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ACCRUAL AND CASH FINANCIAL PERFORMANCE OF INFORMATION TECHNOLOGY COMPANIES DURING THE COVID-19 PANDEMIC

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Abstract

Research background: Many companies have experienced a significant impact on their financial performance due to the pandemic period. The effects were mostly negative as a result of by due to the various restrictions that were put in place to limit direct contact among people and restrict mobility during the pandemic. As a result, online contacts increased, therefore, we decided to ask the following research question: Did the performance of Information Technology companies increase during the COVID-19 pandemic?
Purpose: The aim of the research was to examine the financial performance of Information Technology businesses from 2018 to 2021. In the article, a ratio analysis was conducted using the bi-annual financial data of IT companies.
Research methodology: The analysis included data accrual and cash results. The objective of the investigation was to assess the economic status of Information Technology firms, utilizing various analytical tools such as ratio analysis. Descriptive statistical methods were also employed to provide an overview of the findings. Furthermore, logit and discriminant models were utilized to summarize the financial outcomes.

Results: Based on the findings of the study that examined the financial status of Information Technology firms before and during the COVID-19 pandemic, it appears that these companies were able to maintain or improve their financial status during the pandemic, which goes against the general trend observed in the economy.
Novelty: Our examination of Information Technology firms' bi-annual accrual and cash financial outcomes amid the COVID-19 pandemic is unique due to the macroeconomic element – the epidemic at such a scale had not taken place in many years of the Polish market economy.

Keywords: profitability, static and dynamic liquidity, debt, turnover, logit and discriminant models model, Information Technology companies listed on the Warsaw Stock Exchange (WSE), COVID-19 pandemic

JEL classification: G19, G28, G30 G3

Introduction

The COVID-19 pandemic had a negative impact on the overall financial situation of business entities. For instance, the results of the Bulgarian capital market showed that returns on stocks in the healthcare, (IT), public utilities, and real estate sectors deteriorated, while the first wave of the COVID-19 pandemic had a positive impact on the healthcare and consumer staples sectors. During the second wave of COVID-19, the returns on stocks in the IT sector soared, while the returns on stocks in the utility sector fell. The third wave of COVID-19 had a positive impact on the stock returns of the industrial and consumer staples sectors, while the healthcare, real estate, and information technology sectors showed a negative result. During the fourth wave of COVID-19, the IT sector's stock returns continued to grow, while the consumer staples sector suffered further declines (Dospatliev, Ivanova, Varbanov, 2022).

For many businesses, this was tantamount to closing or suspending operations. The global shift to remote teaching, home-office work, and lack of access to entertainment such as movie theaters, theaters, philharmonic halls, restaurants, and many others, contributed to a temporary halt in the market. However, in opposition to the general downward trend, the IT industry saw a considerable opportunity in remote work and teaching. The IT industry was pressured by both businesses and customers, who expected their existing needs to be met from a computer or smartphone. Increased demand for IT hardware and software allows one to propose that the performance of companies in this sector, unlike others, should improve.

The study aimed to analyze IT companies' accrual and cash financial performance in 2018–2021. The following research hypotheses were formulated to meet the research objective. The null hypothesis is that the restrictions as a result of the COVID-19 pandemic caused the introduction of remote work. Working remotely resulted in an increased demand for IT sector products and services, which positively affected the financial performance of IT companies, which was evidenced by: increased revenues, increased profitability, improved liquidity, lower debt, and improved cash productivity. The alternative hypothesis opposes the null hypothesis and states that the introduction of restrictions resulting from the COVID-19 pandemic negatively affected the financial performance of IT companies.

To verify the research hypothesis in question and to reach the aims of the article, the following research stages were completed: literature studies, methodology, aims and objectives, research results, and conclusions.

1. Literature studies

The impact of the COVID-19 pandemic on the financial performance of companies is a research problem that is quite unusual, as it is only possible at the time of the emergence of this macroeconomic factor. However, most studies published to date have mainly addressed the negative impact of the pandemic on corporate financial performance. An analysis of the literature in terms of research on the financial deterioration of companies as a result of the COVID-19 pandemic confirms our reasons for taking up the topic and the preliminary theses set forth in the research hypothesis on the impact of the coronavirus pandemic on the financial performance of Chinese listed companies. A study by Chinese researchers indicates that small and medium-sized companies were most affected by the pandemic and the results indicated that those companies experienced a sharper decline in financial performance compared to other industries. The findings of this study have far-reaching implications for policymakers, as it is clear that governments, banks, regulators, and central banks need to join forces to deal with the financial and economic impacts of COVID-19. They should also design comprehensive policies to counteract the negative effects of such crises in the future. A starting point would be to take measures such as the provision of loans and rescheduling existing loans in the most affected sectors, such as tourism, the aviation industry, etc. In addition, providing transparent information about the healthcare sector and infection rates by officials could potentially prevent panic situations from arising in the future (Rababah, Al-Haddad, Sial, Chunmei, Cherian, 2020).

