"The influence of interest rates on outstanding loans of enterprises on their structure in the bankruptcy warning system"

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BUSINESS PERSPECTIVES

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THE INFLUENCE OF INTEREST RATES ON OUTSTANDING LOANS OF ENTERPRISES ON THEIR STRUCTURE IN THE BANKRUPTCY WARNING SYSTEM

Abstract

Small and medium-sized enterprises (SMEs) create more than half of the added value, providing about two-thirds of employment in most countries. However, they need more liquidity, access to credit resources, and significant outstanding loans. This study aims to identify the impact of interest rates on outstanding loans of enterprises on their structure as a way to prevent bankruptcy. The correlation-regression analysis used OECD statistical data for 2008–2019 sampling individual countries; it showed an ambiguous situation between the interest rate and the share of outstanding loans of SMEs in the overall structure of outstanding loans. The paper verified constructed regression equations and estimated their parameters. The regression equations for Belgium, the Czech Republic, Estonia, and Latvia are statistically reliable. Thus, in Belgium and the Czech Republic, a negative relationship was recorded ($r = -0.822$; $D = 0.675$; $r = -0.9274$; $D = 0.794$; F-criterion > Ft, respectively), and in Estonia and Latvia – a positive one ($r = 0.876$; $D = 0.767$; F-criterion > F·Ft; $r = 0.800$; $D = 0.641$; F-criterion > Ft, respectively). Australia, Italy, Slovakia, and France practically do not have a corresponding relationship. The regression equations make it possible to estimate the change in the level of interest rate on the share of outstanding loans of enterprises in the overall structure of outstanding loans, make predictions of the corresponding performance indicator, and develop measures of restoring the solvency of enterprises as an essential task of preventing their bankruptcy.

Keywords	interest rate, structure, accounts payable, bankruptcy, regression analysis
JEL Classification	G33, C45, M11

INTRODUCTION

Small and medium-sized enterprises (SMEs) constitute about 99% of all non-financial firms in the EU and create almost 55% of the added value in the economy and more than 65% of jobs (Ćehajić & Košak, 2022). An essential factor in the development of SMEs is ensuring their access to financial resources, which positively affects the availability of working capital and liquidity (Motta, 2020). Access to credit for SMEs is vital for their development and bankruptcy prevention (Aminu & Shariff, 2015). Outstanding creditor debt and an increase in non-payment periods lead to the risk of bankruptcy (Brygata, 2022). The problem of outstanding payables is exacerbated in the event of force majeure, in particular, the COVID-19 pandemic (Hanspal et al., 2020; Kozlovskyi et al., 2021), which significantly affects future revenues, liquidity, debts, and the efficiency of enterprises (Poliakov & Zayukov, 2022).

An important factor leading to bankruptcy is unpaid creditor debt for loans. Unlike economic bankruptcy, financial bankruptcy can be

avoided by providing SMEs with financial resources, debt restructuring, and effective rehabilitation procedures. At the same time, the loan cost, namely, low-interest rates on loans, can significantly reduce the probability of bankruptcy or help avoid it (Aguiar-Diaz & Ruiz-Mallorqui, 2015; Gharaibeh & Farooq, 2022; Nasir et al., 2022). As a rule, the risk of insolvency increases the interest rates on loans, especially if it concerns SMEs. In force majeure conditions, for example, the spread of the COVID-19 pandemic, SMEs needed additional funding (Shosha et al., 2022).

At the same time, many countries reduced interest rates on loans, but those SMEs with a significant risk of insolvency were forced to enter into loan agreements with increased interest rates (Kaya, 2022). An increase in interest rates can provoke economic crisis, in particular, deepen the economic recession, cause investors to make decisions to invest funds in other areas of activity, and, in general, cause the default of enterprises (Stiglitz, 1999). SMEs have a higher risk of bankruptcy due to high-interest rates because big enterprises are more liquid, more solvent, and have more access to bank lending (Damayanthi et al., 2022; Frolov & Shukairi, 2020; Horvathova et al., 2022). An increase in loan interest rates for SMEs can significantly change the structure of outstanding loans. This, in turn, will trigger the deterioration of the economic situation because an increase in the specific weight of outstanding loans of SMEs in the overall structure of outstanding loans will cause bankruptcies of financial market entities and make the financial and credit policy of countries more rigid. As a result, the probability of a slowdown in business activity and a decrease in the leading economic indicators of the country's development will increase.

1. LITERATURE REVIEW

Access to finance plays a critical role in SMEs' formation, growth, and survival (Singh & Wasdani, 2016). Currently, in the conditions of the COVID-19 pandemic and Russia's war against Ukraine, the main financing sources available to SMEs are loans from banks and other non-banking institutions. Currently, the world faces a new problem that makes it necessary for enterprises to adapt their economic activities to the consequences of the war in Ukraine (Prohorovs, 2022), regulating financial and credit policy, developing measures to strengthen the liquidity of SMEs (Koziuk et al., 2020), and reducing bankruptcy risks.

SMEs play a critical role in the economic development of countries, as they are considered the engine of development. At the same time, access to their financing, particularly the size of interest rates, is the main problem hindering SME development (Awani, 2020). High-interest rates are considered a factor of limited access to financing (Radipere & Dhliwayo, 2014). They are an obstacle to their development, creating preconditions for decreased liquidity and solvency and enhanced probability of bankruptcy (Beck & Cull, 2014). Due to the COVID-19 pandemic, governments worldwide were forced to save SMEs from liquidity shortages and bankruptcy. For example, in 2020, 48 countries could avoid powerful waves of bankruptcy of SMEs, which decreased by 11.7% compared to 2019 (OECD, 2022).

On the one hand, the conditions for granting loans to SMEs were significantly eased: interest rates reached record low levels in 2020 compared to 2009; there was a reduction in interest rate spreads; and the conditions for securing credit resources were simplified. On the other hand, however, the level of outstanding loans increased significantly. Moreover, in 2022, considering growing socio-economic instability, banks began to increase the requirements for lending to small business entities. Thus, in 2022, compared to 2021, the percentage of decisions on granting loans decreased significantly and amounted to only 14.6% (Rosenbaum, 2022).

