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FINANCIAL SECURITY UNDER ECONOMIC PRESSURE: OLS AND ARMAX ANALYSIS OF MACROECONOMIC STABILIZATION IN HEALTHCARE SECTORE

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Purpose: The objective of this article is to comprehensively assess the financial security of the Polish healthcare sector over 15 years, taking into account both internal measures of financial efficiency and the impact of macroeconomic conditions.
Design/methodology/approach: The paper uses a synthetic indicator of financial security (HealtFinSec), constructed using the TOPSIS method and the OLS and ARMAX econometric models. Particular emphasis is placed on examining the role of macroeconomic stabilisation (MSP) as a factor determining the financial security of the sector.
Findings: The results of the study indicate that the long-term financial stability of the health sector depends not only on internal management, but also on the overall macroeconomic situation of the country. This means that health care financing planning should be integrated with the state's economic policy. The practical consequence is the need to build buffer mechanisms, e.g. stabilisation funds – that will increase the resilience of the system in periods of recession.
Research limitations/implications: The availability of data, the choice of normalisation method and the choice of research sample.
Practical implications: For decision makers, this means the need for long-term planning and strengthening of tools to monitor the condition of the sector in a dynamic approach. These conclusions may also be helpful for medical facilities, indicating the importance of liquidity management, operational efficiency, and debt reduction. For international institutions and regulators, the article provides arguments for a better linking of health policy with the goals of sustainable development and economic stability.
Social implications: The social implications of the article relate to the health security of citizens, the role of economic policy in shaping quality of life, and the need for systemic changes in the financing of the health care sector in Poland. The results provide a strong argument for long-term coordinated public policy that integrates health and economic goals.

Originality/value: The novelty of the article is the multidimensional, quantitative, and dynamic approach to the financial security of the health sector and its innovative link to macroeconomic stability – using advanced analytical methods (TOPSIS, ARMAX) and a long-term time perspective. This article makes an original contribution to research on the economics of the health care sector, indicating the need for a systematic approach to assess its financial stability, in connection with macroeconomic conditions and long-term financing and management strategies.
Keywords: ARMAX analyse, healthcare sector, financial security, macroeconomic stability.
Category of the paper: Research paper.

1. Introduction

The financial stability of the healthcare sector is the foundation for its effective functioning, especially in public systems, where the balance between the quality of services and budget constraints is a key challenge (Longo, Saadati, 2025). In Poland, as in many other countries, the healthcare sector is strongly dependent on political decisions, available public funds, and the general macroeconomic condition of the country (Nojszewska, Sielska, 2022). Analysis of the financial security of the healthcare sector in the years 2008-2023 allows a better understanding of how economic variables and internal financial parameters affected its long-term stability.

The period covered by the study includes both the global financial crisis (2008-2010) and the COVID-19 pandemic (2020-2021), which were serious stress tests for the healthcare system. Despite these challenges, the financial liquidity indicators (CR and QR) remained at a satisfactory level, indicating the ability of the entities to settle short-term liabilities. However, at the same time, profitability indicators such as ROS, ROA, and ROE remained low throughout the analysis period, which suggests permanent structural limitations in the generation of financial surpluses.

The objective of this article is to comprehensively assess the financial security of the Polish healthcare sector over 15 years, taking into account both internal measures of financial efficiency and the impact of macroeconomic conditions. The paper uses a synthetic indicator of financial security (HealtFinSec), constructed using the TOPSIS method and the OLS and ARMAX econometric models. Particular emphasis is placed on examining the role of macroeconomic stabilisation (MSP) as a factor determining the financial security of the sector.

HealtFinSec is a synthetic indicator used for comprehensive assessment of the level of financial security of entities operating in the healthcare sector. It takes into account a set of key financial indicators describing liquidity, debt, operational efficiency and profitability. The purpose of HealtFinSec is to capture the overall level of the entity's ability to operate safely, meet financial obligations, undertake investment activities and respond to changes in the macroeconomic environment. This indicator can be constructed as a normalized value

calculated based on the weights assigned to individual components (e.g. current financial liquidity, debt level, operating margin, receivables turnover), adapted to the specifics of the healthcare sector.

