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THE IMPACT OF THE ECONOMIC GROWTH ON THE FINANCIAL SECURITY OF THE HEALTH CARE AND SOCIAL ASSISTANCE SECTOR IN POLAND

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Purpose: The study's primary aim is to assess the impact of economic growth on the financial security of the healthcare and social assistance sector from 2008 to 2022.
Design/methodology/approach: The paper consists of a theoretical background and a research part. We created a synthetic indicator of financial security and examined the correlation between it and GDP per capita. Additionally, we developed a statistical model estimated using the Ordinary Least Square method.
Findings: We verify that the financial security indicator of section Q fluctuates in the examined period, although it has a slight positive trend, and that GDP per capita from the two periods before has an impact on its level ($p < 0.05$).
Research limitations/implications: The study limitations are related to the selection of data, the method of calculating correlation coefficients and the OLS estimation method. Additionally, it should be noted that we analyzed the impact of only the level of GDP, which is an important research limitation.
Practical implications: The empirical implications are related to introducing a model allowing for the assessment of the impact of GDP on the financial security of the health sector. Additionally, we have developed a synthetic indicator for assessing the sector's financial security.
Social implications: The financial situation of health care depends on macroeconomic conditions and demand for medical services.
Originality/value: The paper's novelty is developing a synthetic indicator of financial security in section Q and examining the relationship between this indicator and GDP per capita in Poland.
Keywords: economic growth, financial security, the health care and social assistance sector.
Category of the paper: research paper.

1. Introduction

The health care and social assistance sector (section Q) is important for the stable socio-economic development of the country. Providing medical care for the population is one of the basic tasks of the state, and the right to medical care is one of the tasks included in the constitution. Section Q consists of companies that provide broadly understood medical services. The development of enterprises here depends on macro-social factors and those related to the internal situation of enterprises. However, whether endogenous or exogenous factors influence the financial and property situation cannot be clearly stated.

The paper's primary goal is to assess the impact of economic growth, measured by GDP per capita, on the financial security of Poland's health care and social assistance section from 2008 to 2023. Financial security is a financial situation that enables current functioning and future development. Therefore, assessing financial liquidity, profitability, debt level and operational effectiveness is crucial here.

The main research hypothesis is as follows: "The increase of GDP per capita has a statistically significant ($p < 0.05$) positive impact on the financial security of the health care and social assistance section".

The paper's novelty is developing a synthetic indicator of financial security in section Q and examining the relationship between this indicator and GDP per capita in Poland.

We verify the main hypothesis based on the designated synthetic indicators of financial security, linear correlation analysis, Pearson's r, Spearman-s Rho, Gamma and Kendall rank correlation coefficients, Ordinary Least Square (OLS). We check our model's linearity, normality of distribution, homoscedasticity and autocorrelation. The study used data from the Central Statistical Office and Eurostat databases.

The study includes an introduction, theoretical background, research methodology, research results, discussion and conclusion.

2. Theoretical background

Financial security (FS) is a complex, multi-faceted, and variously defined economic category. It is next to important terms such as economic and national security. These categories are close and connected (Szafraniec-Siluta et al., 2024). Maintenance and improvement of financial security is one of the essential parts of the functioning and development of enterprises (Allen et al., 2014; Dovhan, Rippa, 2022; Zaleska, 2024).

FS can be defined as the ability of enterprises to maintain the ability to repay current liabilities and a high level of efficiency in undertaken activities (Franc-Dąbrowska, 2006). Financial security constantly reduces and eliminates targeted monetary risk to secure capital adequacy (Raczkowski, 2014). It may define a state that gives a sense of certainty of existence and a guarantee of its preservation as well as development opportunities; its name can also determine the financial guarantee of the existence and development of the enterprise, which is created as a result of the company's daily, long-term efforts to ensure good financial condition" (Karbownik, 2012, p. 66). By financial security can be understood as "protection of the financial interests of enterprises at all levels of financial relations" (Zahorodniy, Voznyuk, 2007).