The irrational behavior of SMEs (Wang et al., 2020), especially under the conditions of force majeure (pandemics or wars), forces banks and other lending entities to set stricter conditions for granting loans (Aminu & Shariff, 2015). This, in turn, limit SMEs' access to credit resources, forcing them to look for other sources of financing (Casey & O'Toole, 2014). In general, the shortage of financial resources increases the volume of outstanding loans and the onset of bankruptcy (Kozlovskyi et al., 2013; Petrunenko et al., 2022; Shevchuk et al.,

2023). Negative credit history is a factor that reduces the likelihood of SMEs getting a loan from banks. That is why business entities are forced to turn to the informal lending sector, where interest rates are much higher (Casey & O'Toole, 2014), which increases the risk of loan defaults. An integral aspect of access to credit and its value is the rational behavior of SMEs regarding its use; otherwise, the credit risk for the bank increases (Wang et al., 2020). Lending conditions (interest rates, loan size, and loan repayment time) are important factors that affect the repayment of loans by SMEs (Worokinasih & Potipiroon, 2019).

In preventing the bankruptcy of SMEs, it is advisable to refer to the provisions of The Treaty on the Functioning of the European Union (EU, 2007), which establishes the well-known four freedoms of the EU. The relationship between these provisions regarding mentioned freedoms and the conditions for the occurrence of insolvency allows concluding that namely the bankruptcy of SMEs in the EU will not be limited to only one jurisdiction but, on the contrary, will go beyond the borders of Member-States and, respectively, fall under the scope of cross-border insolvency procedure under the Regulation (EU) 2015/848 of the European Parliament and of the Council on insolvency proceedings, 2015 (EIR 2015). However, there are issues of danger in ensuring the legal regulation of cross-border insolvency from the standpoint of the theories of territorial universalism, to which the EIR 2015 is enshrined. Despite the widespread opinion that mentioned theory is a real "cure-all" to cross-border insolvencies, it is not free from shortcomings such are extra time and monetary expenses due to the commencement of more than one insolvency procedure. Currently, these issues are not fully settled since the theory of pure universalism (which in its turn provides for only one universal proceeding and permits to reduce the costs) is merely impossible under the EIR 2015 provisions. Therefore, for SMEs facing insolvency problems, the simultaneous and interconnected insolvency proceedings in different states will inevitably lead to additional economic losses.

The literature review shows that, it is necessary to pay sufficient attention to the availability of loans, simplifying the procedure for obtaining credit resources, or restructuring outstanding loans to en-

sure the development of SMEs. There needs to be more research on a close and reliable relationship between the interest rate on loans and bankruptcy. After all, the interest rate on loans issued is a factor in financial bankruptcy (Aguiar-Diaz & Ruiz-Mallorqui, 2015). Solvency can be restored by reducing it or restructuring debt. Therefore, the study aims to analyze the dynamics of interest rates and the structure of outstanding loans and determine the impact of interest rates on outstanding loans of enterprises on their structure, which can be considered an instrument for preventing bankruptcy.

2. METHODOLOGY

The study involves several stages. The first is analyzing the dynamics of SMEs' share of outstanding loans as a percentage of the total number of outstanding loans (SOLT) and the interest rate (IR) for SMEs. The second is calculating SOLT growth (decline) rates in 2020 compared to 2010. The third is calculating IR growth (decline) rates in 2020 compared to 2010. The fourth is analyzing IR for enterprises in 2018–2021 in Ukraine, depending on their size. The fifth is analyzing bankruptcy cases in Ukraine in 2015–2022. Finally, there is a study of the influence of interest rates on the share of outstanding loans of SMEs in the general structure of outstanding loans in individual countries.

The paper used OECD statistical database to analyze the dynamics of the share of SMEs' outstanding loans as a percentage of the total number of outstanding loans (SOLT) and the interest rate (IR) for SMEs. During the analysis, statistical data on the relevant indicators (SOLT and IR) for the current period were considered for those countries included in the OECD statistical database (Table 1). However, there is no statistical database of SOLT and IR indicators by year for individual countries to provide objective statistical analysis of comparability of years. Thus, the correlation-regression analysis of the impact of interest rate on the share of outstanding loans of SMEs in the overall structure of outstanding loans was carried out for Australia, Belgium, Estonia, Italy, Latvia, the Slovak Republic, France, and the Czech Republic.

The influence of the interest rate (x) on the level of outstanding loans (Y) is determined by correla-

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┌─────────────────┐    ┌─────────────────┐    ┌──────────────────────────────────────────────────────────────────┐
│ Analysis of     │    │ Creation of a   │    │ Assessment of the reliability and adequacy of the constructed linear │
│ statistical data│    │ system of       │    │ regression equation (1):                                         │
│ and             │ →  │ normal          │ →  │  • calculation of the closeness of relationship (r);             │
│ construction of │    │ equations for a │    │  • calculation of the share of variation of the studied resultant variable (D); │
│ the regression  │    │ linear regression│   │  • calculation of the probability of multiple correlation coefficient (F); │
│ equation        │    │ equation        │    │  • calculation of the average error of approximation (έ);        │
│ (equation 1)    │    │ (equation 1)    │    │  • calculation of the absolute average value of the squared deviation (6_{абс}) │
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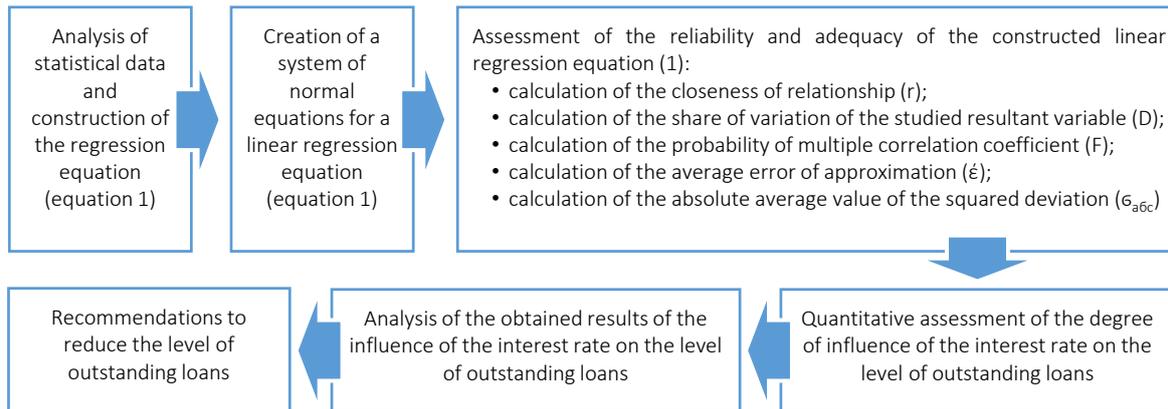
Figure 1. Algorithm for detecting the impact of interest rate on the level of outstanding loans