This study makes a significant contribution to the debate on sustainable healthcare financing in Poland and is a valuable source of knowledge for policy makers, healthcare facilities, and health economists interested in the long-term resilience of the system to external shocks.

2. The Role of Financial and Macroeconomic Stability in Ensuring Enterprise Security and Sustainable Growth - literature review

Financial security is currently the most important component of the economic security of an enterprise (Raczkowski, 2014). In the literature, it is defined in various ways. In a narrow sense, an enterprise's financial security means maintaining an appropriate surplus of current assets over short-term liabilities (Wędzki, 2003) or maintaining financial liquidity and high management efficiency (Franc-Dąbrowska, 2006). In a broad sense, it is identified with a situation that enables the company's current operations and development (Karbownik, 2012), with access to resources and the market for selling products (Górczyńska, Zadora, 2014).

Considering the financial security of an enterprise, several aspects should be noted:

- a company's financial security is a component of its economic security,
- it is a process that ensures the protection of the financial interests of the company,
- it is one of the factors of the company's growth and its stability,
- it can be characterized by a combination of selected indicators (Delasa et al., 2015).

These indicators include primarily: financial liquidity, operational efficiency, debt and profitability (Kowalska, Misztal, 2020).

The choice of the right indicators for assessing financial security should be consistent with the features of the enterprise's functioning: meet strategic goals, consider the peculiarities of the composition and structure of funding sources, reflect the specifics of the industry and the individual level of profitability (Dokiienko et al., 2024).

It should be emphasized that financial security refers to two fundamental issues in the functioning of a company: financial stability and financial independence (Nguyen, Nguyen, 2020). Financial security is ensured not only by maintaining a stable financial position but also by the strategic development of the enterprise and the creation of conditions for implementing a financial mechanism capable of adapting to future changes in the internal and external environment (Postolache, 2025). Ensuring financial security should be based not on the separate process but on the system of interconnections of all processes that occur within and outside the enterprise's boundaries in interaction with the external environment (Tursunov, 2020). An important element of this environment is the macroeconomic environment and its stability.

Macroeconomic stability is an ambiguous and hard-to-define concept. In a broad sense, it is understood as a configuration of social, political, economic, demographic, military, and natural and climatic indicators that determine economic growth (Raczkowski, Komorowski, 2023; Siddik, 2023). This concept is often based on the evaluation of several key macroeconomic indicators. These include GDP growth, unemployment rate, inflation rate, the budget balance of the state to GDP, and the balance of the current turnovers size to GDP (Kamguia et al., 2024). Some studies propose a broader concept encompassing price stability and fiscal prudence, well-functioning real economy, sustainable debt levels, and healthy private and public sector balance sheets (Wielechowski, 2024).

Macroeconomic stability is achieved when public policies lead to strong growth, low inflation, low unemployment, and a balance of payments position that does not lead to disruptive exchange rate movements (Kireyev, 2025). The OECD defines macroeconomic stability as avoiding significant fluctuations in economic activity, particularly regarding GDP growth, inflation, and unemployment rates. It also emphasizes the role of fiscal and monetary policies in achieving this stability (Sutherland, Hoeller, 2014).

Macroeconomic stability exists when key economic relationships are in balance. These relationships, however, need not necessarily be in exact balance. Imbalances such as fiscal and current account deficits or surpluses are perfectly compatible with economic stability, provided they can be financed sustainably (Ames et al., 2001). The objective of macroeconomic stability is not merely the maintenance of such stability but rather the advancement of the population's well-being and the state's economic growth. Macroeconomic stability can be regarded as a public good, facilitating the achievement of stable well-being, confidence in the future for the entire society, and the success of long-term investment projects (Bilenko, 2024). This stability affects the quality of the business environment (Mac Clay et al., 2023), eliminates uncertainty in economic activity, increases the country's investment attractiveness, and increases the probability of future economic activity growth. In a situation of increasing macroeconomic instability, uncertainty and risk aversion increase among investors (Janecki, 2017; Aghion, Howitt, 2006). Macroeconomic stability significantly affects financial development in the region (Ehigiamusoe et al., 2020), and it is also critical for peace (Kireyev, 2025). It has an important bond to economic growth. According to the economic consensus, macroeconomic stability is a necessary, although not sufficient, condition for achieving high and sustainable economic growth (Arriaza-Herrera, Castillo-Maldonado, 2022).

