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## **COST OF CREDIT AND PROFITABILITY OF LARGE INDUSTRIAL FIRMS IN UKRAINE<sup>2</sup>**

Lending in Ukraine is usually studied from the creditor's perspective, and based on the macroeconomic-level data, due to statistics availability. This potentially leaves out the problems that exist on microeconomic level, and leads to one-sided conclusions regarding, for instance, justification for certain levels of cost of credit based exclusively on minimal required profitability. In order to complement these conclusions, it is expedient to use microeconomic data-based analysis performed on a representative selection of firms, and thus the aim of this study is to evaluate credit availability for large firms in Ukraine in 2006-2020.

Within the framework of the designated aim, liabilities structure, expected costs of financial resources, both credit and equity-based, have been analyzed for a selection of firms, and then compared to their respective profitability ratios. The main conclusion is that an average large industrial firm in Ukraine in 2006-2020 was not profitable enough to attract either loans or investments on market terms, and it is unlikely the situation has changed now. Individual firms, mainly of agricultural, mining, mechanical engineering, food and trade industries, are the exception to this rule. The reason for this is abnormally high profitability volatility, and in many cases – loss-making of large industrial firms, which in turn raise their risks (and thus the cost of financial resources for them); in other words, an average industrial firm has to pay elevated cost for credit due to its low creditworthiness.

The practical conclusion is that the average large industrial firm in Ukraine is maladapted to market-based economy, and thus they should not be the centerpiece for planning of an economic development policy. Due to the tendency of such firms to bias any form of aggregated statistics in their

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favor, it is advisable to exclude them altogether, and aim to use representative selections based on medium and small firms instead. In particular, such approach must be used for aggregation of industry-specific capital structure, as well as for evaluation of costs of credit, equity and of their underlying risks. This would allow for setting a better scale in estimation of costs of financial resources.

**Key words:** loans, trade credit, cost of capital, cost of credit, return on capital.

**Formulation of the problem.** The question of factors of economic development is among the most exhaustively researched ones in economics. The idea of unilateralism of economic and financial development began gaining in popularity starting from the late 1960s. A significant number of authors gauge financial growth via growth in credit, in particular, for instance, the “financial depth”, which is mostly defined in the modern studies as domestic credit to GDP ratio. However, the results of purely macroeconomic approach based on aggregated data tend to differ from those obtained based on specifically constructed samples of firms, and only by accounting for the difference between such results, the proper conclusions about the real state of economy can be made.

In particular, this research is focused on the lending conditions for big industrial firms in Ukraine, specifically the volume, justification and cost of credit from the point of view of such firms. This, in turn, allows to draw conclusions about weak points in credit policy in the country and the perspectives of renewal of the big industrial firms using the credit financing.

Thus, the **aim of the study** is to evaluate the possibility of taking a loan from the point of view of a big industrial firm in Ukraine in 2006-2020. Within the above-mentioned aim the following tasks were pursued:

- 1) to analyze the fraction of loans in financing structure of big industrial firms during the time period in consideration;
- 2) to analyze costs of credits for said time period;
- 3) to analyze expected cost of equity for big industrial firms during this period; as an alternative source of financing;
- 4) to analyze profitability of the firms in the sample during 2006-2020 and to compare it with cost of credit.

**Literature review.** Certain methodical issues with calculating the cost of credit and expected cost of equity, using Ukrainian data, were covered in previous publications by the author, namely, the assessment of risk-free rate and its analogues [1], and approaches usable in assessment of individual risk



## **Cost of credit and profitability of large...**

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rate  $\beta$  based on Ukrainian open-source data [2]. The conclusion, important for this particular research, is that the financial resources in Ukraine are higher than normal due to:

1) excessively high volatility in profits of big industrial firms in Ukraine, which, in turn, raises the risks and thus, – the expected cost of equity;

2) high country risk, which raises the cost of credit by raising the minimal required profitability of the investment, AKA the risk-free rate.