tion-regression analysis. A correlation-regression analysis when assessing the impact of the interest rate on the level of outstanding loans involves the construction of a correlation equation (equation 1): (Chatterjee & Simonoff, 2013):

$$Y_x = a_0 + a_1 x, \qquad (1)$$

where Y_x – linear equation; a_0, a_1 – parameters (coefficients) of the equation; x – impact factor.

The unknown parameters of the regression equation (a_0, a_1) are proposed to be found by the least squares method. The share of variation of the studied result characteristic (Y) is caused by the influence of factors (x) included in the regression equation 1 determined using the coefficient of determination (D). The paper estimates the probability of the multiple correlation coefficient (as well as the correlation equation in general) by calculating the F-criterion (F). In addition to the closeness of the relationship, the average error of approximation and the absolute mean square deviation between the actual and calculated values of functions are used to assess the adequacy of the regression equation (1) for real processes. Figure 1 shows the algorithm for detecting the effect of the interest rate on the level of outstanding loans.

The reliability and adequacy of the constructed linear regression equation (equation 1) were assessed using the MS Excel program (the appropriate functions from the statistical package of the MS Excel program were used to calculate the F-criterion and determine its tabular value).

3. RESULTS

3.1. Analysis of interest rates and the structure of outstanding loans

Tables 1 show the OECD statistics on the dynamics of the share of outstanding loans of SMEs as a percentage of the total number of outstanding loans (share of SME outstanding loans, % of total outstanding business loans) (SOLT) and the interest rate (interest rate of SME) (IR) for SMEs in the world and Ukraine in 2007–2020 by individual countries.

Table 1 shows that as of January 1, 2021, the highest value of the SOLT level was recorded in Slovakia (80.95%), Latvia (72.71%), Belgium (68.43%), and Ukraine (61.23%). That is, SMEs of these countries hold the lion's share of outstanding loans. Figure 2 shows the growth rate of SOLT in 2020 compared to 2010. The highest SOLT growth rates were recorded in Australia (30.6%), Greece (24.99%), Austria (21.96%), and Belgium (9.75%). The highest rates of decline, which is considered a positive process, are observed in Estonia (–31.7%), Ireland (21.71%), and Latvia (–16.75%).

A positive point is a decrease in the rate of growth of the SOLT level (Figure 2) because the decrease in the corresponding share allows SMEs to improve their credit history. Accordingly, there is an opportunity to receive loans with lower interest rates.

The lowest values of the IR level (Table 1) in 2020 were recorded in France (1.03%), Belgium (1.55%),

Table 1. The share of outstanding loans of SMEs as a percentage of the total number of outstanding loans and interest rates for SMEs by individual countries

