−06)	(8.5E−05)	(0.05346)	(0.02997)	(2.0E−07)
	[17.2493]	[−37.2085]	[20.7134]	[33.2195]	[22.0079]
C (Premium)(−1)	9.41E−05	−0.006586	4.830169	1.474379	5.55E−06
	(5.8E−06)	(0.00033)	(0.20884)	(0.11707)	(7.8E−07)
	[−16.1060]	[−19.7932]	[23.1281]	[12.5944]	[7.15530]
C (Premium)(−2)	−8.99E−06	−0.005844	1.070294	0.712950	3.88E−06
	(3.1E−06)	(0.00018)	(0.11117)	(0.06232)	(4.1E−07)
	[−2.88899]	[−32.9974]	[9.62760]	[11.4410]	[9.39734]
C (Premium)(−3)	−2.87E−05	2.50E−05	−1.445931	−0.818414	−2.43E−06
	(3.4E−06)	(0.00019)	(0.12099)	(0.06782)	(4.5E−07)
	[−8.47445]	[0.12991]	[−11.9508]	[−12.0674]	[−5.40597]
C(Payouts)(−1)	−1.275709	781.9146	−282120.0	−206075.0	−0.492960
	(0.29739)	(16.9346)	(10629.6)	(5958.37)	(0.03948)
	[−4.28974]	[46.1725]	[−26.5409]	[−34.5858]	[−12.4856]
C(Payouts) (−2)	−0.192368	−153.6905	123251.5	100132.2	−0.330055
	(0.32271)	(18.3766)	(11534.8)	(6465.72)	(0.04284)
	[−0.59611]	[−8.36337]	[10.6852]	[15.4866]	[−7.70358]
C(Payouts)(−3)	3.244016	687.6326	−331387.1	−137956.4	−0.547408
	(0.41460)	(23.6094)	(14819.3)	(8306.86)	(0.05504)
	[7.82444]	[29.1254]	[−22.3618]	[−16.6075]	[−9.94485]
Const	1.443955	885.9904	−48664.47	−84258.68	−0.945870
	(0.41416)	(23.5843)	(14803.5)	(8298.01)	(0.05499)
	[3.48648]	[37.5670]	[−3.28735]	[−10.1541]	[−17.2021]

Table 1 (cont.). Dynamics of the vector autoregression results of the integral indicator of Ukraine's social progress's (ISP) dependency on pertinent risk insurance variables in relation to time gaps

Vector Autoregression Estimates					
Sample (adjusted): 4 162					
Included observations: 159 after adjustments					
Standard errors in () & t-statistics in []					
indicator	ISP	A	B	C (Premium)	C (Payouts)
R-squared	0.908898	0.991865	0.947148	0.968821	0.966293
Adj. R-squared	0.899342	0.991012	0.941604	0.965551	0.962758
Sum sq. resids	1.531270	4965.499	1.96E+09	6.15E+08	0.026991
S.E. equation	0.103480	5.892688	3698.762	2073.314	0.013739
F-statistic	95.11155	1162.386	170.8430	296.2305	273.2980
Log likelihood	143.4919	−499.1997	−1523.484	−1431.447	464.5408
Akaike AIC	−1.603672	6.480500	19.36458	18.20688	−5.642022
Schwarz SC	−1.294851	6.789320	19.67340	18.51570	−5.333202
Mean dependent	−0.003830	324.5094	35556.77	25987.38	0.236241
S.D. dependent	0.326162	62.15547	15306.06	11170.57	0.071190
Determinant resid covariance (dof adj.)		0.000000		—	
Determinant resid covariance		0.000000		—	

validates sufficiency and accuracy of the model. This indicates that, accounting for time reflections, the variation in the components accounts for 90.89% of the variance in the outcome. The statistical significance of the constructed model is shown by the F-statistic, which is 95.11 and significantly greater than the critical permissible level. The created model seems to offer a reasonably excellent approximation of the statistical data, as demonstrated by the Schwarz criterion ([−1.29]) and Akaike information criteria ([−1.60]).

Comparable vector autoregressions were constructed for life and reinsurance, two other forms of insurance.