Financial security is one of the stages in the company's goal of financial independence. In the first stage, managers strive to obtain financial protection, i.e. a financial situation in terms of liquidity, profitability and debt level that covers current liabilities. The second stage is financial security or a situation that guarantees the existence and development of the enterprise. The third stage that companies should strive for is financial freedom, which, in addition to financial security, also includes financial opportunities to implement even in unforeseen circumstances investment (Karbownik 2012, p. 67).

Financial security can be analyzed at two levels (Karbownik, 2014, p. 18).

- operational means all the financial conditions for the effective and efficient continuation of business activity by an economic entity; good financial standing plays a pivotal role here,
- strategic, emphasizing factors and indicators that influence the long-term development of enterprises.

Accrual and cash ratios are used to assess financial security (Tang et al., 2022). Therefore, data to assess its level comes from all financial statements, including the balance sheet, profit and loss account, and cash flow statement.

Due to the lack of data availability, analyzing cash indicators at the sector level is impossible. Hence, it is necessary to use accrual ratios. Therefore, financial liquidity determines how much an enterprise can cover its current liabilities with liquid assets, i.e., current and increased financial liquidity indicators are determined (Bernardin, Tifani, 2019; Nowicki et al., 2024).

Analysis of profitability ratios, one of the basic indicators for assessing financial security, determines how quickly we will achieve a return on the capital employed in the enterprise. Analysis of the ratio of the result to individual balance sheet items provides answers about the current situation of the business and enables the design of development activities in particular areas. Most often, the higher the profitability ratios, the more favourable the entity's financial situation (Dirman, 2021; Taddeo et al., 2024).

An important debt indicator is the overall financial situation, which is the ratio of external capital (liabilities) to assets. The overall debt ratio is the most general picture of the financing structure of a company's assets. The higher the value of this indicator, the higher the risk the

lender bears. Hence, it is often assumed that a value above 0.67 indicates excessive credit risk. A low level of the indicator proves the financial independence of the company (Özyeşil et al., 2024).

Financial security depends on the following factors (Misztal, 2019; Misztal, Kowalska, 2020):

- external, including legal conditions, level of economic growth, research and development expenditure, and situation on the labour market,
- internal, financial conditions, structure of enterprise assets, management strategies and models, management skills of entrepreneurs.

One of the factors important for financial security is economic growth (Song et al., 2021; Chen et al., 2023). However, the literature on the subject needs to include publications devoted to the statistical assessment of this phenomenon. Although the authors often indicate that this relationship is positive, the strength of the relationship in section Q still needs to be explored.

3. Research methodology

The research was conducted on Poland's health care and social assistance sector (section Q) from 2008 to 2023. The data for the study were taken from the Central Statistical Office and Eurostat databases; they are annual. We want to analyze how financial security was shaped over the period studied and whether events such as the economic downturn from 2008 to 2012 and the COVID-19 pandemic impacted the FS level in section Q.

However, the main goal of the study is to assess the relationship between economic growth and financial security in section Q. Therefore, we have put forward the following research hypothesis "The increase of GDP per capita has a statistically significant ($p < 0.05$) positive impact on the financial security of the health care and social assistance section".

The study was conducted in the following stages:

- synthetic indicator of financial security was determined,
- the relationship between GDP per capita and financial security was examined using Pearson's r, Spearman-s Rho, Gamma and Kendall rank correlation coefficients,
- a single-equation model was created; which was estimated using the ordinaryleast squares method.

We create financial security indicator (FS) based on:

- stimulants: classic current liquidity ratio (liquidity of the third degree), classic quick liquidity ratio (liquidity of the second degree), net return on sales (ROS), return on total assets (ROA), return on equity (ROE), total assets turnover ratio, equity share in asset financing (self-financing), liabilities coverage ratio with tangible fixed assets,

- destimulants: inventory turnover ratio in days (inventory cycle), receivables turnover ratio in days (receivables cycle), liabilities turnover ratio in days (liabilities cycle), operating cost level ratio, total debt ratio, equity debt ratio - financial leverage, long-term debt ratio.

