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CREDIT POSITION OF LOGISTICS SECTOR COMPANIES IN POLAND IN THE CONTEXT OF MACROECONOMIC CONDITIONS

Marzena PAPIERNIK-WOJDERA[1], Renata PISAREK-BARTOSZEWSKA[2*]

[1] Faculty of Economics and Sociology, University of Lodz; marzena.papiernik@uni.lodz.pl,
ORCID: 0000-0002-2872-0881
[2] Faculty of Economics and Sociology, University of Lodz; renata.pisarek@uni.lodz.pl,
ORCID: 0000-0001-5745-4407
* Correspondence author

Purpose: The research's main aim is to determine how the general macroeconomic situation (Macro) affects the credit position of the logistics sector.
Design/methodology/approach: Designed was a model based on the macroeconomic conditions indicator and credit position indicator. Spearman's rank was used to assess the relationship between the above indicators and the OLS regression to estimate the model. At the last stage, the Vector Auto-Regression model (VAR) was created. The research focuses on a group of enterprises from the Transportation and Storage (H) section, employing more than ten employees in Poland. The study covered the period from the beginning of the financial crisis (2008) to 2023. The data for the model is annual, and obtained from the Central Statistical Office database.
Findings: The analysis found that the macroeconomic conditions positively impact the credit position of enterprises in the logistics sector in Poland. Moreover, the credit position from the previous period positively impacts the credit indicator's value in the current year. In the logistics sector, throughout the analysed period, receivables from short-term supplies and services exceeded the value of liabilities (credit position indicator of the logistics sector in Poland > 1). During the COVID-19 pandemic, the Polish economy's synthetic macroeconomic indicator and the logistics sector's credit position indicator decreased.
Research limitations/implications: The research focused on the static approach to credit position. Further research will be dedicated to assessing the impact of internal and external factors on the credit position in a dynamic approach (based on the cycle of liabilities towards suppliers and the cycle of receivables from recipients) and then determining the differences between the static and dynamic approach in the context of macro social conditions.
Practical implications: The results of the analysis can support the managers of companies in making decisions aimed at trade credit granted and trade credit received in the context of the macroeconomic situation.
Originality/value: The study's novelty is to establish the relationship between the macroeconomic situation measured by the Macro indicator and the credit position of enterprises in the logistics sectors, with particular emphasis on the period of the COVID-19 pandemic.
Keywords: credit position, macroeconomic conditions, logistics sector.
Category of the paper: research paper.

1. Introduction

Understanding the complex relationship between macroeconomic factors and logistics performance is crucial in contemporary economy, facing many challenges nowadays and in recent decades (Ababou, Benomar, 2024). Conversely, efficient logistics system can foster economic growth and increase competitiveness of the given country (Mumin, Yakubu, 2023).

The importance of logistics sector companies in Poland in economic processes has increased significantly in recent years, which is also related to the development of logistics systems (Sadowski et al., 2020). A broadly defined transport system and warehousing, as well as their efficiency are considered as elements of the logistics system, within which processes are implemented in supply chains and logistics networks (Rudd, 2023; Richards, Grinsted, 2024).

According to the World Bank's Logistics Performance Index (LPI), ranging from 1 (worst) to 5 (best), which measures the effectiveness of logistics operations in given countries (efficiency of customs clearance process, quality of trade- and transport-related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time), the situation of Poland improved in years 2007-2022, from 3,04 in 2007, prior to financial crisis to 3,6 in 2022, in post-pandemic period (Arvis et al., 2023).

However, the macroeconomic conditions, such as: economic growth, measured by GDP, situation on the labor market, expressed in employment and unemployment rate, international trade (export and import) value and volume, as well as expenditures on investment, education and R&D and overall situation of public finance, measured by public sector debt, are the framework for economic activity of logistics sector companies (Muslija et al., 2021; Comporek et al., 2022). Moreover, the macroeconomic situation and all external factors have an impact on financial situation of enterprises in logistics sector, such as: credit position, financial liquidity and profitability, determining the possibilities of development and further existence on the market (Misztal, 2022).

The purpose of the research is to examine how the general macroeconomic situation, in the years 2008-2023, affects the credit position of the logistics sector companies in Poland, involved in Transportation and Warehousing. The most significant examples of breaking points, causing economic shock were global financial crisis in 2008 or the Covid-19 pandemic, started in 2020. Reduced demand on commodities and transport during the financial crisis, as well as disruptions in logistics or even broken supply chains due to the Covid-19 pandemics, were severe problems. Logistics sector had to face the challenge of demand volatility, e-commerce growth, shortage of employees and containers, congestion in ports, excessive freight and shipment cost and last but not least energy crisis (Xu et al., 2020; Moosavi et al., 2022).