The research shows a significant impact of macroeconomic stability indicators on economic growth after the 2008 global financial crisis, compared to a very small impact during the 2000-2008 boom (Bilenko, 2024). The financial crisis had particularly negative consequences in countries with high levels of debt and deficit, which also affected the healthcare sector (Hnatyszyn-Dzikowska, 2013). Macroeconomic instability and financial crises had a multidimensional impact on the functioning of this sector (Kaplan, 2012; Mladovsky et al., 2012). Maintaining macroeconomic stability is important because it helps generate higher and

more predictable budget revenues, facilitating the financing of public healthcare systems and investments in infrastructure, technology, research, and preventive programs. In a stable macroeconomic environment with a high level of employment, more people have insurance offered by their employer and/or can afford private insurance. Price stability facilitates healthcare cost planning and makes healthcare, including private care, more accessible to patients. Economic downturns usually force budget cuts, resulting in health service underfunding and reduced investment in healthcare infrastructure. Macroeconomic instability can lead to increased costs, limited access to health care, longer waiting times for medical services and a deterioration in their quality.

Macroeconomic stabilization can strengthen public management (Raczkowski, 2016), which is possible thanks to increasing available financial resources and creating specific sectoral policies, including healthcare. The problem of financing the healthcare sector in Poland is becoming particularly important in the face of the financial gap in the healthcare system forecasted by the National Health Fund, which may amount to approximately PLN 250 billion in 2025-2028 (Dudek et al., 2025).

3. Research methodology

The objective of the investigation is to assess the impact of financial security on the healthcare sector in Poland from 2008 to 2023 and to determine the effect of macroeconomic stabilisation on the financial condition of the sector. Annual data were obtained from wskaznikibranzowe.pl and stat.gov.pl.

The following research questions were asked:

- How has the financial security of the Polish healthcare sector evolved between 2008 and 2023?
- What were the main changes in liquidity, profitability, operational efficiency, and debt during the analysis period?
- Is there a relationship between the level of macroeconomic stabilisation (MSP) and the financial security of the healthcare sector?
- Which financial indicators are most strongly correlated with the overall condition of the sector?
- What conclusions can be drawn from the OLS and ARMAX models regarding the impact of macroeconomic factors on the stability of the healthcare sector?

In the first step, financial indicators were selected and grouped into four categories.

- Liquidity: Current Ratio (FLI) and Quick Ratio (FFL).
- Profitability: Return on Sales (ROS), Return on Assets (ROA), and Return on Equity (ROE).
- Operational efficiency: Days Inventory Outstanding (DIO), Days Sales Outstanding (DSO), and Days Payables Outstanding (DPO).
- Debt: Debt Ratio (DR).

Based on these indicators, a synthetic financial security index for the healthcare sector (HealtFinSec) was calculated using the TOPSIS method, which allows comparison and ranking of years relative to an ideal financial condition.

In the next step, the Macroeconomic Stabilization Index (MSP) was calculated based on the concept of Grzegorz W. Kołodko's Macroeconomic Stabilization Pentagon. The MSP index includes five variables: real GDP growth rate, inflation rate (HICP), unemployment rate, current account balance as a percentage of GDP, and general government deficit as a percentage of GDP.

All variables were standardised, and the MSP index was calculated as the arithmetic mean of the five components. The MSP index reflects the general level of macroeconomic stability in a given year.

To examine the relationship between MSP and HealtFinSec, two econometric models were used:

- The Ordinary Least Squares (OLS) regression model to assess the direct impact of MSP on financial security.
- The ARMAX model also considers lagged effects and the influence of past economic shocks.

A correlation matrix was also constructed to analyse the strength and direction of the relationships between the individual financial indicators and HealtFinSec and MSP.

The models were evaluated in terms of:

- Statistical significance of coefficients (p-values).
- Goodness of fit (R-squared, AIC).
- Compliance with the assumptions of the classical model (White test, Durbin-Watson test, LM test, normality of the residuals).

The results of the analysis provided answers to the research questions. They allowed conclusions to be drawn about the financial condition of the healthcare sector and its sensitivity to macroeconomic changes in Poland between 2008 and 2023.