We use the following formulas:

$$FS_{ij} = \frac{\sum_{i=1}^{n} \frac{S_{ij}}{max\, S_{ij}} + \sum_{i=1}^{n} \frac{min\, DS_{ij}}{DS_{ij}}}{n};\ FS_{ij} \in [0;1] \tag{1}$$

where:

FS_{ij} – the normalized value of the j-th variable in the i-th year,

S_{ij}/DS_{ij} is the value of the j-th variable in the i-th year,

n is the number of metrics.

To assess the relationship between the FS and GDP per capita, we used:

- the Spearmans rang, which we determined based on the following formula:

$$r_s = \frac{\frac{1}{6}(n^3 - n) - (\sum_{i=1}^{n} d_i^2) - T_x - T_y}{\sqrt{\left(\frac{1}{6}(n^3 - n) - 2T_x\right)\left(\frac{1}{6}(n^3 - n) - 2T_y\right)}},$$
$$d_i = Rx_i - Ry_{i\,;}\, T_x = \frac{1}{12}\sum_j (t_j^3 - t_j)\ ;\ T_y = \frac{1}{12}\sum_k (u_k^3 - u_k) \tag{2}$$

where:

t_j is the number of observations in the sample having the same j-th rank value of the variable x,

u_j is the number of observations in the sample having the same k-th rank value of the variable y,

$R_x$is the ranks of x in the sample,

$R_y$is the ranks of y in the sample.

- the Pearson's R given by the formula:

$$r_{Pearson} = \frac{\sum_{i=1}^{n}\left(FS_i - \overline{FS}\right)\left(\text{GDP}_{\,i} - \overline{GDP}\right)}{\sqrt{\sum_{i=1}^{n}\left(FS_i - \overline{FS}\right)^2}\sqrt{\sum_{i=1}^{n}\left(DGP_i - \overline{GDP}\right)^2}}, r_{Pearson} \in [-1;1] \tag{3}$$

- The Kendall rank:

$$r_{Kendall} = \frac{(\text{number of concordant pairs}) - (\text{number of disordant pairs})}{(\text{numer of pairs})} = 1 - \frac{2(\text{number of concordant pairs})}{\frac{n\,(n-1)}{2}} \tag{4}$$

- The Gamma corellation coefficient:

$$r_{Gamma} = \frac{N_S - N_D}{N_S + N_D} \tag{5}$$

where:

N_S - the number of pairs of cases ranked in the same order on both variables,

N_D - the number of pairs of cases ranked in reversed order on both variables.

We also create an equation based on formula:

$$FS = \propto_0 + \propto_1 \cdot GDP + \propto_2 \cdot GDP_{(t-1)} + \propto_3 \cdot GDP_{(t-2)} + \varepsilon_i \quad (6)$$

the residual for each observation is as follows:

$$e_i = FSi - \hat{\propto}_0 - \hat{\propto}_1 GDP_i - \hat{\propto}_2 GDP_{(i-1)} - \hat{\propto}_3 GDP_{(i-2)} - \varepsilon_i \quad (7)$$

We use the OLS regression to estimate model:

$$s(\hat{\propto}_0, \dots, \hat{\propto}_3) = \sum_{i=1}^{n} (FSi - \hat{\propto}_0 - \hat{\propto}_1 GDP_i - \hat{\propto}_2 GDP_{(i-1)} - \hat{\propto}_3 GDP_{(i-2)} - \varepsilon_i)^2 \rightarrow \min \quad (8)$$

4. Research results

Table 1 presents the number of entities from section Q operating in Poland in 2008-2022. In the period under review, a trend is growing. Entities increase yearly (except for 2018, 2020 and 2021).