| Country	Indicator	Year													
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Australia	SOLT, %	27.03	6.66	28.71	32.68	33.11	32.76	32.64	32.3	31.44	31.01	31.13	29.73	43.71	42.68
	IR, %	8.66	8.04	7.6	8.4	8.02	7.13	6.54	6.27	5.63	5.36	5.28	5.33	4.18	3.4
Austria	SOLT, %	–	–	11.76	12.57	12.97	11.56	12.09	11.26	13.15	13.5	12.89	12.7	12.12	15.33
	IR, %	5.11	5.47	2.89	2.43	2.92	2.46	2.28	2.27	2.02	1.92	1.8	1.82	1.8	1.59
Belgium	SOLT, %	61.72	59.62	62.73	62.35	65.07	65.43	67.6	66.39	63.44	66.12	66.66	67.31	67.8	68.43
	IR, %	5.45	5.7	3.01	2.51	2.88	2.32	2.06	2.09	1.83	1.72	1.66	1.6	1.58	1.55
Greece	SOLT, %	–	–	–	38.5	36.84	38.82	49.75	50.57	52.65	55.33	54.39	53.75	52.31	48.12
	IR, %	6.57	6.82	4.62	5.53	6.77	6.87	6.51	5.8	5.38	5.32	4.91	4.66	4.31	3.94
Estonia	SOLT, %	35.83	34.55	31.01	29.37	28.28	26.24	26.45	26.4	24.56	23.23	26.15	23.7	21.76	20.06
	IR, %	6.11	6.71	5.34	5.06	4.92	4.02	3.41	3.36	3.04	2.96	2.99	3.28	3.85	4.08
Ireland	SOLT, %	–	–	–	63.89	67.82	67.51	66.89	67.3	62.7	58.05	57.14	50.96	49.47	50.02
	IR, %	6.23	6.67	3.98	3.88	4.68	4.34	4.3	4.78	5	4.43	4.22	4.36	4.22	4.17
Italy	SOLT, %	18.72	17.88	18.26	18.72	18.22	18.24	18.54	18.7	18.49	17.83	17.69	17.3	17.2	17.1
	IR, %	6.3	6.3	3.6	3.7	5	5.6	5.4	4.4	3.8	3.2	3.1	3.1	3.4	2.4
Latvia	SOLT, %	87.16	83.71	86.52	87.34	85.67	82.34	76.57	77.43	76.05	77.55	76.14	73.52	71.57	72.71
	IR,%	8.3	8.9	7.9	7.1	5.8	4.5	4.5	4.7	4.5	4.4	3.8	3.8	4	4.4
Slovak Republic	SOLT, %	65.7	77.12	79.39	79.39	65.77	71.11	71.07	80.22	81.7	79.81	80.46	79.81	80.03	80.95
	IR, %	5.5	4.6	3	3.2	3.2	3.8	3.6	3.8	3.4	3.1	3	3	2.89	2.6
France	SOLT, %	20.78	20.39	20.2	20.49	20.76	21.18	21.09	21.17	20.82	20.62	20.4	20.13	19.74	22.28
	IR, %	5.1	5.42	2.86	2.48	3.11	2.43	2.16	2.08	1.78	1.5	1.4	1.48	1.39	1.03
Czech Republic	SOLT, %	–	65.24	67.28	70.2	70.73	70.15	70.08	69.8	69.77	70.64	70.03	69.53	70.14	73.1
	IR, %	–	5.57	4.64	4.01	3.73	3.48	3.13	3.76	2.7	2.5	2.5	3.14	3.8	3.26
Ukraine	SOLT, %	–	–	–	–	–	–	–	–	–	–	52.42	50.86	56.77	61.23
	IR, %	–	–	–	–	–	–	–	–	–	–	18.5	17.35	17.51	13.84
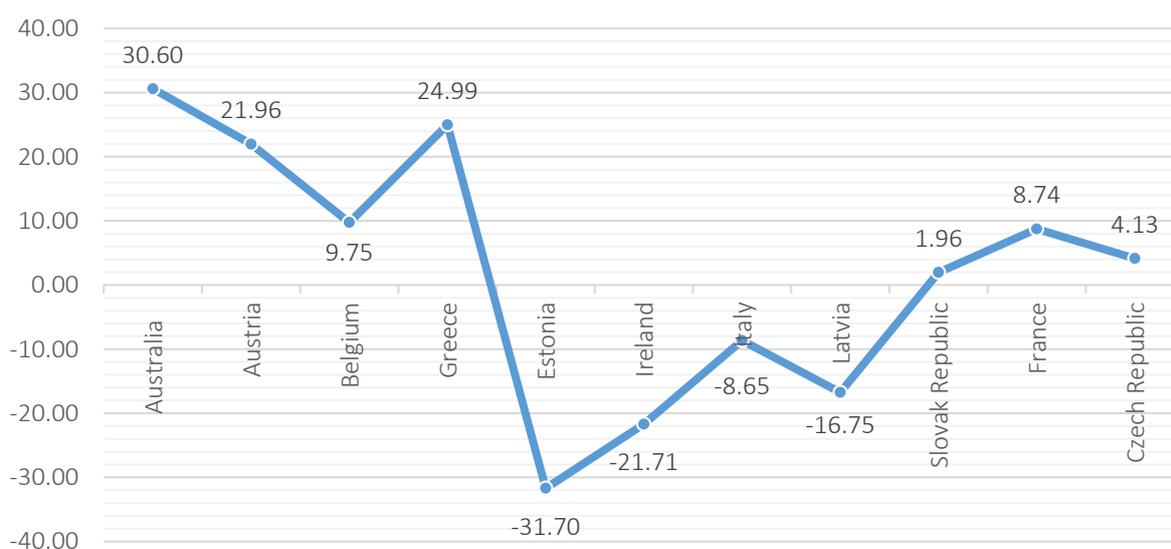
Figure 2. Rates of growth (decrease) in the level of SOLT in 2020 compared to 2010 by individual countries, %
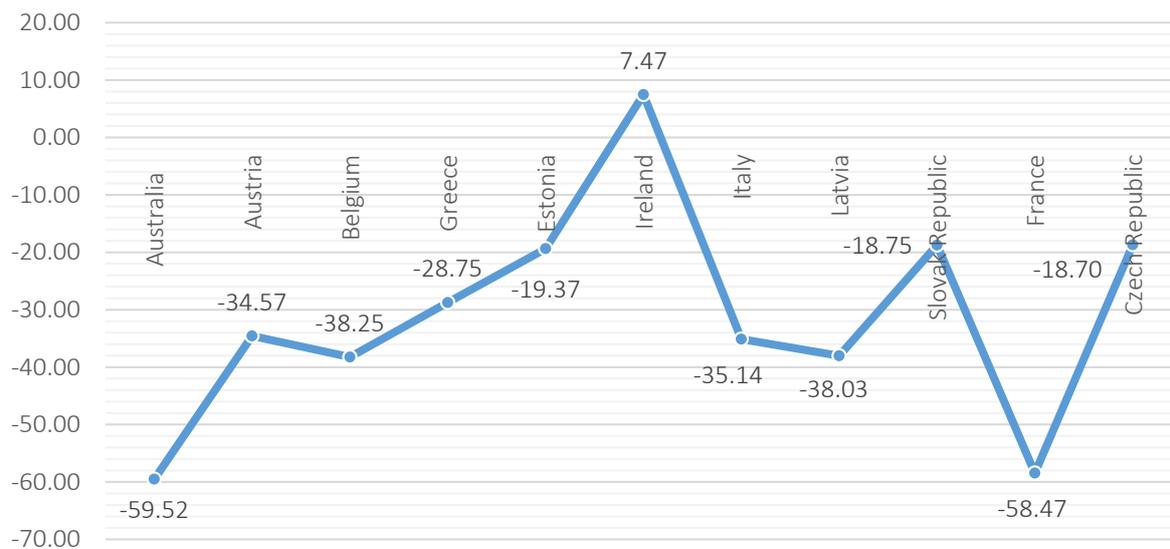
Figure 3. The rate of growth (decline) of the IR level in 2020 compared to 2010 by individual countries, %

Austria (1.59%), Slovakia (2.6%), the Czech Republic (3.26%), and the highest values were observed in Ukraine (13.84%), Ireland (4.17%), and Estonia (4.08%). Figure 3 shows the growth (decrease) of the IR level in 2020 compared to 2010. The highest level of IR decline is observed in the majority of the considered countries, such as Australia (–59.52%), France (–58.47%), Latvia (–38.04%), and Austria (–34.57%). IR growth was recorded in Ireland (7.47%). In general, the lower the value of the IR level, the higher the possibilities for the development of SMEs. On the one hand, they have advantages in the market, which is provided with the sufficient purchasing power of consumers, makes it possible to increase the demand for SMEs products. On the other hand, SMEs can get cheap loans, which are a source of increasing working capital, liquidity, and innovative development.