4. Research results

Table 1 presents the financial security of the Polish health sector for the years 2008-2023. The indicators are grouped into four categories: liquidity, profitability, operational efficiency, and debt. The liquidity indicators include the Current Ratio (FLI) and Quick Ratio (FFL). Throughout the period analysed, the FLI ranged from 1.13 in 2011 to 1.42 in 2021, while the FFL fluctuated between 1.02 (2011) and 1.28 (2021). These values suggest that the sector maintained a stable ability to meet short-term liabilities, with slight improvements in liquidity after 2020.

The profitability indicators – Return on Sales (ROS), Return on Assets (ROA), and Return on Equity (ROE) – remained lower overall. ROS was highest in 2021 (0.06) and lowest in 2011 and 2018 (0.01). ROA ranged from 0.02 to 0.08, peaking in 2008 and 2021. Similarly, ROE reached a high of 0.16 in both 2008 and 2021, reflecting occasional surges in profitability but a generally modest financial return.

Regarding operational efficiency, days of inventory outstanding (DIO) increased from 3.32 days in 2008 to a peak of 7.37 days in 2020 before declining to 4.66 in 2023. Days Sales Outstanding (DSO) showed a gradual increase from 41.34 days in 2008 to 49.80 in 2015, followed by a slight decrease to 41.78 in 2023. Days payables outstanding (DPO) peaked at 77.17 days in 2014 and declined to 59.67 days in 2023, indicating a more efficient payment cycle.

The Debt Ratio (DR) remained relatively stable over the years, ranging from 0.51 in 2018 to 0.59 in 2010. This indicates a moderate but persistent reliance on external financing within the sector.

Table 1.
The Financial Security of the Polish Health Sector from 2008 to 2023

	FLI	FFL	ROS	ROA	ROE	DIO	DSO	DPO	DR
2008	1.36	1.25	0.05	0.08	0.16	3.32	41.34	56.37	0.53
2009	1.31	1.20	0.05	0.07	0.15	3.67	42.11	61.77	0.57
2010	1.19	1.09	0.04	0.05	0.11	3.99	45.52	69.56	0.59
2011	1.13	1.02	0.01	0.02	0.04	4.47	44.25	73.19	0.58
2012	1.18	1.07	0.03	0.03	0.08	4.38	45.42	72.27	0.57
2013	1.30	1.18	0.03	0.03	0.07	4.68	46.42	69.52	0.55
2014	1.14	1.03	0.03	0.02	0.06	4.89	48.35	77.17	0.56
2015	1.38	1.26	0.03	0.03	0.06	5.01	49.80	67.88	0.56
2016	1.36	1.24	0.02	0.02	0.04	5.09	47.27	65.54	0.57
2017	1.29	1.17	0.02	0.02	0.04	5.05	44.47	70.25	0.56
2018	1.24	1.12	0.01	0.02	0.03	5.02	42.94	67.17	0.51
2019	1.30	1.18	0.02	0.02	0.05	4.95	44.83	66.22	0.53
2020	1.36	1.22	0.04	0.04	0.08	7.37	46.48	72.89	0.55
2021	1.42	1.28	0.06	0.07	0.16	6.54	43.14	64.43	0.54
2022	1.35	1.22	0.04	0.04	0.09	5.85	43.22	64.77	0.54
2023	1.41	1.27	0.05	0.07	0.14	4.66	41.78	59.67	0.54

Source: own elaboration based on wskaznikibranzowe.pl

The financial safety index was calculated using the TOPSIS method. It includes indicators of liquidity, profitability, debt, and working capital. The analysis covers the years 2008 to 2023 in the healthcare sector.

From 2008 to 2010, the financial condition was stable. Liquidity remained strong. The sector was resilient during the economic crisis. The index decreased slightly but remained at a reasonable level. From 2011 to 2016, financial safety weakened. Profitability was reduced. The levels increased. Liquidity and efficiency also decreased. This period reflects financial stress in the sector. Between 2017 and 2019, the situation improved slowly. Liquidity ratios increased. Receivables turnover became shorter. Profitability was still low, but financial safety stabilised. In 2020-2023, the index increased significantly. The best results were recorded in 2021 and 2023. Profitability and liquidity improved. The healthcare sector responded well after the COVID-19 crisis.