Heightened cost of credit leads to loans being phased out by commercial loans, which can be traced via growth in accounts payable and accounts receivable, both in absolute terms and as a fraction of current assets [3]. Such changes in liabilities' structure lead to decrease in financial stability of such firms, especially their liquidity and solvency ratios, and thus serve to diminish their creditworthiness even further. Without taking such details into account an outside observer can only ascertain the lack of efficiency of loans as the instrument of financing for development of Ukrainian firms and draw conclusions about the need for strengthening of the role of state in stimulating the investment loans for firms of the real sector and about the importance of modernization [4], all while the state cannot influence the private enterprises directly, and from the point of view of the classical finance theory it is impossible to encourage the banks to invest into firms that are not creditworthy.

None the less, the research of the firms with negative book equity in Ukraine indicates the presence of non-market elements in the credit process [5]. The important conclusion of that research is the theory of quasi-risk financing model, which is used by some of the big industrial firms. It implies that the firms within a financial-industrial group are being divided into the centers of expenditures, which are left in Ukraine, and the centers of revenues, which are being relocated to offshores. The centers of expenditures are sustained in a minimally functional state, complete with chronic net losses, and thus are not creditworthy, but they get the loans they need to function from “pocket banks” within the same financial-industrial group. In other words, they get loans on non-market basis – either by a preferential risk assessment using insider information, or based on collusion between the bank and the lender. These conclusions are complimentary to the conclusions of V. Kozyuk, who wrote that growth of financial depth in Ukraine in 2010-2013 was a result of specific, concentrated expansion of lending between related parties, which was an adaptation of business groups



to distorted institutional environment [6], and thus, reduction in financial depth after 2015 was not a negative trend, as well as increase in it before 2015 wasn't a positive one. Same as V. Kozyuk, N. Rekova and Y. Dyatlova note the opposite dynamics of loans in the national and foreign currencies due to volatility of currency rate after 2015, yet the latter also emphasize on the constancy of net loans to individuals and legal entities, in case if the assessment is made using a fixed exchange rate [7]. These observations, however, are likely to be characteristic exclusively for agricultural firms, which have foreign currency income and access to hard currency loans from the linked companies.

The research by I. Pasynovych and V. Dmytruk draws attention to another important aspect of credit process in Ukraine, namely, the availability of better, more profitable alternatives, than giving loans, to banks [8], for instance, the government bonds, – a tendency, which existed in Ukraine until recently. Availability of such an alternative makes possible for the banks to minimize their credit risks by reducing their credit portfolio while retaining relatively high risk-free revenue – a very enticing proposition, especially if you take into account the aggregated fraction of non-performing loans as high as at 28,5%. S. Vlasyuk and N. Bondarenko consider the high fraction of non-performing loans as one of the main factors of the limited volume of bank loans to real sector, along with the lack of long-term financial resources in banking system and the lack of protection of rights of both debtors and creditors [9].

Recent force-majeure circumstances, however, somewhat shifted the focus of research of credit practice in Ukraine. With the beginning of the full-scale invasion of Ukraine by RF, credit relations were largely put on manual control, namely the currency rate was fixed [10], the budget deficit was covered by emission of war loan bonds and their subsequent purchase by the National bank of Ukraine [11], all while the revenue on government loans in hryvnas was kept low by the Ministry of Finance of Ukraine [12]. Thus, the restrictions on capital movement are effectively paid by the owners of income and savings in hryvnas, the fixed currency exchange rate is paid by the NBU's forex reserves and the revenues of exporters, and the decrease in tax revenue is being paid by all of the owners of hryvna (inflation) and international grants and loans. The situation is worsened by the distortion of international trade due to war and increased demand for currency by population due to emigration and volunteer activity, which in turn leads to worsening of the balance of payments deficit.



The dissonance between policy of the NBU (inflation targeting) and the Ministry of Finance (minimization of debt) on monetary policy is aggravated by the actions of other regulating agencies, which further distort monetary policy. Namely, starting from the 24<sup>th</sup> of February, the National commission for securities and fund market (NCSFM) first stopped circulation of the securities altogether, and then only allowed circulation of war loan bonds, on the condition that only the initial issuers (i.e. banks) were allowed to conduct operations with them [13]. Maintaining the low profitability on the bonds, all while the whole stock exchange was reduced to the trading bonds of a single issue by a narrow circle of actors, effectively brought the stock market to a halt, which, in turn, caused the partial withdrawal of the resources into non-controlled assets such as crypto currency.