Fernandes (2020) contends that the impact of the crisis will be very asymmetrical across different sectors. Depending on the economic structure of a country, some will be more affected than others. For instance, countries with more service-oriented economies will be more affected and as a result have more jobs at risk. Fernandes's 2020 research outlines several possible scenarios for how the situation will unfold and its impact on the economic outlook.

The impact of the pandemic on financial markets in China and the US was also compared. The findings of the study were, indeed, very interesting. A positive significant relationship was observed between COVID-19 confirmed cases and all financial markets (Shanghai Stock Exchange and New York Dow Jones) from March 1, 2020 to March 25, 2020 in China and the US. This implies that COVID-19 had a significant impact on financial markets from March 1, 2020 to March 25, and 2020 in China and the United States (Sansa, 2020).

Microenterprise in Malaysia, where the small business sector was one of the most directly affected by the mobility restrictions, was analyzed. In fact, the impact is more significant for microenterprises than their larger counterparts. Entrepreneurs experienced business dropouts or closures and reduced income due to the closure of several auxiliary sectors, such as retail and transportation (Fabeil, Pazim, Langgat, 2020).

The impact of the pandemic on various sectors of the Indian economy was also analyzed. In the face of the worsening economic situation caused by the coronavirus, Indian industry suffered serious economic and financial consequences (Rakshit, Paul, 2020). A risk analysis of investing in IT companies listed on the Warsaw Stock Exchange was also conducted (Szaniewski, Dudkowska, 2020), and the potential positive impact of the pandemic on the IT industry globally was also addressed (Zemlińska-Sikora, 2021). They also analyzed how the COVID-19 pandemic affected the Hungarian labor market. The economic crisis following the coronavirus outbreak affected the lives, jobs, and incomes of many people. Some sectors of the economy froze or came to a standstill, causing many people to lose their jobs and thus be forced to look for other career options than the ones they had originally planned. The COVID-19 pandemic caused a deep economic crisis that left many people feeling insecure and unable to support themselves, which also negatively affected people's lives and their jobs. In Hungary, the sectors that were most affected by the pandemic were hotels, the tourism sector, and the automotive industry; these industries were affected early in the pandemic due to mobility restrictions and social distancing measures. The survey was conducted in July 2021 after the second wave of the outbreak, with a total of 613 participants. The results of this research indicated that the coronavirus outbreak had a significant impact on respondents' sense of job insecurity and financial situation. There was a strong relationship between the reduction of the

number of Hungarian small and medium-sized businesses and the sense of insecurity felt by employees. Thus, based on the results, it can be concluded that the coronavirus crisis had a negative impact on people's lives due to work-related problems (Karacsony, Krupánszki, Antalik, 2022) and the Turkish real estate market (Tanrıvermiş, 2020).

The problem of restricting the flow of tourists to the Czech Republic, related to government restrictions introduced, was also highlighted by Novotný and Pellešová in their 2021 analysis. During the pandemic, Hussam Musa, Frederik Rech, Chen Yan, Zdenka Musovae (2021) analyzed the financial performance of companies listed on the Bratislava Stock Exchange with a focus on their corporate governance practices. The results of the research confirmed the deterioration of the financial situation of the companies, however, companies applying corporate governance were slightly less affected by the COVID-19 pandemic.

The impact of COVID-19 on 28 industries in China was also investigated. The occurrence of the COVID-19 pandemic during the Chinese Spring Festival had a significant effect on industries such as leisure services, transportation, and media. The outbreak of the pandemic weakened the heterogeneity of industries.