Table 1.
Number of entities from section Q operating in Poland in 2008-2022

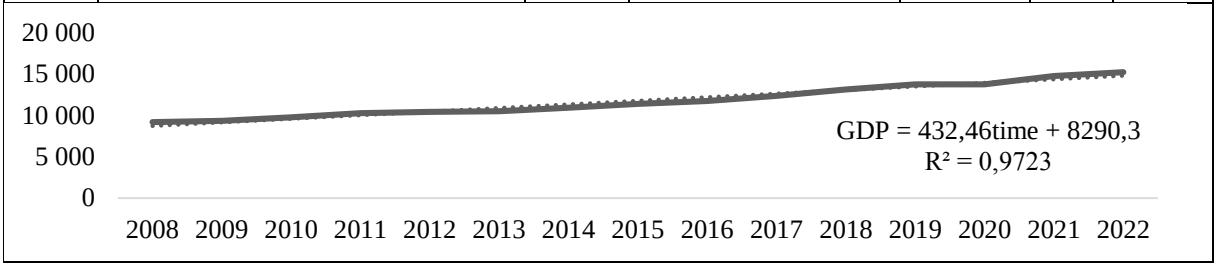
Poland – section Q	
Year	**Number of entities**
2008	281
2009	313
2010	341
2011	359
2012	396
2013	440
2014	466
2015	470
2016	475
2017	487
2018	476
2019	488
2020	474
2021	470
2022	485

Source: own study on the basis of Eurostat, https://ec.europ a.eu/Eurostat, 25.10.2024.

Table 2 shows the indicator of real GDP per capita (EUR) of section Q entities in Poland in 2008-2022. The average value of this indicator in the period under review is 11 750 EUR (standard deviation 1,894,895 EUR; median 11,390 EUR), while the maximum value is 15,190 EUR (2022), and the minimum is 9180 EUR (2008). The real GDP per capita (EUR) indicator of section Q entities in Poland in 2008-2022 characterises a positive trend.

Table 2.
Indicator of real GDP per capita (EUR) of section Q entities in Poland in 2008-2022

Poland – section Q						
		Descriptive statistics				
Year	Real GDP per capita (EURO)	Mean	Standard deviation	Median	Min	Max
2008	9180					
2009	9330					
2010	9740					
2011	10250					
2012	10400					
2013	10480					
2014	10900					
2015	11390	11750	1894,895	11390	9180	15190
2016	11740					
2017	12340					
2018	13120					
2019	13720					
2020	13720					
2021	14750					
2022	15190					



Source: own study on the basis of Eurostat https://ec.europ a.eu/Eurostat, 25.10.2024.

Table 3 presents the values of analytical indicators used to create the financial security indicator of section Q entities in Poland in 2008-2022. Taking into account liquidity indicators, they are at optimal levels. Except the current liquidity indicator in 2010-2012 and 2014, where its level is slightly too low. Profitability indicators should increase year by year; unfortunately, in section Q entities in Poland in the years 2008-2022, the values of these indicators sometimes decrease and sometimes increase (negative situation).

Table 3.
Analytical indicators of the financial security indicator of section Q entities in Poland in 2008-2022

Financial security – analytical indicators, Poland – section Q					
Year	Financial liquidity		Profitability		
	Classic current ratio	Classic quick ratio	Return on sales	Return on assets	Return on equity
2008	1,36	1,25	0,23%	7,69%	16,32%
2009	1,31	1,20	4,89%	6,54%	15,19%
2010	1,19	1,09	3,62%	4,66%	11,39%
2011	1,13	1,02	1,29%	1,58%	3,80%
2012	1,18	1,07	2,88%	3,48%	8,05%
2013	1,3	1,18	3,17%	3,20%	7,15%
2014	1,14	1,03	2,56%	2,46%	5,54%
2015	1,38	1,26	2,77%	2,63%	5,97%
2016	1,36	1,24	1,61%	1,61%	3,73%
2017	1,29	1,17	1,89%	1,90%	4,29%

Cont. table 3.