Also, agriculture and trade firms had received preferential lending in order to maintain basic functionality needed for state survival - producing food supplies, distributing wares and services among the population, and exporting grain for lessening the trade balance deficit. Additionally, the measures were taken in order to adapt the banking system for war time conditions, involving corresponding softening of the terms of providing banking services, namely, the penalties and sanctions for breaching economic standards [14], publications deadlines of financial statements [15] and requirements for creating and keeping mandatory reserves were temporary cancelled in order to ensure uninterrupted operation of the banking system.

And thus, anti-crisis measures, implemented as a reaction to the war, had a number of contradictory and sometimes unexpected results, moreover, this process is still ongoing and the final results of the current policy (which has signs of insufficient consistency) are still an open question.

**Highlighting insufficiently researched aspects of the problem.**

Literature review indicates that the aggregated macroeconomic approach to credit relations analysis has its weaknesses – while the main trends can still be discerned with relative ease, the reasons behind them and their prevalence are usually left beyond the scope of the research. Thus, this particular research will be focused on the analysis of statistics based on a representative sample of firms.

**Research methodology.** The research is built on the analysis of the dynamics of a number of indices, which define credit relations, namely:



1) the fractions of short- and long-term loans in total assets of the firms of the sample, and juxtaposition of said index with the fraction of debt (i.e. loans and accounts payable) of the firms of the sample;

2) the cost of credit, calculated based on the financial statements (financial expenses to total loan volume) of the firms of the sample, and its juxtaposition with the aggregated rate on new loans, published by the NBU;

3) the expected cost of equity, calculated based on CAPM for the firms in the sample, and its juxtaposition with the cost of credit;

4) the return on equity of firms of the sample and its juxtaposition with costs of credit and expected cost of equity; two variants of the cost of credit are used – the average one (based on the NBU statistics) and the factual one for the firms in the sample (financial expenses to total loan volume), while for the expected cost of equity only one (factual) variant is used (risk-free rate + country risk, adjusted for individual beta coefficient, which, in turn, is calculated via adjusting the industry beta coefficient by individual financial leverage of each firm).

All of the calculations are conducted based on the primary data of a sample of 286 predominantly large industrial firms of Ukraine, and are aggregated using median values.

**Presentation of research material.** During 2006-2020, a rather significant fraction of firms of the sample had chronic solvency problems, which reflected on their financial statements not only as accumulated net losses, but also as negative book equity. In total, the book equity was negative for 13.49% of all observations; moreover, the average fraction of negative equity observations by industry fluctuated from 0% (pharmaceutical and power industries) up to 37.72% (chemical industry). As a result, if one aggregates data using the approach used by State statistics service of Ukraine (i.e. by simply adding up the indicators), the aggregated book equity reaches negative numbers in 12,31% of observations (paper industry in 2013–2020, coke-chemical industry in 2019–2020, chemical industry in 2015–2020, production of other non-metallic mineral products in 2006 and 2019, metallurgy in 2016–2020 and mechanical engineering in 2019).

In order to minimize the impact of this peculiarity on the aggregated values, all the firms with negative book equity were treated as the firms with a 100% debt (Table 1).