The following time gap VAR models may be created in the respective tables using the information in the “ISP” column (Table 2).

According to the modeling, social reforms that were put into place three years ago have had a big influence on how far society has come now.

Of all the variables in risk insurance, the following have been found to have statistically significant effects on Ukraine's integrated indicator of social progress: the number of non-life insurance companies, their assets, the gross insurance premiums in the risk insurance segment, and the payout level of these companies. The number of non-life insurance companies has a three-year lag.

The assets of non-life insurance companies have a three-year lag. After three years, an increase of ten insurance businesses will result in a 0.08 unit drop in the integrated level of social development. Given that there should only be a small number of highly funded insurers operating in the insurance market, this association makes sense. After three years, an increase of USD 1 billion in risk insurance businesses' assets will translate into a 0.026 unit rise in the integrated indicator of social development. In the meantime, the performance indicator is greatly influenced more quickly by the volume of insurance premiums for risk insurance. For example, after a year, an increase of USD 1 billion in insurance premiums will result in a 0.094 unit rise in the integrated index of social development. The payment level is clearly the most important variable in the risk insurance market, as, after three years, a 1% increase will result in a 0.03 unit increase in the integrated indicator of social progress.

An expansion in life insurance companies has a negative effect on the integral measure of social growth when compared to risk insurance. For example, after three years, an increase of 10 units in life insurance firms will lead to a fall of 0.206 units in the integral index. On the other hand, all other indices pertaining to the life insurance sector show an improvement with a two-year lag. To be more precise, an increase of USD 100 million in assets causes the integral index to grow by 0.010

Table 2. Factor characteristics of the variables in assessing the integrated indicator of Ukraine's social progress

Factor characteristics of the variables in the assessment the integrated indicator of Ukraine's social progress at time t for risk insurance						
Time gap	The integrated indicator of Ukraine's social progress at time t	The “Number of Insurance Companies” factor – Non-life	The “Company Assets” factor – Non-life	The “Gross Insurance Premiums” factor – within risk insurance	The “Payout Level” factor – within risk insurance	Constant, the free term of the regression level, which determines the level of the resulting characteristic at zero levels of all factors
t-1	+ 0.818528	– 0.008721	+ 3.67E-05	– 2.87E-05	– 1.275709	+ 1.443955
t-2	+ 1.139331	+ 0.012290	+ 2.96E-05	– 8.99E-06	– 0.192368	
t-3	+ 0.830121	+ 0.008799	+ 2.58E-05	– 2.87E-05	+ 3.244016	
Factor characteristics of the variables in the assessment the integrated indicator of Ukraine's social progress at time t for life insurance						
Time gap	The integrated indicator of Ukraine's social progress at time t	The “Number of Insurance Companies” factor – Life	The “Company Assets” factor – Life	The “Gross Insurance Premiums” factor – within life insurance	The “Payout Level” factor – within life insurance	Constant, the free term of the regression level, which determines the level of the resulting characteristic at zero levels of all factors
t-1	– 0.917195	– 0.013451	+ 5.83E-05	– 0.000272	+ 1.368266	+ 0.997580
t-2	– 0.029250	- 0.001414	+ 0.000100	– 0.000589	+ 3.441717	
t-3	+ 0.469833	- 0.020557	+ 5.59E-05	– 0.000260	+ 3.182073	
Factor characteristics of the variables in the assessment the integrated indicator of Ukraine's social progress at time t for reinsurance						
Time gap	The integrated indicator of Ukraine's social progress at time t	The “Premiums for Resident Reinsurers” factor	The “Premiums for Non-resident Reinsurers” factor	The “Reinsurance Payout Level” factor	Constant, the free term of the regression level, which determines the level of the resulting characteristic at zero levels of all factors	
t-1	+ 0.294811	- 4.45E-05	+ 0.000328	– 0.024402	+ 0.069992	
t-2	– 0.183594	+ 5.11E-05	+ 5.19E-05	– 0.007260		
t-3	+ 0.469366	+ 0.000111	– 5.60E-05	+ 0.030390		

units; an increase of USD 100 million in gross premiums causes the integral index to rise by 0.059 units; and an increase of 1% in payment levels causes the integral index to climb by 0.034 units. Compared to risk insurance, life insurance not only has a greater impact more quickly, but it also has a greater impact on the processes of social development in Ukraine.