2018	1,24	1,12	1,47%	1,52%	3,10%
2019	1,3	1,18	2,07%	2,16%	4,63%
2020	1,36	1,22	3,70%	3,78%	8,36%
2021	1,42	1,28	6,16%	7,19%	15,75%
2022	1,35	1,22	3,52%	4,28%	9,29%

Source: own study on the basis of https://wskaznikibranzowe.pl/, 25.10.2024.

Table 4 shows the continuation of the values of analytical indicators used to create the financial security indicator of section Q entities in Poland in 2008-2022. The values of the efficiency of operation indicators - inventory turnover ratio in days, receivables turnover ratio in days, payables turnover ratio in days and financial cost level ratio, should decrease from year to year, which means improvement in the efficiency of inventory, liabilities, and payables management. Decreasing the financial cost level ratio means taking profitable actions that reduce operating costs. In entities of section Q in Poland in the years 2008-2022, the values of these indicators do not always decrease (negative situation). The total asset turnover ratio should increase, but this is also not true in the examined entities (negative situation). The indicator of debt - total debt, equity debt and long-term debt should decrease from year to year (improving the entity's creditworthiness and credibility), which is not always the case in the entities examined. The remaining indicators belonging to this group should increase year by year.

Table 4.

Analytical indicators of the financial security indicator of section Q entities in Poland in 2008-2022

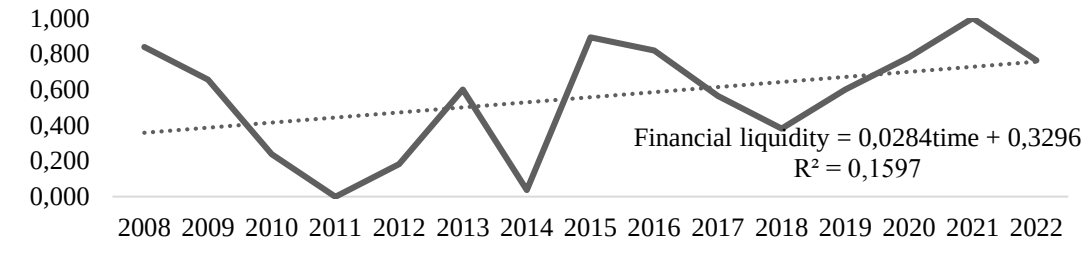
Financial security – analytical indicators, Poland – section Q										
Year	Efficiency of operation					Debt				
	Inventory turnover ratio in days	Receivables turnover ratio in days	Payables turnover ratio in days	Total asset turnover ratio	Financial cost level ratio	Rate of share of equity in asset financing	Total debt ratio	Debt equity ratio	Long-term debt ratio	Liability coverage ratio with tangible fixed assets and total debt ratio
2008	3	41	56	1,47	0,92	47,12%	52,88%	56,92%	59,10%	58,37%
2009	4	42	62	1,34	0,93	43,08%	112,24%	132,14%	144,52%	140,22%
2010	4	46	70	1,29	0,95	40,90%	50,06%	66,09%	69,52%	65,91%
2011	4	44	73	1,23	0,96	41,63%	234,04%	180,59%	185,49%	198,96%
2012	4	45	72	1,21	0,96	43,29%	56,71%	131,02%	58,17%	218,65%
2013	5	46	70	1,01	0,96	44,70%	55,30%	123,71%	59,06%	200,03%
2014	5	48	77	0,96	0,97	44,34%	55,66%	125,54%	55,18%	221,64%
2015	5	50	68	0,95	0,96	43,98%	56,02%	127,36%	60,24%	198,09%
2016	5	47	66	1	0,97	43,21%	56,79%	131,44%	62,18%	195,82%
2017	5	44	70	1,01	0,97	44,17%	55,83%	126,38%	56,73%	209,44%
2018	5	43	67	1,04	0,99	49,04%	50,96%	103,93%	39,73%	274,99%
2019	5	45	66	1,05	0,98	46,74%	53,26%	113,95%	44,95%	246,57%
2020	7	46	73	1,02	0,98	45,21%	54,79%	121,17%	42,51%	262,42%
2021	7	43	64	1,17	0,95	45,63%	54,37%	119,16%	39,46%	273,49%
2022	6	43	65	1,22	0,97	46,05%	53,95%	117,17%	34,12%	315,29%