Table 1  
Debt to total assets per industry, 2006–2020, %

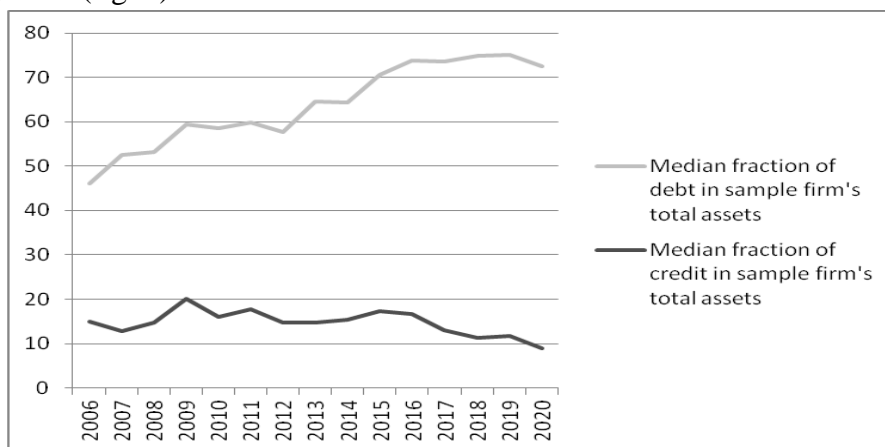
Industry	Number of firms	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Agriculture	27	44.2	52.9	58.9	64.6	62.7	53.6	47.8	53.1	55.5	62.8	59.2	56.4	54.6	57.1	59.2
Mining	17	35.9	37.9	40.4	41.7	45.3	46.1	45.9	42.3	39.3	44.7	48.8	51.4	53.8	52.4	39.0
Food industry	52	50.5	52.5	57.2	59.3	56.7	59.8	57.7	54.4	52.4	60.0	61.9	64.2	62.7	62.0	53.2
Paper industry	2	34.6	38.3	47.1	72.2	73.7	73.2	78.4	77.7	78.3	100.0	100.0	100.0	100.0	100.0	76.6
Coke-chemical industry	12	51.0	54.3	53.2	51.9	53.8	52.6	57.0	64.6	65.9	72.9	73.8	75.6	75.1	78.3	77.7
Chemical industry	12	37.2	42.3	43.0	47.8	62.0	70.7	74.4	74.9	79.9	78.5	77.3	78.3	76.6	78.5	74.1
Pharmaceutical industry	4	43.6	38.5	39.7	44.6	46.1	52.1	53.0	50.8	45.6	41.1	43.2	41.9	41.7	45.8	49.4
Production of other non-metallic mineral products	4	61.2	68.5	60.6	56.8	36.3	64.9	65.3	68.6	64.4	70.6	79.8	82.4	83.0	83.7	69.9
Metallurgy	16	46.1	50.2	52.5	62.3	60.9	68.1	71.2	74.7	75.9	80.9	81.6	83.3	80.5	79.3	79.4
Mechanical engineering	57	46.1	47.9	51.0	59.7	58.5	59.9	56.6	58.4	57.9	63.8	67.1	70.9	74.6	78.3	72.5
Power industry	20	63.0	59.3	55.7	58.2	57.8	56.6	50.4	44.8	45.7	49.0	48.7	48.2	46.0	47.9	42.8
Construction	31	66.8	72.2	69.3	74.8	71.8	76.6	77.2	76.9	76.6	79.0	81.0	75.5	74.8	75.1	73.7
Trade industry	32	78.8	81.6	78.6	78.5	83.1	80.2	80.2	80.1	75.5	74.7	76.3	73.6	78.4	73.5	73.5

Source: author's calculation using data [17].

As we can see from the table 1, all of the industries, except for trade and power industries, showed the trend of increasing the fraction of debt in the structure of financing. The highest growth rates were observed in chemical and paper industries, with the latter one having no equity during the 2015-2019 period, even though the aggregation method was adjusted not to be influenced by the firms with negative equity. The likely reason for this is the comparatively low number of firms in this subset. In absolute terms, the growth in the fraction of the loan debt is linked not necessarily to growth in its volume, but rather to reduction in the volume of equity due to accumulated net loss, which was then transformed into negative book equity.

The influence of the latter factor during the aggregation is rather significant: if the aggregation is to be conducted without replacing negative book equity with 0, the number of industries with no book equity is increased from one to six; moreover, there are periods with negative book equity even for the mechanical engineering, whose subset contains 57 firms. The total number of observations for this industry with 0 or less book equity in that case increases from five to 24 out of 195, while 18 of them happened during 2015–2020 and another six – during 2019. Such dynamics indicates drop in profitability among the big industrial firms and corresponding issues with creditworthiness.

This statement is further indirectly confirmed by the mutual dynamics of debt and actual loans: starting from 2015, the growth in the fraction of debt coincided with the decline in the fraction of actual loans. The difference between them shows the growth of different kinds of accounts payables (fig. 1).



**Figure 1. Median fractions of debt and loans in total assets in sample, 2006–2020, %**

Source: author's calculations using data [12].