After three years, the integral transformation index of social progress decreases by 0.011 units due to a USD 100 million rise in premiums given to national reinsurers. On the other hand, after a year, premiums paid to non-resident reinsurers raise the integral indicator by 0.033 units. This makes sense given that social development depends on the nation's financial resources operating effectively. Reinsurance payout levels have a favorable, but less pronounced, influence on societal development than both risk and life insurance categories.

For example, after three years, a 1% rise in reinsurance payouts will raise the integral index of social development by 0.03 units. The desire of customers for the financial stability of insurance firms rather than reinsurers explains this.

Summarizing, it is important to highlight that this study's results diverge considerably from those of other academic studies on the same subject. For example, Onyshchenko et al. (2023) evaluated the impact of risks related to the state and patterns of the insurance market in Ukraine on societal stability. Nevertheless, their strategy was circumspect, emphasizing financial stability as opposed to the in-depth analysis carried out in this piece. The investigation of reciprocal impacts as well as one-sided ones is one key distinction between the study discussed in this article and the study by Onyshchenko et al. (2023). This article uses an integrated method, while their meth-

od is index-based. Furthermore, this study used VAR modeling, whereas their study used correlation-regression analysis to evaluate effects.

According to Krupka's (2020) study, which examines how social and personal insurance affect Ukrainians' quality of life, reviewing the basic concepts of pension insurance accumulation is a prerequisite for achieving any meaningful social benefits. Similar conclusions are reached in this article: life insurance might have the biggest effects. But this time, the investigation's purview is far wider, covering a comprehensive analysis of

the ways in which all the main categories of insurance impact societal advancement.

A dynamic general equilibrium model was used in Antón et al. (2016) to simulate the social effects of various regulatory interventions moving from selective (i.e., contributions to social insurance are made by officially employed citizens as deductions from wages) to comprehensive social insurance. The research discussed in this article, in contrast to the previously described study, is more extensive; it considers time delays, previous societal shifts, and all forms of insurance.

CONCLUSION

The purpose of this study was to examine the impact of different segments of the insurance market (risk insurance, life insurance, and reinsurance) on the dynamics of social progress in Ukraine and to identify key reforms to improve social development. The study reveals that the indicator "growth/decline rates of nominal wages," which is highly representative of Ukraine when considering family income sources, is given the most weight in the integral index of social progress in Ukraine. The quintile coefficient of money, which comes in second place with about the same weight, is closely related to this indicator, emphasizing the significant wealth inequality between different socioeconomic groups. The integral indicator is greatly influenced by public spending on social security and protection as well as the percentage of total household consumption expenditures. The share of income from self-employment and entrepreneurial endeavors ranks lowest, indicating a low level of population participation in ventures that capitalize on the insurance market, with a weight coefficient of 0.195. The study emphasizes the significant impact of the social changes that took place three years ago on the current state of social development.

Looking at the segments of the insurance market, the study reveals a moderate and multidirectional impact on the integral level of social progress from 2003 to 2020. In particular, an increase in the number of insurance companies harms the integral indicator for three years, while an increase in the assets of risk insurance companies has a positive impact on social development during the same period, and in the case of life insurance, for two years.

The results emphasize the urgency of prioritizing measures to support the life insurance industry, as life insurance-related indicators have a more direct and significant impact on society within two years compared to other insurance sectors. In addition, the intensification of measures to increase insurance tariffs has a positive impact on social development, with a response time of one year for risk insurance and two years for life insurance. Interestingly, premiums paid to Ukrainian reinsurers have a negative impact on the composite indicator for three years, while payments to non-resident reinsurers have a positive impact for one year.

In conclusion, this study offers insightful information on the intricate connection between social development and the insurance industry in Ukraine, highlighting the significance of particular metrics and suggesting targeted actions to improve social well-being.

AUTHOR CONTRIBUTIONS

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