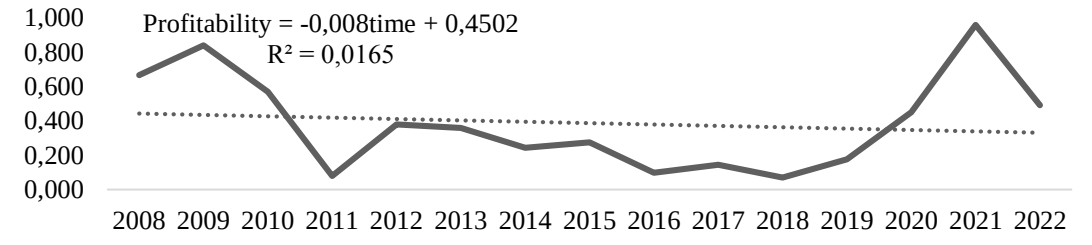
Source: own study on the basis of https://wskaznikibranzowe.pl/, 25.10.2024.

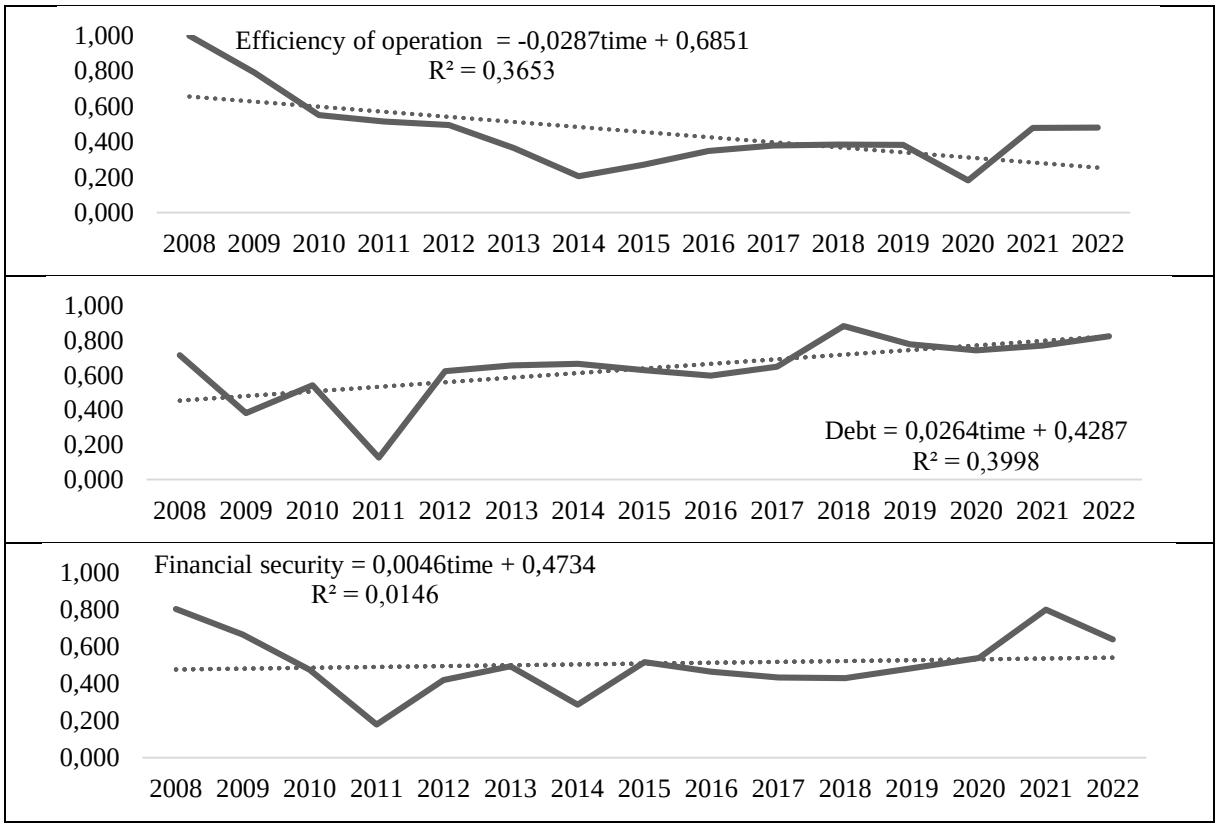
Table 5 presents the synthetic indicator of financial security of entities of section Q in Poland in 2008-2022 (with components). The average value of this indicator in the period under review is 0,510 (standard deviation 0,163; median 0,485), while the maximum value is 0,806 (2008), and the minimum is 0,181 (2011). The synthetic indicator of financial security of entities of section Q in Poland in 2008-2022 characterizes a positive trend.