A similar study on the impact and role of COVID-19 on global industries was conducted by Szczygielski, Charteris, Bwanya, and Brzeszczynski in 2021 who selected 68 industries representing 11 global industries. The findings suggest that the unpredictability brought about by the COVID-19 outbreak had adverse impacts on returns across all sectors, resulting in increased instability. We perceive these results as an indication of the uncertainty surrounding the future financial outcomes of firms and the emergence of prospects for select industries as some sectors are more resilient compared to others. During the COVID-19 period, new factors emerged in the return-generating process. It is demonstrated that, despite the uncertain climate, some industries have done well, producing positive cumulative abnormal returns, which were at times increasingly higher than in the pre-COVID-19 period. Another study related to the COVID-19 pandemic, using industries in the US as an example, examined the industry's response to the global financial crisis. Furthermore, there was a study on the consequences of the pandemic on IT jobs in the United States as well as Germany, as the largest economic players in Europe.

Alpar and Osterbrink's (2020) findings indicate that some companies benefited from the COVID-19 pandemic, but the overall impact of the recession on IT labor demand is still negative. This situation may improve as we deal with health issues, but some consequences of the pandemic are likely to remain. One way to address the issue is to shift from permanent to temporary work in IT, as companies seek increased flexibility. This should be accompanied

by regulations preventing the deterioration of working conditions for IT workers (Alpar, Osterbrink, 2020).

There are also studies on the IT sector's adaptation to the pandemic and how this affected banks' performance (Dadoukis, Fiaschetti, Fusi, 2021).

2. Data and sample

The financial information included in the study covers the years 2018–2021. The financial data were collected from the bi-annual financial statements of the listed companies operating on the Warsaw Stock Exchange to better assess the change in financial performance caused by international restrictions due to the pandemic. We adopted six-month evaluation periods for two reasons. The first was the timing of the introduction of pandemic restrictions, which were introduced on March 11, 2020. Thus, the first financial results reflecting the restrictions were already expected to be included at the end of June 2020. The second reason was also the unavailability of annual financial data. Since the annual financial statements for 2021 were not available in the databases until the second half of following next year, we were forced to include the half-year research periods, which affected the selection of data from previous periods. Therefore, the subject scope of the assessment included 24 companies in the IT sector operating on the Polish Stock Exchange. The subject of the study was the financial performance of IT sector companies listed on the Polish Stock Exchange in 2018–2021 (there are 28 companies on the market dealing in software and information systems).

3. Research methods

The research objective and research hypotheses are verified by analyzing data from three types of financial statements (balance sheet, income statement, cash flow statement), i.e., both accrual and cash results. The study of the financial situation employs methods of economic analysis including a ratio analysis (ratios of static and dynamic liquidity, operating efficiency, debt level, and self-financing). The selection of indicators was influenced by the possibility of comparing them with benchmark published sector indicators. The phenomenon was described using the methods of descriptive statistics. Ohlson's early warning logit model of bankruptcy risk was used to derive conclusions. The ratio analysis covered four main areas of financial ratios: (1) profitability ratios (return on total capital, return on equity, return on net assets, return on operations on assets, return on net sales and return on sales) (Gabrusewicz, 2014; Wiatrzyk,

2018), which are a key component of the financial analysis process, (2) static (current, quick, cash) (Kosińska, Cicirko, 2010; Sierpińska, Jachna, 1999) and dynamic liquidity ratios (cash productivity of sales, cash productivity of assets, cash productivity of operating profit, and cash sufficiency, also called cash flow adequacy ratio) (Śnieżek, Wiatr, 2011; Sierpińska, Wędzki, 2017; Śnieżek, Wiatr, 2011; Siemińska, 2002; Gołębiowski, Tłaczała, 2005), (3) turnover ratios (Jantoń-Drozdowska, Woźniak-Mikołajewicz, 2017; Mioduchowska-Jaroszewicz, Porada-Rochoń, Romanowska, 2021), and debt ratios (4) (Bednarz, Mioduchowska-Jaroszewicz, Ziółkowska, 2015, pp. 203–214). The ratio analysis was supplemented by Olhson's (1994) early warning models and discriminatory models: Altman (1993) and Gajdka, Stos (2004), Wędzki (2005) and INEPAN (Mączyńska, 2014).

In order to compare the results derived from Ohlson's model, discriminant models were introduced in the study to assess the risk of insolvency of enterprises. Among the many discriminatory models, five models were selected for the study: Altman (1993), Gajdka, Stos (2004), Wędzki (2005), INEPAN (Mączyńska, 2014). The interpretation of the model values is presented in Table 1.