The years 2020 and 2021 were dominated by the pandemic and programs aimed at combating its economic consequences (Opolski, Zuber, 2023). Appropriate legal acts were adopted and financial measures were launched, including those from EU aid funds, to mitigate the effects of the COVID-19 pandemic (The Act of 2 March 2020 and the Act of 16 April 2020).

Overall, the index shows a U-shaped trend. After a decline, the financial safety of the healthcare sector improved. The sector became more stable and financially secure.

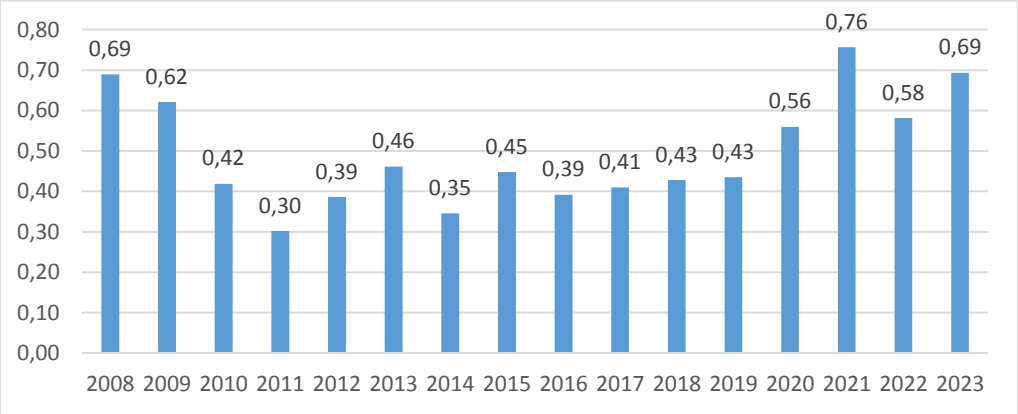

Figure 1. Financial security indicator from 2008 to 2023.

Source: based on wskaznikibranzowe.pl

The MSP index shows how stable the economy was each year (Figure 2). In 2008, the value was 0.38. It remained close to 0.40 for several years. In 2012, it dropped to 0.34, showing weaker stability. After 2012, the index started to rise. It reached 0.44 in 2015 and 0.48 in 2017 and 2018. This means that the economy became more stable during those years. In the last years, the index stayed between 0.42 and 0.45. In 2023, it was 0.39, a small drop.

Overall, macroeconomic stability improved after 2012 and remained at a good level in 2015-2020.

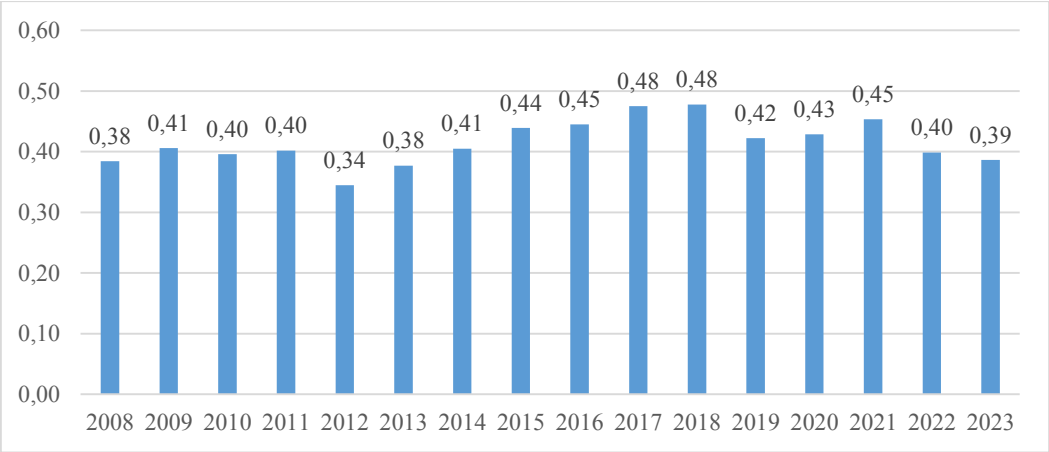

Figure 2. Macroeconomic Stabilisation Indicator from 2008 to 2023

Source: based on stat.gov.pl.