Data on SOLT and IR levels are collected according to a unified methodology and taken from the OECD statistical database. Unfortunately, the available statistical data (2017–2020) did not make it possible to reveal the impact of interest rates on the share of outstanding loans of SMEs in the overall structure of outstanding loans in the example of Ukraine. At the same time, the analysis of SOLT and IR for the corresponding period showed that the level of SOLT in Ukraine was the highest in 2020 – 61.23%, which increased compared to 2017 by 16.81%. This shows

that SMEs account for two-thirds of all account payables in the total debt structure, and the rest belongs to big enterprises. This situation reduces the probability for SMEs to receive preferential and cheap loans and forces banks to treat these borrowers more harshly, which significantly limits their liquidity and may increase the threat of insolvency and bankruptcy (Poliakov & Zayukov, 2022). This conclusion is also evidenced by the relatively high-interest rate (IR), which in Ukraine in 2020 was 13.84% and was the highest among the countries considered in Table 1. For example, compared to France, it is 13.44 times higher, Austria – 8.7 times higher, to Latvia – 3.14 times higher. A theoretical review of the literature proved that not only the value of credit resources depends on IR but also liquidity, solvency, and the probability of bankruptcy of SMEs.

According to Euler Hermes (2021), in 2022, global insolvency is forecast to grow by 15% compared to 2021. The main measures to restore solvency can be (OECD, 2021; Euler Hermes, 2021):

- organizational and legal (amendments to bankruptcy legislation regarding the suspension of bankruptcy proceedings and the search for ways to restore the liquidity of SMEs (Poliakov & Zayukov, 2023));

- mechanisms of out-of-court restructuring; for example, the experience of SMEs in the

Netherlands is based on the provision of restructuring loans, but subject to the consent of all creditors and the corresponding restructuring plan with the presentation of a detailed business plan (Qredits, 2021);

- simplified bankruptcy procedure (O'Halloran, 2022);

- improved bankruptcy procedure (O'Callaghan et al., 2020).

Similarly, organizational and legal measures should also include competitive agreements, that is, a particular type of agreements available exclusively in the competitive process, which aims to save the debtor and satisfy creditor claims. In other words, it should aim to find a compromise solution that will be beneficial to everyone – debtors, creditors, and the state. At the same time, this type of agreement limits the unity of creditors' will and its expression, as well as determines the concessions that creditors are ready to accept (for example, postponement, installment, or even write-off of part of the debt) for the sake of saving the debtor. At the same time, the court is taking an active part in the execution of such a transaction, observing the actions and protecting the rights and interests of the parties – debtors and creditors. This type of agreement includes an insolvency plan in Germany or a pre-trial sanitation plan in Ukraine:

- organizational and economic (assistance from the state to attract specialists who would provide recommendations on the restructuring of outstanding debts of SMEs, drawing up long-term development plans (O'Halloran, 2022);

- application of mechanisms for deferring outstanding loan payments (more than ten years);

- transformation of accounts payable into other forms of indebtedness, in particular, the provision of guarantees by the state regarding the return of debts to creditors (EP, 2021).

3.2. The influence of interest rate on the share of outstanding loans of SMEs in the overall structure of outstanding loans

In order to study the influence of interest rates on the share of outstanding loans of SMEs in the overall structure of outstanding loans in the aspect of preventing the bankruptcy of enterprises, a correlation-regression analysis was used with the construction of regression equations (equation 1) and a summary of the results in Table 2.

The data for conducting the correlation-regression analysis from 2008 to 2019 are shown in Table 1. It was impossible to conduct the correlation-regression analysis for Ukraine because there were not enough statistical data for the analysis provided in the OECD statistical database. The given data for Ukraine are only for the period 2017–2020. At the same time, it is possible to determine the correlation coefficient ($r = -0.8388$). However, the data for four years do not give reliability to the constructed correlation-regression equation because the calculated Fisher coefficient ($F = 2.154$) does not correspond to the normative (table 2) value ($F_t = 3.182$; i.e., $F < F_t$). Therefore, the study considers those countries that are part of the Organization for

Table 2. Impact of interest rate (x) on the share of outstanding loans of SMEs in the overall structure of outstanding loans (*Y*) by individual countries

Country	r	D	F	F$_t$	έ	σ$_{abc}$	Regression equation
Australia	−0.4924	0.2425	1.789		14.96	2.091	$Y = 0.065093 + 0.19419x$
Belgium	−0.82212	0.6758	4.567		20.87	1.348	$Y = 0.007861 + 0.03642x$
Estonia	0.87594	0.7972	5.742		11.02	0.823	$Y = -0.071275 + 0.15690x$
Italy	0.36108	0.1304	1.224		14.17	1.175	$Y = -0.016608 + 0.23442x$
Latvia	0.80064	0.6410	4.226	2.201	13.96	1.598	$Y = -0.012555 + 0.06789x$
Slovak Republic	−0.22523	0.0507	0.731		9.53	0.647	$Y = 0.003467 + 0.04354x$
France	0.06104	0.0037	0.193		22.55	1.246	$Y = -0.000559 + 0.00377x$
Czech Republic	−0.79476	0.6316	4.141		13.42	1.067	$Y = 0.0034576 + 0.05124x$

Economic Cooperation and Development and have enough available statistical information in the statistical database.

Therefore, the correlation-regression analysis of the impact of interest rate (x) on the share of outstanding loans of SMEs in the overall structure of outstanding loans (Y) revealed the ambiguity of the specified impact. A reliable negative relationship exists between the interest rate (x) and SMEs' share of outstanding loans in the overall structure of outstanding loans (Y). In particular, these are Belgium and the Czech Republic. The correlation coefficient (r) was −0.82212, the coefficient of determination 0.6759, and the constructed correlation-regression equation is characterized by statistical reliability and adequacy because the calculated Fisher coefficient ($F = 4.567$) is greater than the normative (Table 2) value ($F_t = 2.201$), i.e. ($F > F_t$). The average error of approximation ($\acute{\varepsilon}$) is 20.87, and the absolute root mean square deviation is 1.348. Therefore, an increase in the interest rate by 1% leads to an increase in the share of outstanding loans of SMEs in the total structure of outstanding loans by 0.03642%.

As for the Czech Republic, the calculated correlation coefficient (r) was −0.79476, the coefficient of determination 0.6316, and the constructed correlation-regression equation is characterized by statistical reliability and adequacy because the calculated Fisher coefficient ($F = 4.141$) is greater than the normative (Table 2) value ($F_t = 2.201$), i.e. ($F > F_t$). The average error of approximation ($\acute{\varepsilon}$) is 13.42, and the absolute root mean square deviation is 1.067. Therefore, an increase in the interest rate by 1% leads to an increase in the share of outstanding loans of SMEs in the total structure of outstanding loans by 0.051245%.