Table 1. Diagnostic value of discriminant models

Type of models	Solvent	Insolvent	Uncertainty zone (solvent and insolvent)
Altman (1993)	>2.6	<1.1	between 1.11 and 2.6
Gajdka, Stos (2004)	>0.49	<–0.49	between –0.49 and 0.49
Wędzki (2005)	>0.5	<0.5	lack
INEPAN (Mączyńska, 2014).	>0	<0	lack

Source: own research.

4. Cash and accrual financial results of the IT sector from 2018 to 2021

The profitability results from the first part of the study are presented in Table 1. During the period under review, revenue dynamics increased slightly. The average value in the base year was 120%, while in 2021 the level of dynamics increased to 126%, which represents a 5% increase compared to the base year. In 2018, the company with the lowest value of revenue dynamics of 66% was NTT System SA, while the highest value of revenue dynamics was Asseco South Eastern Europe SA – 325%. The return on total capital (ROC) slightly increased during the period under review. In 2018, the average value of this indicator was 6%, while in 2021 it was 7%. In the base year, the average return on equity (ROE) was 7%, while in 2021,

it averaged at 9%. The company with the lowest value of the net return on assets (ROA) in the base year was Datawalk (–39%). The highest value was recorded by LiveChat Software SA at 82%. Compared to the base year, there was a noticeable decrease in the standard deviation observed, which indicates that the ROA values of the surveyed companies became more unified compared to the base year. The median increased from 2% in 2018 to 3% in 2021, which means that half of the companies recorded a value greater than or equal to 3% in 2021. The median increased slightly from 19% to 22%, which means that in 2021 half of the companies under study recorded a value of return on sales of less than or equal to 22%. The results of the profitability ratios are presented below in Table 2.

Table 2. Descriptive statistics of financial indicators of profitability

Years	Ratios in percent	M	Min	Max	SD	Years	M	Min	Max	SD
2018	1	120	67	325	47	2020	124	58	484	80
	2	6	–39	88	20		5	–9	73	15
	3	7	–45	90	22		5	–19	75	16
	4	5	–39	82	19		4	–9	69	14
	5	4	–40	108	24		4	–9	78	16
	6	–11	–542	63	112		5	–126	78	34
	7	26	–81	174	46		23	–75	100	37
2019	1	108	48	196	33	2021	127	57	327	52
	2	4	–50	72	18		7	–5	60	12
	3	5	–58	78	21		9	–10	70	16
	4	4	–50	72	18		6	–5	60	13
	5	3	–50	89	21		3	–4	13	5
	6	–25	–935	90	191		15	–26	93	28
	7	25	–83	171	46		27	–73	100	40

Indicators: 1 – revenue dynamics; 2 – return on total capital; 3 – return on equity; 4 – net return on assets; 5 – return on operating assets; 6 – net return on sales; 7 – return on sales.

M – median; Min –value minimal; Max – value maximal; SD – standard deviation.

Source: own study.

Moving forward with the study, we evaluated the financial liquidity of the companies. The data presented in Table 3 reveals that the liquidity ratio consistently declined throughout the review period. This implies that over the years, the companies had less current assets that they could easily convert to cash in comparison to the current liabilities, which typically have a repayment term of up to one year. The average value of the indicator in the period 2018–2020 deviates from the recommended values. This was attributed to the high

values of the indicators for Asseco South Eastern Europe SA and Datawalk SA. The quick liquidity ratio decreased regularly in the analyzed periods. The companies with the highest values of the ratio were Procad S.A. and Datawalk SA. Over the studied years, the average value of the cash liquidity ratio was well above the recommended value (i.e., 0.1–0.2). This means that companies had a significant amount of cash compared to current liabilities. Table 3 displays the ratios for liquidity, operational efficiency, and asset financing.