2. Theoretical background

2.1. Macroeconomic indicators of logistics sector companies

The literature emphasizes the importance of considering macroeconomic factors in assessing performance of logistics sector companies (Orzukulova, 2022). Taking into consideration overall macro environment one can distinguish: politics, law, technological, demographic and other socio-economic conditions, which undoubtedly in the researched period, influenced logistics sector (Krykavskyy et al., 2023).

The macroeconomic environment plays a pivotal role in shaping logistics dynamics, as economic growth, investment flows, inflation rate, and trade openness interact with logistical infrastructure and operations (Delgado et al., 2012).

GDP, or Gross Domestic Product, serves as a fundamental measure in economics, quantifying the total value of goods and services produced within a country during a specific time period. It is widely utilized as an indicator of economic growth. However, its status as a sole measure of welfare and development faces debates and criticisms (Syrquin, 2016).

In the macroeconomic context, the impact of inflation will be felt by all companies in the logistics sector, affecting the performance of the capital market and causing high uncertainty. Inflation rates can have negative effects on the economy, including weakening the national currency, increasing the cost of imports, decreasing the purchasing power of individuals, and increasing credit costs and interest rates (Ababou, Benomar, 2024).

Foreign trade, defined as the sum of exports and imports of goods and services, measured as a share of gross domestic product, plays a crucial role in economies worldwide. International trade has been a vital part of civilizations for thousands of years, with motivations ranging from dire necessity to improving the quality of life (Reisman, 2023). Terms of trade for goods have generally increased over time, while the terms of trade for services have decreased, indicating a shift in comparative advantage from services to goods (Officer, 2022). Modern theories of international trade aim to explain the dynamics of trade and the changing structure and volumes of exports and imports.

Countries with higher levels of trade relative to GDP tend to invest more in trade facilitation measures, such as customs modernization and infrastructure development, leading to smoother cross-border trade and enhanced logistics efficiency (Arvis et al., 2018).

A deeper understanding of the elements contributing to a country's logistics performance can enhance freight transport and warehousing efficiency and reveal underlying challenges, making monitoring trade and logistics performance imperative for uncovering areas in need of improvement. The exploration of the relationship between macroeconomic factors and logistics performance reveals several significant gaps in existing literature that warrant further investigation.

2.2. Trade credit approach and a credit position of an enterprise

Trade credit is an arrangement between a seller and a buyer allowing an exchange of goods with deferred payment terms (Martinez-Sola et al., 2013). It is a short-term cash management tool wherein a firm can simultaneously act as a supplier and user of the trade credit. Trade credit, when it appears on the assets side of the balance sheet, is called accounts receivables (trade credit granted). When trade credit appears on the liability side, it is called accounts payable (trade credit received) (Boyer, Gobert, 2009). For a firm, it is important to extend trade credit to sell its goods to its customers, but it is also important to receive trade credit from its suppliers to finance production.

The trade credit can be characterised as highly diverse relationships operating under various market and off-market factors. Several mutually non-exclusive theories point to four major motives behind trade credit use: financial motive, element of competitive strategy, transaction cost reduction and quality control/signalling (Ciżkowicz-Pękała, 2017). Adopting a more comprehensive approach, we can indicate that the trade credit issue extends beyond a purely financial perspective. Trade credit management can be regarded as a relational activity affected by the level of the credit team's skills and awareness, communication of credit information, the structural position of the activity in the firm (Boden, Paul, 2014) and managerial ability (James et al., 2023). Research proves that cultural factors, such as trust, religion, and national culture, also play important roles in the provision and receipt of trade credit (Ziętek-Kwaśniewska, 2023).

A multi-faceted approach to the issue of trade credit and a diverse approach to the factors shaping its development result in research development in this area. However, there is an important gap in this research. It refers to the impact of macroeconomic conditions on the creation of the credit position of enterprises. This position is measured using a credit position indicator calculated as the relationship between receivables from recipients (receivables resulting from deliveries and services) and liabilities towards suppliers (liabilities resulting from deliveries and services) (Sierpińska, Wędzki, 2023).

Depending on the value of this ratio, two forms of credit position can be distinguished:

- trade credit recipient's position (credit position indicator <1),
- trade credit provider's position (credit position indicator >1).

The analysis of this indicator is important, among other things, because its level is associated with the risk of bankruptcy. Research findings show that in the period leading up to and in the year of bankruptcy, enterprises were usually in the position of trade credit recipient (Kowalik, 2021). The above issue becomes particularly important in the context of the growing problem of insolvency of Polish enterprises, especially companies from the logistics sector (Raport Coface…, 2024).