Figure 3 is a correlation matrix. It shows the strength and direction of the relationships between financial and performance indicators. Values range from -1 to +1. Red means positive correlation (variables increase together). Blue means negative correlation (one increases, the other decreases).

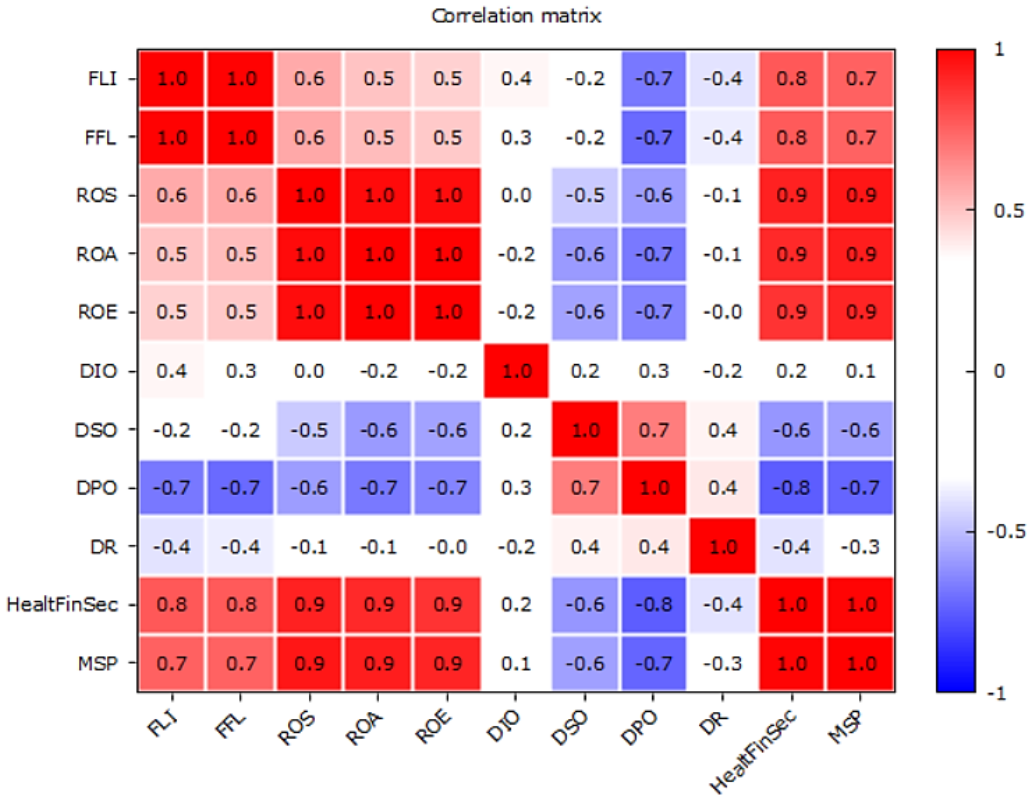

Figure 3. Correlation matrix from 2008 to 2023.

Source: based on stat.gov.pl

The diagonal shows values of 1.0 because each variable is perfectly correlated with itself. It shows that:

- FLI (Financial Leverage Index) and FFL (Firm Financial Leverage) are strongly and positively correlated (1.0). They both measure how much debt a company uses.
- ROS (Return on Sales), ROA (Return on Assets), and ROE (Return on Equity) show very strong positive correlations with each other (approximately 1.0). This means that if one type of profitability increases, the others also increase.
- These profitability indicators also have strong positive correlations with:
  - HealtFinSec (Health of Financial Security), showing that more profitable companies are also financially healthier.
  - MSP (Market Sustainability Performance), meaning that profitable companies also perform better in terms of long-term market goals.
- DPO (Days Payables Outstanding) has strong negative correlations with ROS, ROA, ROE, HealtFinSec, and MSP (around -0.7 to -0.8). This suggests that the desire to pay bills is related to weaker financial results.
- DSO (Days Sales Outstanding) negatively correlates with profitability and sustainability, but not as strongly as DPO.
- DR (debt ratio) shows moderate negative correlations with performance indicators, suggesting that higher debt levels can hurt company performance.
- The DIO (Day Inventory Outstanding) has weak correlations with most other variables. It does not have a strong effect on profitability or sustainability.