During 2006–2020, short-term loans accounted for, on average, from 5.9 to 21.3% of total assets, while the long-term loans – from 3 to 8.7%. Total fraction of loans, on average, was no more than 27.5%. The averages, however, tend to skew the picture somewhat due to the outliers. For instance, the average fraction of short-term loans in total assets for mining industry in 2008 is 188% due to one single observation, linked to PrJSC “Ukrnaftoburinnya”. This firm managed to secure a substantial loan right after it had its first instance of negative book equity in 2008, which brought its short-term loans to total assets ratio up to 2800%. This instance is not unique within the sample, more so – it is rather typical for firms with negative or near zero book equity. It is also worth mentioning that by the time it had received the loan the above mentioned firm did not meet the minimum criteria of creditworthiness.

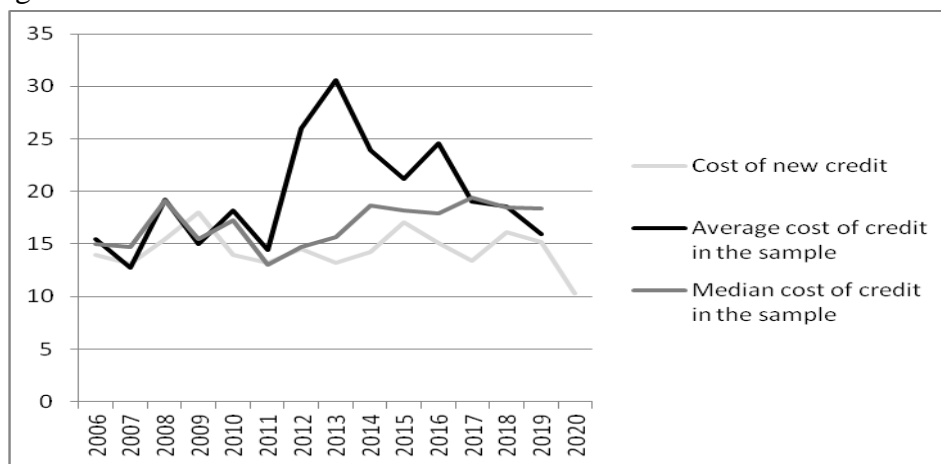
If median values are used instead, the fraction of short-term loans in total assets fluctuates from 5.6 to 10.4%, while the fraction of long-term loans – from 3 to 9%, and total fraction of loans in total assets does not exceed 20,1%. Thus, it is possible to conclude that Ukrainian firms prefer commercial credits, and not by choice, but because of/due to objectively low creditworthiness. The fraction of short-term loans in total assets of the firms is larger than the fraction of long-term loans; additionally, the fraction of long-term loans peaked in 2016, and was consistently declining since then (in 2020 it was 2,5 times smaller than in 2006), while the fraction of short-term loans continued to grow up until the end of the observed time period, or, in other words, the long-term loans were phased out by the short-term loans.

Pharmaceutical industry, metallurgy and mechanical engineering were the only industries, which increased the fraction of the short-term loans in their total assets throughout the time period observed; the rest of the industries had the fraction of the short-term loans actually reduced for the period overall, with the turning point being mostly in 2015. Dynamics of the long-term loans fraction was negative for all industries during 2006–2020 overall, with turning point from the growth to decrease being mostly in 2016–2017.

Dynamics of the cost of credit allows to supplement previous conclusions with additional details (fig. 2). The cost of credit, shown on fig. 2, was calculated using two main sources: manual calculation of the cost of credit using the sample data and the average cost of new credits, taken from the NBU publications. The calculation using the data from the sample was

performed using the fraction of financial expenses (since the majority of the firms in the sample do not trade on the stock market and do not invest in securities) in the sum of short-term debts, long-term debts and short-term obligations on long-term debts.

As it is seen from fig. 2, the average cost of credit for the sample exceeded 30% in 2013 due to an outlier, although both the average and the median costs of credit for the sample were higher than the nominal cost of new credits, published by the NBU throughout the whole observed period, except for 2020 (due to lack of data). The difference between the average and the median costs of credit is especially noticeable in 2011–2016, when the instances of negative book equity skyrocketed; this was caused by the outliers, which tend to arise during the calculations of relative indicators, when the volume of assets reduces sharply. Or in other words, the firms of the sample acquired loans on worse than the average terms due to their higher risks.