Research shows that the level of trade credit is influenced by macro indicators and the economic climate (Kumar, Shrivastava, 2013; Kumar et al., 2021), but there are no studies on the influence of macroeconomic situation on the credit position of enterprise, especially in the logistics sector. In case of deteriorating gross domestic product, non-financial firms practice more deferred payment sales (Ahmed et al., 2015; Kumar et al., 2021) but also increase the use of trade credit (Niskanen, Niskanen, 2006). Therefore, during a downturn or financial crisis, trade credit management may have a key impact on the company's liquidity, profitability, and financial security. Research proves that there is a significant connection between trade credit policy and the cash flows (Molina, Preve, 2009; Kumaraswamy, 2019), profitability of enterprise (Kumar, Shrivastava, 2013; Hoang et al., 2019) and also firm's value (Shahzad et al., 2022), growth in sales (Lefebvre, 2023). Therefore, proper trade credit management may be crucial for enterprises' survival and development, especially during financial crises or the COVID-19 pandemic. Research showed that the pandemic outbreak forced changes in trade credit management. The decrease in receivables from customers and the maintenance of the previous level of liabilities resulted in a decrease in the credit position indicator (Zimon, Dankiewicz, 2020).

3. Research methodology

Our research focuses on a group of enterprises from the Transportation and Storage (H) section, employing more than ten employees in Poland. The study period covered the period from the beginning of the financial crisis (2008) to 2023 (due to the availability of statistical data). The data for the model is annual, and it was retrieved from the Central Statistical Office database.

The research's main aim is to determine how the general macroeconomic situation (Macro) affects the credit position of the logistics sector. In connection with this goal, the following research hypothesis was formulated: *Macroeconomic conditions positively impacted the credit position of the logistics sector in Poland from 2008 to 2023* ($p < 0.05$). Additionally, the following research questions were asked:

- What is the trend of the credit position indicator of enterprises?
- What is the general macroeconomic situation in Poland?
- Has the COVID-19 pandemic negatively affected the credit position of the logistics sector?

To verify the research hypothesis, created were a macroeconomic conditions indicator (Macro) and credit position indicator of the logistics sector ($Cred_{Po}$).

The Macro indicator was developed based on stimulants (GDP per capita, employment, education expenditure, R&D expenditure, investment expenditure, export) and destimulants (unemployment rate, import, public sector debt). The following formulas were used:

$$Macro_{ij} = \frac{\sum_{i=1}^{n} \frac{x_{ij}}{max\, x_{ij}} + \sum_{i=1}^{n} \frac{min\, x_{ij}}{x_{ij}}}{n};\ Macro_{ij} \in [0;1] \quad (1)$$

where:

$Macro_{ij}$ – the normalized value of the j-th variable in the i-th year;

x_{ij} is the value of the j-th variable in the i-th year;

n is the number of metrics.

$$\text{Cred}_{Po} = \frac{Rec}{Pay} \quad (2)$$

where: $Cred_{Po\,ij}$ – logistics sector credit position; Rec-short-term trade receivables; Pay- short-term trade payables.

To assess the relationship between the Macro and Credit_{Po} indicators, used was the Spearman's rank, which was determined based on the following formula:

$$r_s = \frac{\frac{1}{6}(n^3 - n) - (\sum_{i=1}^{n} d_i^2) - T_x - T_y}{\sqrt{\left(\frac{1}{6}(n^3 - n) - 2T_x\right)\left(\frac{1}{6}(n^3 - n) - 2T_y\right)}}, \quad (3)$$

$$d_i = Rx_i - Ry_i;\ T_x = \frac{1}{12}\sum_j (t_j^3 - t_j);\ T_y = \frac{1}{12}\sum_k (u_k^3 - u_k)$$

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.

Created was also an equation based on formula:

$$\text{Cred}_{Pos}i = \beta_0 + \beta_1 \cdot \text{Macro}_I + \varepsilon_i; \quad (4)$$

the residual for each observation is as follows:

$$e_i = Cred_{Po\,i} - (\hat{\beta}_0 + \hat{\beta}_1 Macro_i) \quad (5)$$

Used was the OLS regression to estimate model:

$$s(\hat{\beta}_0, \ldots, \hat{\beta}_6) = \sum_{i=1}^{n} (Cred_{Po\,i} - \hat{\beta}_0 - \hat{\beta}_1 Macro_i - e_i)^2 \rightarrow \min \quad (6)$$

Model tests: White's test for heteroskedasticity; Frequency distribution for residual; Breusch-Godfrey test for first-order autocorrelation; the variance inflation factor (VIF).