Table 3. Descriptive statistics of financial ratios of liquidity, operational efficiency and asset financing

Years	Ratios	M	Min	Max	SD	Years	M	Min	Max	SD
2018	1	3.0	0.6	18.2	3.7	2021	2.3	0.4	11.0	2.4
	2	1.4	0.0	5.6	1.2		0.8	0.0	2.5	0.5
	3	1.1	0.0	8.0	2.0		1.2	0.0	10.2	2.3
	4	0.5	0.0	2.5	0.5		0.4	0.0	1.0	0.3
	5	0.7	0.0	1.8	0.5		0.7	0.1	1.6	0.4
	6	0.1	0.0	0.5	0.1		0.1	0.0	0.7	0.2
	7	1.6	0.3	6.2	1.3		1.7	0.4	7.2	1.6
	8	1.8	0.5	6.3	1.3		1.9	0.8	7.3	1.6
2019	1	2.6	0.5	16.0	3.2	2022	1.9	0.4	10.6	2.0
	2	1.1	0.0	4.0	0.9		0.8	0.0	2.3	0.5
	3	1.0	0.0	7.5	1.7		0.9	0.0	8.4	1.7
	4	0.6	0.0	3.3	0.6		0.4	0.0	0.9	0.3
	5	0.7	0.1	2.6	0.7		0.6	0.1	1.3	0.3
	6	0.1	0.0	0.6	0.1		0.1	0.0	0.3	0.1
	7	1.5	0.4	7.1	1.3		1.6	0.5	5.4	1.2
	8	1.6	0.5	7.1	1.3		1.8	0.7	5.4	1.2

Indicators: 1 – current liquidity; 2 – quick liquidity; 3 – cash liquidity; 4 – turnover of short-term receivables; 5 – turnover of liabilities; 6 – inventory turnover; 7 – equity to fixed assets ratio; 8 – fixed capital to fixed assets ratio.

Source: own study.

The remaining ratios are presented in Table 4. During the period under review, the ratios of accounts receivable and accounts payable indicate a better collection policy due to a shorter collection period relative to the number of days of settling accounts payable, which indicates a more efficient operation and an improvement in the situation of entities. The situation for accounts payable turnover in days is similar to that of accounts receivable. For the maximum values in 2018–2019, the value of the accounts payable ratio was lower than that of the accounts receivable turnover ratio, and in 2020–2021 the situation was opposite, which means that for

Datawalk SA (which is characterized by maximum performance in this category), the situation during the COVID-19 pandemic was more favorable, i.e., the company collected receivables faster than it was obliged to settle liabilities. Datawalk SA is the only company that achieved a result in days exceeding one year (i.e., 365 days). The nature of the industry of the companies analyzed means that inventory accounts only for a small share of activity, and the number of inventory storage days throughout the period analyzed was similar. It is assumed that equity financing should hover around 60%. The average annual value of the fixed assets to fixed capital ratio for each of the periods studied exceeded 1.5. This is important information, since this ratio should not be less than 1. In this case, the indicator informs about the companies' financial security. In the study period, the average self-financing ratio was 0.66, which indicates that the result was satisfactory. The lowest value of this ratio was recorded in 2018 by Signity SA, 0.17.

Table 4. Descriptive statistics of the financial ratios of self-financing, debt and dynamic liquidity

Years	Ratios	M	Min	Max	SD	Years	M	Min	Max	SD
2018	1	0.7	0.2	0.9	l0.2	2020	0.7	0.3	0.9	0.2
	2	0.3	0.1	0.8	0.2		0.3	0.1	0.7	0.2
	3	–0.2	–6	0.6	1.2		0.1	–0.2	0.6	0.2
	4	0	–0.6	0.8	0.2		0.1	–0.1	0.7	0.1
	5	4.9	–3	99.3	19.8		0.5	–8.1	10.6	4
	6	1.1	–14.6	48.7	11.2		3.4	–2.1	32.6	7.9
2019	1	0.7	0.3	0.9	0.2	2021	0.7	0.4	0.9	0.2
	2	0.3	0.1	0.7	0.2		0.3	0.1	0.6	0.2
	3	–0.2	–6.2	0.5	1.3		0.1	–0.5	0.7	0.3
	4	0	–0.3	0.7	0.2		0	–0.3	0.7	0.2
	5	2.1	–27.8	70.5	15.8		2.7	–5.7	54.4	11.2
	6	1.3	–4.5	18.5	4.5		–21	–367	12.2	86.7

Indicators: 1 – Self-financing ratio; 2 – Debt ratio; 3 – Cash productivity of sales (CPS); 4 – Cash productivity of assets (CPA); 5 – Cash productivity of operating profit (CPOP); 6 – Cash Sufficiency (CS).

Source: own study.