According to Table 2, a reliable and positive relationship was recorded between the interest rate (x) and SMEs' share of outstanding loans in the overall structure of outstanding loans (Y), particularly in such countries as Estonia and Latvia. Therefore, the correlation coefficient (r) in Estonia was 0.87594, the determination coefficient was 0.76727, and the constructed correlation-regression equation is characterized by statistical reliability and adequacy because the calculated Fisher coefficient ($F = 5.742$) is greater than the normative (Table 2) value ($F_t = 2.201$), i.e. ($F > F_t$). In addition, the av-

erage error of approximation ($\acute{\varepsilon}$) is 11.021, and the absolute root mean square deviation is 0.823. Therefore, an increase in the interest rate by 1% leads to an increase in the share of outstanding loans of SMEs in the total structure of outstanding loans by 0.156902%.

For Latvia, the calculated correlation coefficient (r) was 0.80064, the coefficient of determination was 0.64102, and the constructed correlation-regression equation is characterized by statistical reliability and adequacy because the calculated Fisher coefficient ($F = 4.226$) is greater than the normative (Table 2) value ($F_t = 2.201$; i.e., $F > F_t$). The average error of approximation ($\acute{\varepsilon}$) is 13.962, and the absolute root mean square deviation is 1.598. Therefore, an increase in the interest rate by 1% leads to an increase in the share of outstanding loans of SMEs in the total structure of outstanding loans by 0.06789%.

In the countries listed in Table 2 (in particular, Australia, Italy, Slovakia, and France), there is practically no reliable relationship between the interest rate (x) and the share of outstanding loans of SMEs in the overall structure of outstanding loans (Y), which is confirmed by the calculated Fisher coefficient. For example, for Australia, the calculated correlation coefficient (r) was −0.4924, while the calculated Fisher coefficient ($F = 1.789$) is less than the normative (tabular) value ($F_t = 2.201$; i.e., $F < F_t$). This shows that the constructed correlation-regression equation for Australia, Italy, Slovakia, and France is not statistically reliable.

4. DISCUSSION

The increase in the specific weight of outstanding loans of SMEs in recent years is the result of many influencing factors. This leads to negative consequences, which are associated with a slowdown in the growth of SMEs, a decrease in their liquidity and solvency, and a significant increase in bankruptcy. The study focused on such an important factor of access to loans as the interest rate, which led to identifying the impact of interest rate on SMEs' share of outstanding loans in the overall structure of outstanding loans. The correlation-regression analysis revealed the ambiguity of the specified influence. Its systematized results made it possible to conclude

that the following features are observed between the corresponding generalized feature and the impact factor. The study determined countries with a reliable and stable positive relationship. Other countries have a reliable and persistent negative relationship. In addition, the study identified the countries with no corresponding relationship.

The literature review showed that one of the macroeconomic factors (Kozlovskyi et al., 2017), among many others (credit history of the borrower, credit security, relations between the creditor and financial institutions, liquidity and solvency, size of the enterprise, inflation, etc.) that affects bankruptcy is interest rates. An increase in interest rates on loans in-creases the financial burden on the debtor (Brygata, 2022). Regarding the security of loans, this factor, along with the interest rate, is essential for their provision to SMEs, significantly reducing the risk of non-repayment (Etemesi, 2017).

Furthermore, the study shows a positive correlation between the lack of collateral and refusal to obtain loans ($r = 0.727$) and interest rates ($r = 0.202$) (Chilembo, 2021). However, no specific results were found during the last ten years related to the impact of interest rates on outstanding loans of enterprises on their structure. Therefore, the study of the impact of interest rates on the solvency of enterprises and SMEs' bankruptcy probability remains relevant.

CONCLUSION

Based on the study's goal, the influence of interest rate on outstanding loans of enterprises on their structure in preventing their bankruptcy was revealed. Thus, a clear positive trend toward the reduction of interest rates during the last decade was discovered. On the other hand, there was a negative trend toward an increase in the share of outstanding loans of SMEs in the vast majority of countries in the overall structure of outstanding loans. This situation leads to assisting SMEs as the cost of loans decreases and opportunities for innovative development and the growth of their profitability increase. However, the probability of non-payment of loans and bankruptcy of SMEs increases due to the COVID-19 pandemic, Russia's war against Ukraine, and the worsening of socio-economic crises worldwide.

The empirical analysis of the effect of interest rate on the share of outstanding loans of SMEs in the overall structure of outstanding loans showed a close, reliable negative relationship between the share of outstanding loans of SMEs and the overall structure of outstanding loans in individual countries, for example, in Belgium and the Czech Republic ($r = -0.822$; $D = 0.675$; $r = -0.9274$; $D = 0.794$; F-criterion > F_t, respectively,). On the other hand, in Estonia and Latvia, a positive and close relationship was found ($r = 0.876$; $D = 0.767$; $r = 0.800$; $D = 0.641$; F-criterion > F_t). For the rest of the analyzed countries (Australia, Italy, Slovakia, and France), no relationship was found between the interest rate and the share of outstanding loans of SMEs in the overall structure of outstanding loans.

Reducing the level of outstanding loans of SMEs remains a crucial task in preventing bankruptcy. This problem should be solved by lowering interest rates and allowing SMEs to restore their solvency. Thus, the studied influence will make it possible for state bodies in the management decision-making system to apply tools to increase the effectiveness of the monetary policy. In particular, it is necessary to have the policy aimed at the development of entrepreneurship in increasing SMEs' liquidity level and preventing their bankruptcy in today's force majeure conditions.