In the last stage, built was the Vector Auto-Regression model (VAR) to check:

$$Cred_{Po\,t} = \sum_{i=1}^{np} (A_i\, Cred_{Po} - i + E_t) \quad (7)$$

where:

$Cred_{Po\,t}$ - vector of values of the analyzed processes at time t (including all variables in the model),

Ai - matrix of parameters with delays of variables from vector $Cred_{Po}$,

Et - vector of stationary random disturbances.

4. Research results

Figure 1 shows the research sample, i.e. the number of enterprises in the Transportation and Storage section employing more than ten employees in Poland from 2008 to 2023. The number of enterprises in the period under study is increasing, and the trend is positive.

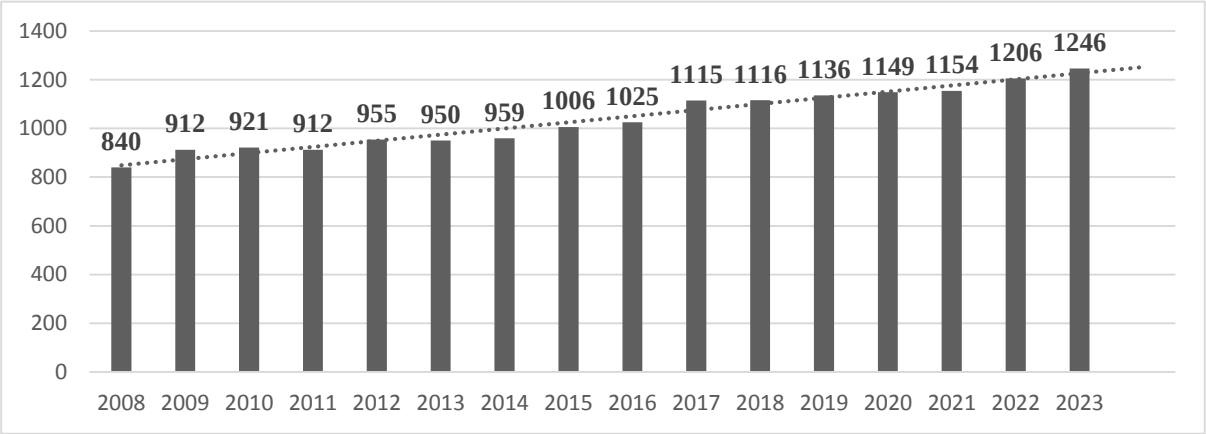

Figure 1. Number of enterprises in logistics sector in Poland (research sample).

Source: https://bdl.stat.gov.pl/bdl/dane/podgrup/tablica.

The credit position indicator is presented in Figure 2. It exceeds the value of 1 throughout the period, which means that short-term trade receivables exceed the value of short-term trade payables. It should be noted that the value of the indicator fluctuates slightly.

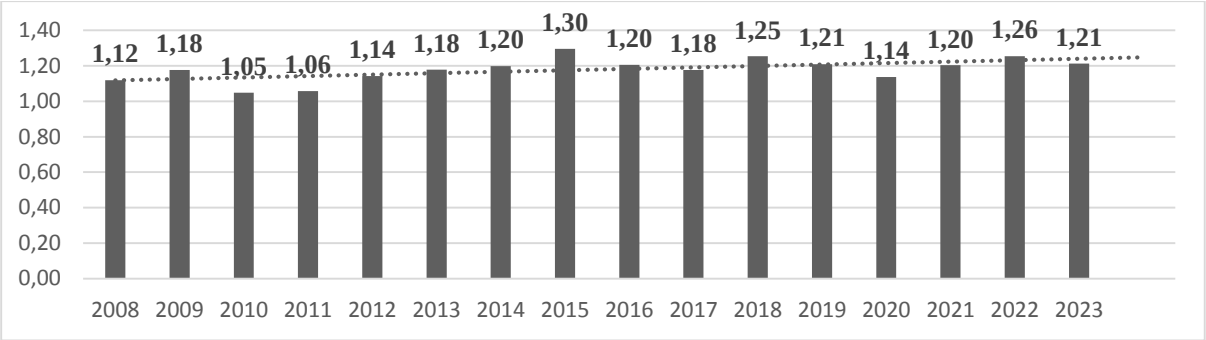

Figure 2. Credit position indicator of logistics sector in Poland.

Source: https://bdl.stat.gov.pl/bdl/dane/podgrup/tablica.