The debt ratio is used to show the degree to which assets secure the repayment of debts. The average level of this ratio was 34%, and it did not exceed the critical value, which indicates a low debt level. In 2018, the average value of the cash productivity of sales (CPS) was negative, –0.23. The breakthrough occurred in 2020 when it increased to 0.13 and then the average dropped to 0.05 in 2021. In 2019, the lowest value of this indicator was recorded

by Datawalk SA. During the period under review, cash productivity of assets (CPA) displayed an average upward trend from –1% in 2018 to 7% in 2020. The year 2021 brought a decrease of 2%. Based on the average, it appears that there was insufficient operational cash flow, indicating a deficiency in cash efficiency. A decrease in cash productivity of operating profit (CPOP) was observed in 2018–2020 as it fell from 4.88 to 0.48. The ratio then increased to 2.74 by 2021. In 2019, the lowest value was recorded by Elzab SA, –27.82, and the highest value of 99.27 was achieved by Atende SA. The average median level was 0.62. The level of cash sufficiency showed an upward trend from 2018 to 2020, with an average increase from 1.08 to 3.40. However, this trend was not sustained in 2021, as there was a significant drop to –20.46. In 2021, the lowest value was recorded by Atende SA, –366.81. Asseco Poland SA recorded the highest value of 48.71 in 2018. The median indicates that there was no cash sufficiency.

To restate the results of the analysis, Olhson's Model was calculated and the empirical results are shown in Table 5. The results indicate that the performance of the companies improved, as 5 out of 24 companies were at risk in the first half of 2017, compared to only one company in the first half of 2021. It is worth noting that the values of the indicators recorded by the companies in most cases did not exceed 0.5, which may indicate their stable situation.

Table 5. Results of the discriminatory models

Period model	Q2				
	2017	2018	2019	2020	2021
1	2	3	4	5	6
Company Ailleron SA					
A	–2.02	–2.48	–2.31	–4.85	–3.37
B	6.34	7.96	7.85	7.04	6.64
C	Nd	0.07	0.01	1.16	0.24
D	Nd	–0.98	–1.40	–1.52	–0.65
E	3.52	4.55	3.20	2.09	4.89
Company Asseco Business Solutions SA					
A	–2.33	–2.02	–1.98	–2.40	–2.21
B	3.50	3.05	3.64	3.97	3.91
C	Nd	0.34	0.29	0.35	0.31
D	Nd	–1.48	–3.30	–0.22	0.00
E	5.29	4.28	5.21	6.29	6.16
Company Asseco South Eastern Europe SA					
A	–4.24	–4.62	–4.88	–4.09	–4.04
B	17.06	14.94	13.74	11.03	11.10
C	Nd	3.72	2.96	2.83	2.67

1	2	3	4	5	6
D	Nd	–0.26	–0.04	–0.01	0.24
E	12.14	12.57	13.11	11.03	11.76
Company Asseco Poland SA					
A	–4.34	–4.40	–4.62	–4.59	–4.67
B	3.69	3.87	3.88	3.68	3.73
C	Nd	2.71	3.26	3.50	3.43
D	Nd	–4.43	–0.70	–0.56	–0.47
E	10.41	14.88	18.18	19.51	18.14
Company Atende SA					
A	1.06	–3.73	–1.70	–2.27	–3.60
B	2.21	2.62	2.78	2.69	3.20
C	Nd	–0.02	0.09	–0.10	–0.17
D	Nd	–3.25	–3.73	–2.56	–2.80
E	0.40	0.99	1.06	1.51	1.48
Company Betacom SA					
A	2.16	1.45	24.70	–0.81	–0.40
B	2.16	2.06	2.76	2.01	3.54
C	Nd	–0.06	–0.15	0.04	–0.15
D	Nd	–1.43	–1.64	–1.25	–1.56
E	0.24	0.84	0.69	1.61	0.90
Company Brand 24 SA					
A	–1.49	–3.76	–0.65	0.85	2.04
B	2.84	4.50	1.12	0.93	1.54
C	Nd	–0.58	–0.20	–0.72	0.02
D	Nd	–2.20	–1.43	–1.68	–0.98
E	0.66	2.89	1.45	0.89	2.13
Company Comarch SA					
A	–2.65	–2.31	–3.60	–2.50	–2.54
B	5.35	5.91	6.27	5.14	5.83
C	Nd	0.03	0.48	0.32	0.41
D	Nd	–0.77	–0.65	–0.99	–1.36
E	3.51	3.57	5.26	3.22	3.76
Company Comp SA					
A	–2.61	–3.33	–4.16	–3.29	–2.41
B	6.78	7.33	6.69	6.61	6.61
C	Nd	0.30	0.13	0.07	0.42
D	Nd	1.09	1.08	1.42	0.01
E	2.93	3.47	2.90	3.14	3.14