AUTHOR CONTRIBUTIONS

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REFERENCES

1. Aguiar-Diaz, I., & Ruiz-Mallorqui, M. (2015). Causes and resolution of bankruptcy: The efficiency of the law. *The Spanish Review of Financial Economics, 13*(2), 71-80. http://doi.org/10.1016/j.srfe.2015.04.001

2. Aminu, I. M., & Shariff, M. N. (2015). Influence of strategic orientation on SMEs. Access to finance in Nigeria. *Asian Social Science, 11*(4), 298. https://doi.org/10.5539/ass.v11n4p298

3. Awani, K. (2020, October 20). *Factoring as an alternative tool for financing SMEs in Africa*. The Making Finance Work for Africa Partnership (MFW4A). Retrieved from https://www.mfw4a.org/blog/factoring-alternative-tool-financing-smes-africa

4. Beck, T., & Cull, R. (2014). *SME finance in Africa* (Policy Research Working Paper No. 7018). Washington, DC: World Bank Group, Development Research Group. Retrieved from https://openknowledge.worldbank.org/entities/publication/3017f4f7-c4ae-5e40-836d-c47fc1e019a0

5. Brygata, M. (2022). Consumer bankruptcy prediction using balanced and imbalanced data. *Risk, 10*(2), 24. https://doi.org/10.3390/risks10020024

6. Casey, E., & O'Toole, C. M. (2014). Bank lending constraints, trade credit and alternative financing during the financial crisis: Evidence from European SMEs. *Journal of Corporate Finance, 27,* 173-193. https://doi.org/10.1016/j.jcorpfin.2014.05.001

7. Ćehajić, A., & Košak, M. (2022). Bank lending and small and medium-sized enterprises' access to finance – Effects of macroprudential policies. *Journal of International Money and Finance, 124,* 102612. https://doi.org/10.1016/j.jimonfin.2022.102612

8. Chatterjee, S., & Simonoff, S. (2013). *Handbook of regression analysis*. John Wiley & Sons, Inc. https://doi.org/10.1002/9781118532843

9. Chilembo, T. (2021). A study of the factors affecting small and medium enterprises (SMEs) access to finance. A case of Lusaka based SMEs. *American Journal of Industrial and Business Management, 11*(5), 437-460. https://doi.org/10.4236/ajibm.2021.115028

10. Damayanthi, I G. A. E., Wiagustini, N. L. P., Suartana, I W., & Rahyuda, H. (2022). Loan restructuring as a banking solution in the COVID-19 pandemic: Based on contingency theory. *Banks and Bank Systems, 17*(1), 196-206. https://doi.org/10.21511/bbs.17(1).2022.17

11. Dawood, T. (2018). Foreign interest rate, monetary policy and bank credit. *Jurnal Economi Pembangunan, 19*(2), 138-155. https://doi.org/10.23917/jep.v19i2.5244

12. El Païs Economía (EP). (2021). *El BOE publica los requisitos para que las pymes puedan pedir ayudas y reestructurar su deuda*. CincoDías. (In Spanish). Retrieved from https://cincodias.elpais.com/cincodias/2021/05/13/companias/1620905010_357298.html.

13. Etemesi, E. M. (2017). *Credit access from commercial banks and growth of small and micro enterprises in Nairobi Central Business District*. Retrieved from https://www.semanticscholar.org/paper/Credit-Access-from-Commercial-Banks-and-Growth-of-Etemesi/4e9e7b9bfceb4a53fab16aa6574aab9de73bf686#citing-papers

14. Euler Hermes. (2021, October 6). *Euler Hermes Report: After two years of decline, global insolvencies to rise in 2022 (+15%)*. Allianz Trade. Retrieved from https://www.allianz-trade.com/en_global/news-insights/news/euler-hermes-report-after-two-years-of-decline-global-insolvenc.html

15. European Community (EC). (2020). *Council Regulation (EC) No. 1346/2000 of 29 May 2000 on insolvency proceedings*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32000R1346

16. European Union (EU). (2007). *Consolidated versions of the Treaty on European Union*. Retrieved from https://www.refworld.org/docid/4b179f222.html

17. European Union (EU). (2015). *Regulation (EU) 2015/848 of the European parliament and of the council*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02015R0848-20220109

18. Frolov, S., & Shukairi, F. (2020). Bank-centric nature of the financial system of Ukraine: Analysis of the current situation. *Banks and Bank Systems, 15*(3), 184-

198. http://dx.doi.org/10.21511/bbs.15(3).2020.16

19. Gharaibeh, A. M. O., & Farooq, M. O. (2022). Determinants of bank lending rates: Empirical evidence from conventional retail banks in Bahrain. *Banks and Bank Systems, 17*(4), 140-153. http://dx.doi.org/10.21511/bbs.17(4).2022.12

20. Hanspal, T., Weber, A., & Wohlfart, J. (2020). *Income and wealth shocks and expectations during the COVID-19 pandemic* (CESifo Working Paper No. 13/20). Center for Economic Studies and ifo Institute (CESifo), Munich. Retrieved from https://www.econstor.eu/bitstream/10419/216640/1/cesifo1_wp8244.pdf

21. Horvathova, J., Mokrisova, M., & Petruška, I. (2022). Indebtedness and profitability – A threshold model approach. *Investment Management and Financial Innovations*, *19*(3), 13-27. https://doi.org/10.21511/imfi.19(3).2022.02

22. Judicial Power of Ukraine. (2020). *Sudova statystyka [Judicial statistics].* (In Ukrainian). Retrieved from https://court.gov.ua/inshe/sudova_statystyka/

23. Kaya, O. (2022). Determinants and consequences of SME insolvency risk during the pandemic. *Economic Modelling, 115,* 105958. https://doi.org/10.1016/j.econmod.2022.105958

24. Koziuk, V., Hayda, Y., Dluhopolskyi, O., & Kozlovskyi, S. (2020). Ecological performance: Ethnic fragmentation versus governance quality and sustainable development. *Problemy Ekorozwoju – Problems of Sustainable Development, 15*(1), 53-64. https://doi.org/10.35784/pe.2020.1.06

25. Kozlovskyi, S., Bilenko, D., Dluhopolskyi, O., Vitvitskyi, S., Bondarenko, O., & Korniichuk, O. (2021). Determinants of Covid-19 death rate in Europe: Empirical analysis. *Problemy Ekorozwoju – Problems of Sustainable Development, 16*(1), 17-28. https://doi.org/10.35784/pe.2021.1.02