Figure 3 shows the macroeconomic conditions index. The indicator trend is positive, which should be assessed positively from the point of view of the economic situation in Poland. The only year in which the index decreased from year to year was 2020, i.e., during the COVID-19 pandemic, when there were temporary restrictions on conducting business activities.

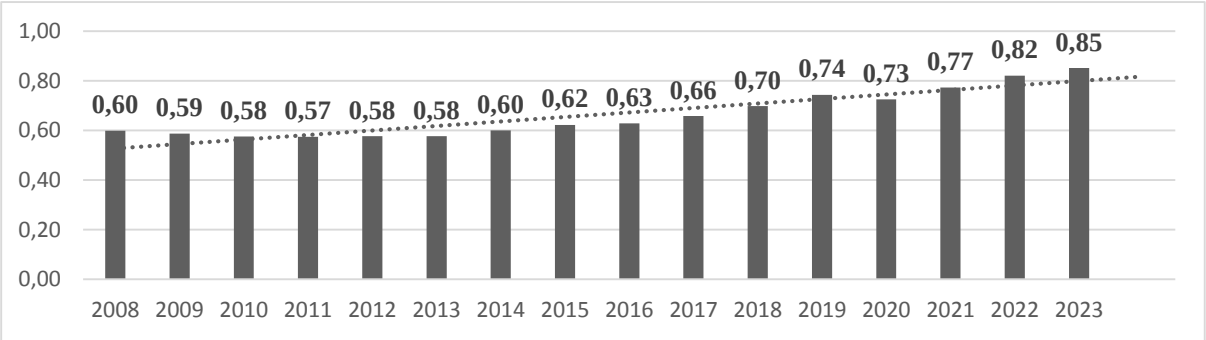

Figure 3. Synthetic macroeconomic indicator of polish economy.

Source: https://strateg.stat.gov.pl/#/wyszukaj-wskaznik/4282.

The Spearman rank correlation coefficient was 0.5, which means the average correlation between the credit position of logistics sector enterprises and macroeconomic conditions in Poland from 2008 to 2023 (Table 1).

Table 1.

The OLS estimation Correlation coefficients, using the observations 1-16; 5% critical value (two-tailed) = 0.4973 for n = 16

CredPo	**Macro**	
1.0000	0.4919	CredPo
	1.0000	Macro

Source: own calculations based on https://bdl.stat.gov.pl/bdl/dane/podgrup/tablica; https://strateg.stat.gov.pl/#/wyszukaj-wskaznik/4282.

Table 2 shows the results of the Ordinary Least Square estimation. At the statistical significance level of $p < 0.05$, macroeconomic conditions positively impact the logistics sector's credit position, i.e. the tendency of enterprises to credit customers to a greater extent than to use credit from suppliers. Therefore, a unit increase in the macroeconomic conditions index

will lead to a 0.35 increase in the credit position index of enterprises. However, the low level of R2 should be noted.

Table 2.
The OLS estimation: dependent variable: Static credit position

	Coefficient	**Std. Error**	**t-ratio**	**p-value**	
Const	0.945784	0.111668	8.470	<0.0001	***
Macro	0.352600	0.166796	2.114	0.0529	*

Mean dependent var	1.179678		S.D. dependent var	0.067034
Sum squared resid	0.051094		S.E. of regression	0.060412
R-squared	0.241967		Adjusted R-squared	0.187821
F(1, 14)	4.468845		P-value(F)	0.052946
Log-likelihood	23.27036		Akaike criterion	-42.54073
Schwarz criterion	-40.99555		Hannan-Quinn	-42.46160
Rho	0.353134		Durbin-Watson	1.260251

White's test for heteroskedasticity: LM = 1.42948 with p-value = P(Chi-square(2) > 1.42948) = 0.489318
Test for normality of residual: Chi-square(2) = 2.14776 with p-value = 0.34168
LM test for autocorrelation up to order 1: LMF = 1.83931 with p-value = P(F(1, 13) > 1.83931) = 0.198121

Source: own calculations based on https://bdl.stat.gov.pl/bdl/dane/podgrup/tablica; https://strateg.stat.gov.pl/#/wyszukaj-wskaznik/4282.

The analysis is supplemented by the first-degree Autoregression model (due to the short research period, we used a one-period delay) (Table 3). The results of VAR estimation indicate that the credit position from the previous period has a positive impact on the indicator's value in the current year. Thus, the credit policy and its conditions are continuous and related to the investment implementation process in the sector.

Table 3.