1	2	3	4	5	6
Company Datawalk SA					
A	Nd	–6.05	–5.31	–4.75	–5.79
B	4.54	3.67	1.23	3.85	11.57
C	Nd	Nd	Nd	Nd	Nd
D	Nd	–1.74	–2.17	–0.57	0.16
E	–7.28	–6.11	–11.14	5.43	6.96
Company Digitree Group SA					
A	–3.57	–2.56	–2.61	–1.79	–2.85
B	9.93	7.24	6.81	5.83	5.33
C	Nd	1.30	0.33	–1.54	0.11
D	Nd	–1.04	–1.26	–1.17	–1.27
E	107.77	11.09	15.60	13.78	No
Company Ifirma SA					
A	–2.61	–1.99	–2.85	–1.72	–0.95
B	6.32	8.52	9.52	5.13	4.45
C	Nd	0.40	0.77	0.40	0.51
D	Nd	0.20	0.64	0.27	0.35
E	6.55	4.21	6.31	3.95	3.64
Company K2 Holding SA					
A	–1.14	–3.78	–2.71	–2.72	–3.03
B	3.96	5.56	4.74	4.64	4.89
C	Nd	1.13	0.04	0.20	0.45
D	Nd	–0.60	–0.64	–0.46	0.01
E	3.81	10.74	6.77	5.65	6.42
Company Livechat Software SA					
A	–3.59	–3.48	–3.67	–3.76	–3.39
B	13.52	Nd	10.29	9.76	13.52
C	Nd	4.14	3.64	3.79	2.74
D	Nd	7.80	5.85	5.07	1.74
E	38.83	43.09	34.56	38.69	12.24
Company LSI Software SA					
A	–2.03	–2.78	–2.62	–2.97	–3.54
B	6.21	6.99	6.45	5.90	6.05
C	Nd	0.69	0.48	0.48	0.59
D	Nd	0.01	–0.42	–0.51	–0.47
E	4.65	5.72	4.98	5.33	5.68

1	2	3	4	5	6
Company NTT System SA					
A	–2.00	–3.00	–3.15	–2.07	–1.38
B	6.82	7.61	7.92	5.89	5.48
C	Nd	0.24	0.19	0.00	0.04
D	Nd	–0.83	–0.78	–1.11	–1.15
E	2.03	3.45	3.39	1.67	1.51
Company Procad SA					
A	–3.48	–3.68	–3.04	–2.92	–2.79
B	9.55	9.98	9.34	8.09	8.85
C	Nd	0.60	0.19	0.09	0.20
D	Nd	0.84	0.17	–0.13	4.54
E	6.04	6.23	3.98	3.52	3.72
Company Quantum Software SA					
A	0.51	–3.42	–4.29	–4.67	–1.60
B	2.40	5.28	6.79	7.97	6.21
C	Nd	0.35	1.14	1.83	0.68
D	Nd	–0.79	–0.42	–0.12	–0.96
E	2.97	35.91	7.65	10.01	2.77
Company Signity SA					
A	0.94	2.78	1.44	0.71	–1.17
B	0.68	2.05	0.60	2.96	3.50
C	Nd	0.16	0.40	0.27	0.73
D	Nd	–1.05	–1.00	–0.30	–0.27
E	–2.31	0.49	0.84	1.68	3.11
Company Elzab SA					
A	0.40	–0.29	–8.32	–0.72	–1.83
B	3.10	4.08	4.29	3.96	4.53
C	Nd	0.07	–0.21	–0.10	0.36
D	Nd	–0.69	–0.68	–0.67	0.22
E	1.39	1.60	1.25	1.69	2.39
Company Wasko SA					
A	–4.65	–4.62	–2.06	–2.89	–2.13
B	6.16	7.16	5.44	5.11	5.58
C	Nd	0.05	0.00	0.03	0.15
D	Nd	–1.04	–1.22	22.37	0.21
E	4.17	3.70	2.38	2.14	2.55