Table 5.
Synthetic indicator of financial security of entities of section Q in Poland in 2008-2022 (with components)

Poland – section Q						
Year		**Financial liquidity**	**Profitability**	**Efficiency of operation**	**Debt**	**Financial security**
2008		0,839	0,667	1,000	0,717	0,806
2009		0,656	0,838	0,792	0,382	0,667
2010		0,238	0,569	0,551	0,544	0,476
2011		0,000	0,080	0,515	0,127	0,181
2012		0,182	0,380	0,494	0,625	0,420
2013		0,601	0,358	0,364	0,657	0,495
2014		0,036	0,243	0,205	0,667	0,288
2015		0,893	0,275	0,271	0,630	0,517
2016		0,820	0,098	0,348	0,599	0,466
2017		0,564	0,144	0,380	0,649	0,434
2018		0,382	0,070	0,385	0,884	0,430
2019		0,601	0,177	0,383	0,780	0,485
2020		0,781	0,450	0,182	0,745	0,540
2021		1,000	0,959	0,478	0,771	0,802
2022		0,764	0,490	0,481	0,825	0,640
Descriptive statistics	Mean	0,557	0,387	0,455	0,640	0,510
	Standard deviation	0,307	0,267	0,205	0,181	0,163
	Median	0,601	0,358	0,385	0,657	0,485
	Min	0,000	0,070	0,182	0,127	0,181
	Max	1,000	0,959	1,000	0,884	0,806







Source: own study on the basis of https://wskaznikibranzowe.pl/, 25.10.2024.

Table 6 shows the Pearson's R, Spearman-s Rho, Gamma and Kendall rank correlation coefficients between indicator of financial security and GDP, $GDP_{(t-1)}$, $GDP_{(t-2)}$ of entities of section Q in Poland in 2008-2022. The correlation coefficients are statistically significant between financial security and $GDP_{(t-2)}$ of entities of section Q in Poland in 2008-2022. There is a positive relationship between these variables and different levels of correlation coefficients regarding the strength of impact (a moderate correlation ($p < 0,05$, bolded in Table 6)).

Table 6.