The VAR system, lag order 1: dependent variable: Static credit position
Log-likelihood = 21.567078
Determinant of covariance matrix = 0.00330114
AIC = -2.6089
BIC = -2.5145
HQC = -2.6099

	Coefficient	***Std. Error***	***t-ratio***	***p-value***	
const	0.641821	0.282935	2.268	0.0410	**
CredPo_1	0.460224	0.239921	1.918	0.0773	*

Mean dependent var	1.183694		S.D. dependent var	0.067365
Sum squared resid	0.049517		S.E. of regression	0.061717
R-squared	0.220605		Adjusted R-squared	0.160652
F(1, 13)	3.679612		P-value(F)	0.077312
rho	0.050747		Durbin-Watson	1.890162

Source: own calculations based on https://bdl.stat.gov.pl/bdl/dane/podgrup/tablica; https://strateg.stat.gov.pl/#/wyszukaj-wskaznik/4282.

5. Discussion and conclusion

Credit position is important for an enterprise's proper functioning and development. Therefore, maintaining appropriate relations between receivables from deliveries and services and liabilities from supplies and services is crucial for the financial situation of enterprises and their development prospects (Kowalik, 2021).

The credit position of enterprises is conditioned by several factors related to the financial and property situation of enterprises, the style and model of financial management, and external factors on which enterprises have a very limited influence. Such an exemplification are macroeconomic conditions, the improvement of which is also an impulse for the development of the enterprise sector (Oladimeji et al., 2021; Niedźwiedzińska, Kowalska, 2020; Njegomir, Radović, 2018).

The research hypothesis put forward at the beginning of the study indicating that macroeconomic conditions positively impacted the credit position of the logistics sector in Poland from 2008 to 2023 ($p < 0.05$) is true. Therefore, the main macroeconomic indicators should be analyzed when analyzing the situation of the logistics sector and the prospects for its development. The credit position of the logistics sector in Poland from 2008 to 2023 exceeds the value of one. It means that the tendency of logistics sector enterprises to finance recipients to a greater extent than financing from suppliers is increasing. This situation may be related to the activities of enterprises in this sector aimed at increasing sales (larger amounts of trade credit granted, longer trade credit periods for recipients), but on the other hand, it creates a need for additional capital - that is consistent with the results of other studies (Ahmed et al., 2015; Kumar et al., 2021, Niskanen, Niskanen, 2006).

The analysis showed that problems with late payments and backlogs in Polish enterprises depend highly on macroeconomic variables (Woźniak et al., 2019). The conducted research also shows that the macroeconomic situation influences the trade credit position in the logistics sector. The macroeconomic conditions indicator is also increasing. A high growth rate characterizes the trend, so one deals with positive changes in the Polish economy throughout the period under review.

The COVID-19 pandemic affected negatively the socio-economic conditions of Poland, it has also weakened the situation of the logistics sector. Observed was a decrease in the credit position indicator, also noticeable in other sectors during the COVID-19 pandemic (Zimon, Dankiewicz, 2020). However, it should be noted that already in the second year, there were signs of recovery and an increase in the credit position indicator of enterprises.

The study has certain limitations related to, for example, the method of calculating the credit position indicator. It was limited only to the static position. Moreover, selecting analytical indicators to create a synthetic indicator of macroeconomic development also affects the estimation results. It should also be noted that applying the conditions for OLS estimation is necessary, which also means this method has certain limitations.

Further research will be devoted to assessing the impact of internal and external factors on the credit position in a dynamic approach (based on the cycle of liabilities towards suppliers and the cycle of receivables from recipients) and then determining the differences between the static and dynamic approach in the context of macro social conditions.