This matrix shows that high profitability goes hand in hand with strong financial health and sustainability. In contrast, high debt, long customer payment times, and delays in paying suppliers are related to poorer performance and weaker financial security.

Table 2 explains how MSP affects HealtFinSec. The constant (intercept) is 0.599. This means that if MSP is zero, HealtFinSec would be negative. The coefficient for MSP is 1.044. This is a strong and positive effect. When MSP increases by 1 unit, HealtFinSec increases by about 1.044 units. The p-value for MSP is very small (< 0.001). This means that the result is statistically significant. The R-squared is 0.979. This means that the model explains almost 98% of the variation in HealtFinSec. The model fits the data very well. The F test is also highly significant. This confirms that the model is overall useful. The Durbin-Watson statistic is 1.05, which suggests some autocorrelation in the residuals. However, the LM test for autocorrelation gives a p-value of 0.071, so autocorrelation is not highly significant. The White test for heteroskedasticity gives a p-value of 0.537, so there is no evidence of heteroskedasticity.

The normality test has a p-value of 0.121. This means that the residuals are likely to be normally distributed.

MSP has a strong and positive effect on HealtFinSec. The model is statistically strong, with no major problems in the residuals.

Table 2.
The OLS estimation Dependent variable: HealtFinSec

coefficient std. error t-ratio p-value
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const −0.599031 0.0433162 −13.83 1.48e-09 ***
MSP 1.04355 0.0410108 25.45 4.02e-013 ***
Mean dependent var 0.495375 S.D. dependent var 0.136710
Sum squared resid 0.005933 S.E. of regression 0.020587
R-squared 0.978836 Adjusted R-squared 0.977324
F(1, 14) 647.4877 P-value(F) 4.02e-13
Log-likelihood 40.49508 Akaike criterion −76.99016
Schwarz criterion −75.44498 Hannan-Quinn −76.91103
rho 0.451775 Durbin-Watson 1.046695
White's test for heteroskedasticity - Test statistic: LM = 1.24229 with p-value = P(Chi-square(2) > 1.24229) = 0.537328
Test for normality of residual - Test statistic: Chi-square(2) = 4.2296 with p-value = 0.120657
LM test for autocorrelation up to order 1 - Test statistic: LMF = 3.87805 with p-value = P(F(1, 13) > 3.87805) = 0.0706122

Source: own elaboration based on wskaznikibranzowe.pl; stat.gov.pl.

Table 3 shows ARMAX estimation. Results show a strong, statistically significant effect of MSP ($\beta = 1.014$, $p < 0.0001$), underscoring its key role in enhancing financial security. The constant term is negative and significant (-0.567, $p < 0.0001$), suggesting low baseline financial security without external drivers. The AR term is insignificant ($\varphi_1 = 0.173$, $p = 0.612$), while the MA term is marginally significant ($\theta_1 = 0.578$, $p = 0.056$), indicating some effect of past shocks.

Table 3.
The ARMAX estimation results; dependent variable: HealtFinSec

	Coefficient	**Std. Error**	**z**	**p-value**
const	−0.567275	0.0482913	−11.75	<0.0001
phi_1	0.173044	0.340984	0.5075	0.6118
theta_1	0.578261	0.303188	1.907	0.0565
MSP	1.01446	0.0447676	22.66	<0.0001

Mean dependent var	0.495375		S.D. dependent var	0.136710
Mean of innovations	−0.000748		S.D. of innovations	0.015646
R-squared	0.986061		Adjusted R-squared	0.983917
Log-likelihood	43.50352		Akaike criterion	−77.00705
Schwarz criterion	−73.14410		Hannan-Quinn	−76.80923

		Real	**Imaginary**	**Modulus**	**Frequency**
AR	Root 1	5.7789	0.0000	5.7789	0.0000
MA	Root 1	-1.7293	0.0000	1.7293	0.5000

Source: own elaboration based on wskaznikibranzowe.pl; stat.gov.pl.