1	2	3	4	5	6
Company Unima 2000 ST SA					
A	–3.75	–2.66	–2.78	–2.64	–3.08
B	3.86	4.24	4.83	3.90	4.86
C	Nd	–0.25	–0.14	–0.34	–0.27
D	Nd	–1.13	0.39	–1.28	–0.11
E	2.55	1.15	1.91	0.99	1.98
Company Talex SA					
A	–1.01	–1.95	–0.81	–2.71	–3.93
B	3.29	5.16	4.78	5.22	4.82
C	Nd	0.11	–0.01	0.00	–0.25
D	Nd	–0.54	–0.58	–0.58	–0.75
E	2.55	3.37	3.02	3.40	2.90
Company Simple SA					
A	0.71	–0.30	–0.54	–0.94	–11.6
B	3.28	3.60	4.08	4.37	3.37
C	Nd	0.07	0.11	0.24	–0.54
D	Nd	–0.20	–0.21	–0.04	–0.27
E	1.17	1.41	1.86	2.20	0.88

A – Ohlson (1995); B – Altman (1993); C – Gajdka, Stos (2004); D – Wędzki (2005); E – INEPAN (Mączyńska, 2014).
Nd – no data.

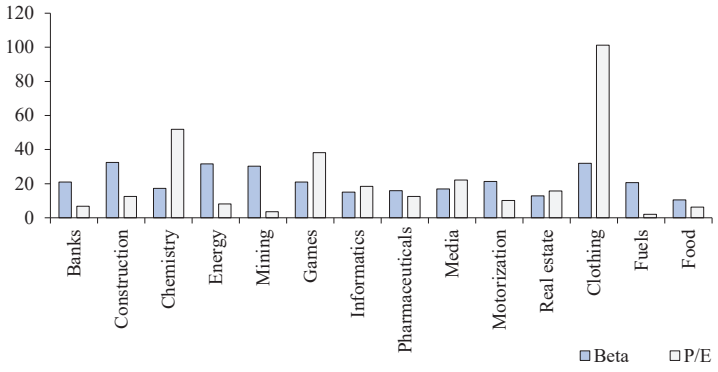
Source: own study.

Confirmation of the research hypothesis results was achieved by utilizing discriminatory models, including Altman (1994), Gajdka, Stos (2004), Wędzki (2005), and INEPAN (Mączyńska, 2014) in conjunction with a ratio analysis. The analysis revealed that the financial situation of IT sector companies improved during the studied period. Interestingly, the pandemic period had a positive impact on the majority of the surveyed companies, with only a few cases where it negatively affected their financial situation in an unmanageable way.

Conclusions

Our research proves that the restrictions and lockdowns had a positive impact on the financial performance of IT sector companies. Despite the high expectations for the financial performance of companies in the IT sector, due to the increasing demand for their services, it improved only slightly during the period studied. However, this confirms predictions that the COVID-19 pandemic exerted a positive impact ~~positive impact~~ on the IT industry. Even the

slight growth during such a recessionary period for the economy is highly impressive. Unlike the majority of companies in the market, the IT sector not only managed to survive but also recorded increasing profits on average. The industry faced a significant challenge due to supply chain disruptions and the ever-increasing demand for computer components. However, it turned out to be an essential factor in the sector's success. This was directly related to the lack of access to basic entertainment sources and conventional education, both of which contributed to the increased consumption of software and electronic equipment. It led to increased revenues and profitability, improved liquidity, lowered debt, and improved cash efficiency in the IT sector. In 2022, sales, profit and listings of companies in the IT sector fell in line with the predictions of stock analysts. What stimulated financial improvement in 2020–2021 resulted in a decline in performance. Among other things, a reduction in demand for IT products and services, inflation and a decline in economic growth. Thus, 2022 ended unfavorably for most companies in the sector. However, market trends related to remote work, the development of e-commerce and the growing demand for various types of customer service systems augur a bright future for these companies. The current state of stock market performance (as of the date of the article's correction), does not translate into market interest in the shares of listed companies. Turnover in the shares of companies in the IT sector is not the highest. The WSE Index (Warsaw Stock Exchange Index) of IT companies as of August 2023 (Figure 1) indicates that P/E and beta (unsystematic risk ratio) ratios are at average levels. The future of IT companies is not at risk as evidenced by their financial performance (no debt, high liquidity), forecasts from discriminatory models, and prospects for growth and increasing demand for such services, so perhaps, this is the right time for long-term investment in the shares of these companies.



Figures 1. Results of the WSE Index as of August 2023

Source: authors' own elaboration.

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