References

1. Ababou, M., Benomar, I. (2024). Insights into the Interplay Between Macroeconomic Factors and Logistics Performance Index. *Journal of Namibian Studies, 40*, pp. 413-435, doi: https://doi.org/10.59670/jsf7q813.
2. Ahmed, J., Xiaofeng, H., Mujtaba, G. (2015). Effects of Firm Specific and Macro-Economic Factors on Trade Credit Supply: The Case of a Developing Country. *International Journal of Financial Management, 5(1),* pp. 18-26, doi:10.21863/ijfm/ 2015.5.1.004
3. Arvis, J.-F., Ojala, L., Shepherd, B., Ulybina, D., Wiederer, C. (2023). Connecting to Compete 2023: Trade Logistics in an Uncertain Global Economy - The Logistics Performance Index and Its Indicators. Washington: World Bank, doi:10.1596/39760.
4. Boden, R., Paul, S.Y. (2014). Creditable behaviour? The intra-firm management of trade credit. *Qualitative Research in Accounting & Management, 11(3),* pp. 260-275, doi: http://dx.doi.org/10.1108/QRAM-08-2012-0032.
5. Boyer, M.M., Gobert, K. (2009). The impact of switching costs on vendor financing. *Finance Research Letters, 6(4),* pp. 236-241, doi: https://doi.org/10.1016/j.frl.2009.07.001.
6. Ciżkowicz-Pękała, M. (2017). Trade credit: A benefit to get, a "must" to give? Motives behind trade credit use in Poland. *Financial Internet Quarterly, 13(4),* pp. 54-66, doi: https://doi.org/10.1515/fiqf-2016-0035.
7. Comporek, M., Kowalska, M., Misztal, A. (2022). Macroeconomic stability and transport companies' sustainable development in the Eastern European Union. *Journal of Business Economics and Management, 23*(1), pp. 131-144, doi: 10.3846/jbem.2021.15913.
8. Delgado, M., Ketels, C., Porter, M.E., Stern, S. (2012). *The Determinants of National Competitiveness (No. w18249).* National Bureau of Economic Research.
9. Hoang, H., C., Xiao, Q., Akbar, S. (2019). Trade credit, firm profitability, and financial constraints. *International Journal of Managerial Finance, 15(5),* pp. 744-770, doi: 10.1108/IJMF-09-2018-0258.
10. James, H., L., Ngo T., Wang H. (2023). The impact of more able managers on corporate trade credit. *Journal of Behavioral and Experimental Finance, vol. 40,* doi: https://doi.org/10.1016/j.jbef.2023.100857.

11. Kowalik, M. (2021). Enterprise Credit Position and the Risk of Bankruptcy. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie, 1(991),* pp. 23-36, https://doi.org/10.15678/ZNUEK.2021.0991.0102.
12. Krykavskyy, Y., Shandrivska, O., Pawłyszyn, I. (2023). A Study of Macroeconomic and Geopolitical Influences and Security Risks in Supply Chains in Times of Disruptions. *LogForum, 19(3),* p. 423, doi: 10.17270/J.LOG.2023.855.
13. Kumar, N., Shrivastava, A., Kumar, P., Bhatt, M.I. (2021). An Analysis of Trade Credit Behaviour of Indian Firms. *South Asia Economic Journal*, *22(1),* pp. 132-154, doi: 10.1177/13915614211009659.
14. Kumar, P., Shrivastava, A. (2013). Trade credits and corporate profitability: Some empirical findings in Indian context. *Journal of Management Value & Ethics*, *3(3),* pp. 41-57.
15. Kumaraswamy, S., George, S. (2019). Trade credit management and firm profitability of Saudi manufacturing firms. *Polish Journal of Management Studies, 20(1),* pp. 243-253, doi: 10.17512/pjms.2019.20.1.22.
16. Lefebvre, V. (2023). Trade credit, payment duration, and SMEs' growth in the European Union. *International Entrepreneurship and Management Journal, vol. 19,* pp. 1313-1340, doi: https://doi.org/10.1007/s11365-023-00871-4.
17. Martinez-Sola, C., García-Teruel, P.J., Martinez-Solano, P. (2013). Corporate cash holding and firm value. *Applied Economics, 45(2),* pp. 161-170, doi: 10.1080/00036846. 2011.595696.
18. Misztal, A. (2022). Profitability, Financial Liquidity and the Sustainable Development of Manufacturing Enterprises in Poland. *Studies in Law and Economics*, *125,* pp. 121-139.
19. Molina, C.A., Preve, L.A. (2009). Trade receivables policy of distressed firms and its effect on the costs of financial distress. *Financial Management*, *38(3),* pp. 663-686, doi: https://doi.org/10.1111/j.1755-053X.2009.01051.x.
20. Moosavi, J., Fathollahi-Fard, A.M., Dulebenets, M.A. (2022). Supply chain disruption during the COVID-19 pandemic: Recognizing potential disruption management strategies. *International Journal of Disaster Risk Reduction*, *75,* doi:10.1016/j.ijdrr.2022.102983.
21. Mumin, M.A., Yakubu, I.N. (2023). Beyond Supply Chains: Investigating the Economic Impact of Logistics Performance. *Journal of International Business, Economics and Entrepreneurship, 8(2),* pp. 7-16, doi: https://doi.org/10.24191/jibe.v8i2.24246.
22. Muslija, A., Džemal, C., Šahić, A. (2021). The relationship between economic growth and logistics sector in the case of G-7 countries. *Transportation Research Procedia, 55,* pp. 326-333, doi: https://doi.org/10.1016/j.trpro.2021.06.038.
23. Niedźwiedzińska, H., Kowalska, M.K. (2020). Evaluation of the impact of macroeconomic factors on innovativeness of enterprises from the TSL sector in the countries of Central and Eastern Europe. *Optimum Economic Studies, 99(1),* pp. 34-47, doi:10.15290/ oes.2020.01.99.03