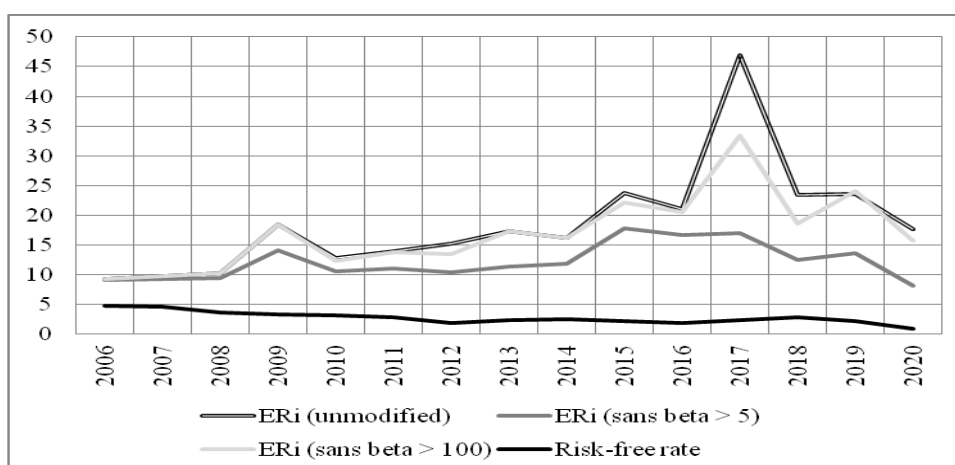


**Figure 2. Cost of credit, 2006–2020, %**

*Source:* author's calculation using data [12, 18].

The latter statement is derived from the analysis of the expected cost of equity, which is calculated based on the risks of the market, on which the firm functions (country risk), risks of the industry to which it belongs (industry beta coefficient) and its individual risks (product of the industry beta coefficient and individual firm's leverage). Expected cost of equity is the profitability expected by the potential investors from their investment in firm's equity. It is a numerical expression of the risks of such investment and has to cover minimum profitability, country risk and individual firm's susceptibility to it. In more detail the calculation is described in the studies [2; 19, c. 157–164].

Due to heightened volatility of profitability of Ukrainian industrial firms, the standard calculation of beta coefficient results in a significant number of outliers. The normal values for beta coefficient lie within (-1) to 1 interval, conditionally normal – within (-5) to 5 interval, however, some of the results of such calculations exceed 10 or even 100, especially for the firms that just had their first year of negative book equity. To illustrate the distribution of risks we'll provide the estimations of expected cost of equity based on unmodified aggregated beta coefficient, aggregated beta coefficient, excluding values over 100, and aggregated beta coefficient, excluding values over 5. The rate on 10 years the US treasury bonds was used as the risk-free rate; it is shown separately on fig.3 in order to make it easier to estimate the scale of risks premiums.



**Figure 3. Risk-free rate and expected cost of equity – unmodified, excluding beta > 100 and excluding beta >5 in Ukraine, the average values, 2006–2020 pp.**

Source: author's calculations using data [12, 20].

The graphs of expected cost of equity based on unmodified beta coefficient and on beta, excluding values over 100, almost coincide up until 2011, which indicates that there were no betas over 100 until that year. The biggest gap is observed in 2017, in which the profitability volatility reached its maximum (mostly due to the chronically unprofitable firms reaching negative book equity values). Expected cost of equity grew accordingly – up to 46,9% for the unmodified indicator, and up to 17,7% for the indicator based on beta sans the values over 5. More detailed view of the dynamics of expected cost of equity, however, allows for additional conclusions (table 2).



Table 2  
Median values of expected cost of equity (ERi sans beta > 5) by industry  
in 2006–2020, %