Pearson's R, Spearman-s Rho, Gamma and Kendall rank correlation coefficients in the period from 2008 to 2022, $p < 0,05$ ($n = 15$)

Indicators	Correlation			
	Pearson's R	**Spearman's Rho**	**Gamma**	**Kendall rank**
GDP/Financial security	0,201	0,109	0,115	0,115
$GDP_{(t-1)}$/Financial security	0,463	0,365	0,289	0,287
$GDP_{(t-2)}$/Financial security	**0,688**	**0,641**	**0,481**	**0,477**

Source: own study on the basis of Eurostat https://ec.europ a.eu/Eurostat, https://wskaznikibranzowe.pl/, 25.10.2024.

Table 7 presents the results of the OLS regression between the indicator of financial security and GDP, GDP(t-1), GDP(t-2) of entities of section Q in Poland in 2008-2022. The results meet the OLS estimation conditions, including no collinearity, homoscedasticity, normal distribution of variables, and no autocorrelation.

Table 7.
Results of the OLS regressions in the period from 2008 to 2022 (p < 0,05):
$FS = \propto_0 + \propto_1 \cdot GDP + \propto_2 \cdot GDP_{(t-1)} + \propto_3 \cdot GDP_{(t-2)} + \varepsilon_i$

Dependent variable	Independent variable	Coefficient	Std. error	P-value	R-squared
FS	Const	−0,308	0,221	0,191	0,537
	$GDP_{(t-2)}$	6,96E-05	1,95E-05	0,004	

Source: own study on the basis of Eurostat https://ec.europ a.eu/Eurostat, https://wskaznikibranzowe.pl/, 25.10.2024.

The OLS estimation results indicate that in entities of section Q in Poland in 2008-2022, GDP(t-2) has a statistically significant impact on financial security. The relationship between the examined variables is positive.

5. Discussion

The development of Poland's health care and social assistance (section Q) sector is visible in the increasing number of enterprises that constitute it. This sector needs help with many problems, including financial ones. However, it should be remembered that due to the population's health condition, it is extremely important for stable social development, including improving citizens' quality of life and health (Kieszkowska-Grudny, 2018; Trzeszczoń, 2024).

The results of financial analysis indicators show that the healthcare and social assistance sector needs help with problems in terms of liquidity, profitability, operational efficiency and debt (Kosycarz, 2016; Misztal, 2019). For most of the period, financial liquidity indicators are lower than the assumed level, and what is more, the profitability of the sector, both in terms of profitability of assets, equity and sales, is low (Bożek, 2022).

The research results indicate that the financial security of the sector had a slightly positive trend from 2008 to 2022, with a decrease in the indicator level visible during the financial crisis. Interestingly, the COVID-19 pandemic has positively impacted the financial and property situation of enterprises in the sector, which may be related to greater demand for medical services. We have seen both a slight improvement in liquidity and profitability. The increase in the sector's debt is significant.

The main research hypothesis is true, although it should be noted that only delaying GDP by two periods impacted the financial security of the sector, which may be because macroeconomic conditions are not crucial for the financial security of the health sector.

The empirical implications of the conducted study are related to the introduction of a model allowing for the assessment of the impact of GDP on the financial security of the health sector. Additionally, we have developed a synthetic indicator for assessing the sector's financial security.

Theoretical implications indicate the conduct of a theoretical review of financial security and research methodology.

The study has limitations related to the selection of data, the method of calculating correlation coefficients and the choice of the OLS estimation method. Additionally, it should be noted that we analyzed the impact of only the level of GDP, which is an important research limitation.

6. Conclusion

The financial security of the health care and social assistance sector in the years 2008 to 2022 has a slight positive trend, although it should be emphasized that the financial situation of the sector deteriorated during the financial crisis and improved during the Covid-19 pandemic. It should be emphasized, however, that the liquidity ratio and profitability are still low, and a phenomenon that should also be assessed negatively is the increase in the sector's debt.

Financial security depends on several factors, including the level of GDP. Our research has shown that delaying the economic growth rate by two periods has a statistically significant impact on the sector's financial security level.

We will devote further research to identifying exogenic and endogenous factors important for the financial and property situation of the health sector in Poland and selected European Union countries.

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