24. Niskanen, J., Niskanen, M. (2006). The Determinants of Corporate Trade Credit Policies in a Bank-dominated Financial Environment: the Case of Finnish Small Firms. *European Financial Management, 12(1),* pp. 81-102, doi: https://doi.org/10.1111/j.1354-7798.2006.00311.x.
25. Njegomir, V., Radović, M. (2018). Analysis of the impact of macroeconomic environment on the entrepreneurship development. *Poslovna Ekonomija, 12(2),* pp. 1-19 doi: 10.5937/poseko14-18713.
26. Officer, L.H. (2022). *Terms of Trade. In Essays in Economic History: Purchasing Power Parity, Standard of Living, and Monetary Standards*. Cham: Springer International Publishing, pp. 157-172.
27. Oladimeji, M.S., Sofoluwe, N.A., Odunaya, H.A. (2021). Macroeconomic Business Environment and the Development of Small and Medium Enterprises in Nigeria. *Modern Management Review, 26(4),* pp. 93-105, https://doi.org/10.7862/rz.2021.mmr.27.
28. Orzukulova, Z. (2022). Macroeconomic Indicators of the Efficiency of Transport Logistics Services and Ways of Their Determination. *Research And Education, 1(9),* pp. 521-525.
29. *Raport Coface: Niewypłacalności w Polsce po I półroczu 2024 r.* Retrieved from: https://www.coface.pl/publikacje-ekonomiczne-i-analizy/raport-coface-niewyplacalnosci-w-polsce-po-i-polroczu-2024-r, 20.10.2024.
30. Reisman, D. (2023). *Goods and Services. In Global Political Economy*. Edward Elgar Publishing, pp. 69-94.
31. Richards, G., Grinsted, S. (2024). *The logistics and supply chain toolkit: over 100 tools for transport, warehousing and inventory management*. London: Kogan Page Publishers.
32. Rudd, J. (2023). A Practical Guide to Logistics: An Introduction to Transport, Warehousing and Distribution. London: Kogan Page Publishers.
33. Sadowski, A., Wąsowska, K., Nowak, I. (2020). Logistics development in European countries: The case of Poland. *European Research Studies, 23(2),* pp. 500-514, doi: 10.35808/ersj/1606.
34. Shahzad, U., Zhaob, L., Liuc, J., Luo, F. (2022). Corporate value and trade-credit policies: evidence from China. *Journal of Applied Economics, 25(1),* pp. 412-432, doi: https://doi.org/10.1080/15140326.2022.2045467.
35. Sierpińska, M., Wędzki, D. (2023). *Zarządzanie płynnością finansową w przedsiębiorstwie*. Warszawa: PWN.
36. Syrquin, M. (2016). A Review Essay on GDP: A Brief but Affectionate History by Diane Coyle. *Journal of Economic Literature, 54(2),* pp. 573-588.
37. Woźniak, D., Sokołowska-Woźniak, J., Jankowiak, B., Cwynar, A., Cwynar, W., Ostrowska-Dankiewicz, A., Dankiewicz, R. (2019). Trade Credit in Polish Companies. An Empirical Analysis of Macroeconomic Factors Influencing Payment Delays. *Business and Non-profit Organizations Facing Increased Competition and Growing*

Customers' Demands, vol. 17, pp. 627-644. http://bazekon.icm.edu.pl/bazekon/element/bwmeta1.element.ekon-element-000171528792

38. Xu, Z., Elomri, A., Kerbache, L., El Omri, A. (2020). Impacts of COVID-19 on Global Supply Chains: Facts and Perspectives. *IEEE Engineering Management Review*, *48(3)*, pp. 153-166, doi: 10.1109/EMR.2020.3018420.
39. Ziętek-Kwaśniewska, K. (2023). Cultural aspect of the use of trade credit. *Zeszyty Naukowe Politechniki Śląskiej. Organizacja i Zarządzanie*, *no. 182*, pp. 695-711, doi: http://dx.doi.org/10.29119/1641-3466.2023.182.41
40. Zimon, G., Dankiewicz, R. (2020). Trade Credit Management Strategies in SMEs and the COVID-19 Pandemic — A Case of Poland. *Sustainability*, *12(15)*, 6114; doi:10.3390/su12156114.