The model shows an excellent fit ($R^2 = 0.986$, adj. $R^2 = 0.984$; AIC = 77.01), with stability confirmed by the root moduli AR and MA exceeding 1. In general, MSP emerges as the dominant and stable driver of financial security in the sector.

5. Discussion

The evaluation of the financial security of the Polish healthcare system from 2008 to 2023 offers several vital trends and implications. The healthcare sector maintained good liquidity throughout the research period. The values of the Current Ratio (FLI) and the Quick Ratio (FFL) indicate that healthcare facilities were generally in a position to fulfil their short-term obligations even during such challenging periods as the global financial crisis (2008–2010) and the COVID-19 pandemic (2020–2021). Liquidity eased after 2020, providing a more solid post-pandemic recovery.

However, profitability was low, as return on sales (ROS), return on Assets (ROA), and Return on equity (ROE) were essentially at low levels. Profit peaks in 2008 and 2021 suggest that the industry is sporadically capable of improving its financials, especially when the macroenvironment is supportive. However, consistently low mean levels of profitability suggest structural obstacles in generating revenue and controlling costs in the public healthcare sector.

On an efficiency-of-operations basis, measures such as days inventory outstanding (DIO), Days Sales Outstanding (DSO), and days payables outstanding (DPO) capture the volatility of broader economic trends. The increase in DIO through 2020 and subsequent drop show efforts to streamline inventory management, possibly due to supply chain disruptions from the pandemic. Similarly, the trend for DPO shows that the industry became more efficient at paying suppliers after peaking in 2014.

The debt ratio (DR) was steady, reflecting a modest but persistent use of outside finance. This reflects the conservative approach of the sector to debt, likely due to the controlling factors and public sector finance mechanisms.

The synthetic financial security index (HealtFinSec), which was created using the TOPSIS method, showed a U shape in 15 years. The financial insecurity of 2011-2016 reflects financial stress, possibly due to increased public budget stringency and economic slowdown. The recovery after 2017, especially for years 2021 and 2023, reflects that the sector responded well to emerging new financial and operational issues.

A key finding of the study is the statistically robust and significant association between macroeconomic stabilisation (MSP) and financial security (HealtFinSec). The OLS and ARMAX models confirmed that MSP is an essential driver of economic security in the healthcare sector. As captured through real GDP growth, inflation, unemployment, fiscal balance, and current account balance, macro stability rises with the sector's financial strength. A healthy economic climate is crucial to maintaining the financing and performance.

The correlation matrix also reflects the centrality of profitability. ROS, ROA, and ROE have strong and positive correlations with HealtFinSec and MSP, reflecting that financial well-being is highly correlated with internal efficiency and macroeconomic external variables. However,

indicators such as DPO and DR have negative correlations with performance measures, reflecting that the longer the payment days and the higher the debt needed, the worse the finances are.

The ARMAX model also sheds more light by incorporating time dynamics. Although the moving average term was not significant, the autoregressive term was significantly just, referring to the presence of follow-through influences from past economic shocks still having some impact on present-day financial performance. However, the MSP continued to be the most influential and stable explanatory variable.

All in all, the evidence suggests that macroeconomic conditions have a crucial influence on the fiscal sustainability of the health sector. Financial stability is vital for policy makers in planning reforms and budgeting. Enhanced profitability and efficiency through focused initiatives could further boost the sector's resilience to external shocks.

6. Conclusions

The research confirms that the financial stability of the Polish healthcare sector in 2008-2023 depended on internal financial situations and the general macroeconomic climate. Liquidity was generally stable, which helped the industry support short-term liabilities even in times of economic crisis. However, the levels of profitability were always low, illustrating structural financial limitations.

The financial security synthetic index (HealtFinSec), based on the TOPSIS method, had a U-shaped trend: decreased during the 2011–2016 period and then recovered afterwards, especially after the COVID-19 pandemic. This is the slow adaptation of the sector to budget constraints and external shocks.

The most notable is the high statistically confirmed correlation between macroeconomic stabilisation (MSP) and sectoral financial security. The OLS and ARMAX models show that increased macroeconomic stability, measured by GDP growth, inflation, unemployment, public deficit, and current account balance, leads to a considerable increase in financial security.

Macroeconomic conditions have a vital influence on the health sector. Financial stability is essential for policymakers to plan reforms and budgeting.

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