26. Kozlovskyi, S., Butyrskyi, A., Poliakov, B., Bobkova, A., Lavrov, R., & Ivanyuta, N. (2019). Management and comprehensive assessment of the probability of bankruptcy of Ukrainian enterprises based on the methods of fuzzy sets theory. *Problems and Perspectives in Management, 17*(3), 370-381. http://dx.doi.org/10.21511/ppm.17(3).2019.30

27. Kozlovskyi, S., Grynyuk, R., Baltremus, O., & Ivashchenko, A. (2017). The methods of state regulation of sustainable development of agrarian sector in Ukraine. *Problems and Perspectives in Management*, *15*(2-2), 332-343. https://doi.org/10.21511/ppm.15(2-2).2017.03

28. Motta, V. (2020). Lack of access to external finance and SME labor productivity: Does project quality matter? *Small Business Economics, 54,* 119-134. https://doi.org//10.1007/s11187-018-0082-9

29. Nasir, M. S., Oktaviani, Y., & Andriyani, N. (2022). Determinants of non-performing loans and non-performing financing level: Evidence in Indonesia 2008–2021. *Banks and Bank Systems, 17*(4), 116-128. https://doi.org/10.21511/bbs.17(4).2022.10

30. O'Callaghan, B., Yau, N., Murdock, E., Tritsch, D., Janz, A., Blackwood, A., Purroy Sanchez, L., Sadler, A., Wen, E., Kope, H., Flodell, H., Tillman-Morris, L., Ostrovsky, N., Kitsberg, A., Lee, T., Hristov, D., Didarali, Z., Chowdhry, K., Karlubik, M., … Heeney, L. (2020). *Global recovery observatory*. Oxford University Economic Recovery Project. Retrieved from https://recovery.smithschool.ox.ac.uk/tracking/

31. O'Halloran, B. (2021, December 8). *Small business rescue scheme becomes law*. The Irish Times. Retrieved from https://www.irishtimes.com/business/economy/small-business-rescue-scheme-becomes-law-1.4750061

32. Petrunenko, I., Kozlovskyi, S., Bolhov, V., Akhnovska, I., Lavrov, R., & Bolgarova, N. (2022). Civilizational cycles and economic development in the context of technological transitions and global pandemics. *Montenegrin Journal of Economics, 18*(4), 191-202.

33. Poliakov, R., & Zayukov, I. (2022). Model for preventing bankruptcy of Ukrainian enterprises in force majeure circumstances. *Problems and Perspectives in Management, 20*(4), 365-381. http://dx.doi.org/10.21511/ppm.20(4).2022.28

34. Poliakov, R., & Zayukov, I. (2023). Assessment of the relationship between liquidity and unprofitability of companies in preventing their bankruptcy. *Problems and Perspectives in Management, 21*(1), 141-153. https://doi.org/10.21511/ppm.21(1).2023.13

35. Prohorovs, A. (2022). Russia's war in Ukraine: Consequences for European countries' businesses and economies. *Journal of Risk and Financial Management, 15*(7), 295. https://doi.org/10.3390/jrfm15070295

36. Qredits. (2021). *Have you been affected by the corona crisis and do you need money to restructure?* Retrieved from https://qredits.nl/toa-krediet/

37. Radipere, S., & Dhliwayo, S. (2014). The role of gender and education on small business performance in the South African small enterprise sector. *Mediterranean Journal of Social Sciences, 5*(9), 104-110. http://dx.doi.org/10.5901/mjss.2014.v5n9p104

38. Rosenbaum, E. (2022, December 15). *For most American businesses, new Fed rate means loans now start at 10%-plus interest.* CNBC. Retrieved from https://www.cnbc.com/2022/12/14/fed-rate-hike-pushes-business-loans-over-10percent-for-first-time-since-2007.html

39. Shevchuk, O., Ilyash, O., Mazhara, G., Roshchyna, N., Hrynkevych, S., Lavrov, R., & Kozlovskyi, S. (2023). Modeling regional sustainable development in Ukrainian crisis and war. *Problemy Ekorozwoju – Problems of Sustainable Development, 18*(1), 37-50. https://doi.org/10.35784/pe.2023.1.04

40. Shosha, B., Mano, R., & Anamali, A. (2022). Businesses and COVID-19 impact, liquidity issues and

failure perceptions: The case of Albania. *Investment Management and Financial Innovations, 19*(2), 95-106. https://doi.org/10.21511/imfi.19(2).2022.08

41. Singh, C., & Wasdani, P. K. (2016). *Finance for micro, small and medium-sized enterprises in India: Sources and challenges* (ADBI Working Paper No. 581). Tokyo: Asian Development Bank Institute. Retrieved from https://www.adb.org/sites/default/files/publication/188868/adbi-wp581.pdf

42. State Statistics Service of Ukraine. (2021). *Activities of enterprises.* (In Ukrainian). Retrieved from https://www.ukrstat.gov.ua/

43. Stiglitz, J. (1999). Interest rates, risk, and imperfect markets: Puzzles and policies. *Oxford*

Review of Economic Policy, 15(2), 59-76. Retrieved from https://www.jstor.org/stable/23606912

44. The Organization for Economic Cooperation and Development (OECD). (2021). *An in-depth analysis of one year of SME and entrepreneurship policy responses to COVID-19: Lessons learned for the path to recovery* (ECD SME and Entrepreneurship Papers No. 25). Paris: OECD Publishing. https://doi.org/10.1787/6407deee-en

45. The Organization for Economic Cooperation and Development (OECD). (2020). *Financing SMEs and Enterpreneurs: An OECD Scoreboard.* Paris: OECD Publishing. https://doi.org/10.1787/061fe03d-en

46. The Organization for Economic Cooperation and Development

(OECD). (2022). *Financing SMEs and Enterpreneurs 2022.* Paris: OECD Publishing. https://doi.org/10.1787/e9073a0f-en

47. Wang, X., Han, L., & Huang, X. (2020). Bank market power and SME finance: Firm-bank evidence from European countries. *Journal International Financial Markets, Institution and Money, 64,* 101162. https://doi.org/10.1016/j.intfin.2019.101162

48. Worokinasih, S., & Potipiroon, W. (2019). Microfinance repayment performance of SMEs in Indonesia: Examining the roles of social capital and loan credit terms. *The Journal of Behavioral Science, 14*(1), 28-45. Retrieved from https://so06.tci-thaijo.org/index.php/IJBS/article/view/150625