Year	Industry											
	A01	B	C10	C17	C19	C20	C21	C22	C23	C24	C26–30	D35
2006	6.51	6.38	7.51	6.82	10.13	8.63	14.43	7.45	9.90	8.03	13.03	10.32
2007	7.80	6.36	8.13	6.91	13.82	7.84	10.71	7.00	10.90	9.30	11.89	10.13
2008	7.80	5.72	7.29	7.20	12.76	10.38	10.96	7.85	13.44	12.69	9.80	7.45
2009	12.80	9.00	11.00	10.44	10.19	11.75	15.81	13.46	11.58	28.82	20.82	14.22
2010	8.89	7.83	8.35	10.35	10.71	11.13	14.32	6.69	7.88	15.39	13.33	12.42
2011	7.66	9.43	9.35	9.57	12.02	15.47	8.79	8.53	17.87	11.30	11.51	11.09
2012	5.42	6.42	7.26	11.33	12.46	14.29	7.82	10.39	17.04	10.30	10.02	11.64
2013	8.29	9.59	6.83	14.37	10.95	8.31	7.68	15.01	12.97	13.83	16.56	12.29
2014	9.00	6.79	14.39	16.23	11.33	12.46	7.41	13.38	10.58	14.77	11.71	14.48
2015	12.28	7.61	17.67	28.16	21.12	12.62	10.37	27.50	25.70	15.74	12.28	21.65
2016	13.05	7.51	10.37	36.90	10.46	7.92	12.40	24.21	37.18	14.40	11.28	14.72
2017	9.76	6.29	14.40	24.38	15.11	7.48	12.82	31.22	41.97	19.65	8.39	12.26
2018	7.11	7.43	13.56	18.87	16.97	7.16	12.16	11.98	10.80	26.84	7.15	9.99
2019	6.46	14.21	12.64	22.08	26.68	9.88	15.44	4.48	12.05	22.66	8.78	8.96
2020	5.40	4.26	4.62	14.49	4.76	3.90	15.54	8.23	5.35	17.68	7.02	5.77

Source: author's calculation using data [12, 13, 15].

The main trends of the table can be summarized as follows: during the time period under observation expected cost of equity fell from 9.1 to 8.1%; its peak values of 14–17% were observed in 2009–2019. The highest average cost of capital was in paper (15.8%), glass (16.4%) and metallurgic (16.15%) industries. The lowest average cost of capital was observed in agricultural (8.6%), mining (7.7%) and chemical (8.6%) industries.

It is worth mentioning that the peak of the average cost of credit for the sample was observed in 2013, while the peak of the average expected cost of equity – in 2017. The question arises: how does the cost of financial resources correlate with the profitability of firms of the selection? To answer this question, it is expedient to look at the dynamics of the sample firms' return on equity during the time period under observation (table 3).

Table 3

Return on equity of big industrial firms in Ukraine,  
2006–2020

Year	Industry										
	A01	B	C10	C17	C19	C20	C21	C23	C24	C26–30	D35
2006	1.4	3.0	14.0	15.9	5.2	2.3	8.2	16.5	18.4	1.7	3.5
2007	0.0	15.9	6.8	10.8	-6.2	6.3	13.0	-0.5	18.5	5.8	3.6
2008	8.7	33.6	1.0	-32.3	-7.8	15.8	13.0	2.9	-6.2	0.8	3.7
2009	2.2	0.0	2.4	-53.4	-8.7	-5.6	11.4	-0.4	-21.0	0.4	11.9
2010	11.7	24.6	11.2	-165.2	-0.1	-19.4	8.0	-8.4	-8.7	2.1	10.0
2011	13.4	26.5	10.1	3.0	-5.7	-14.4	7.4	1.2	-5.7	6.8	13.9
2012	11.2	17.5	12.0	-25.7	-19.2	-5.5	13.0	-16.3	-23.3	3.4	10.1
2013	19.5	17.6	10.3	-5.0	-3.6	-62.0	12.6	-0.6	-25.7	4.4	10.6
2014	0.2	17.9	0.6	-19.5	-14.4	-38.8	19.4	-13.1	-86.5	-3.6	3.0
2015	9.2	3.1	0.7	8.4	-5.8	-1.6	15.2	-40.4	-29.4	-2.6	4.4
2016	7.5	8.7	-0.7	-2.8	-0.4	-5.6	14.2	-196.4	-26.3	1.4	6.4
2017	1.7	34.8	1.6	13.2	-0.8	-2.4	7.4	-12.7	-9.6	3.4	4.5
2018	4.8	37.8	0.8	16.0	0.0	-0.4	8.7	13.7	3.6	2.7	5.2
2019	10.6	14.6	1.0	7.2	-9.2	0.0	14.9	5.2	-12.3	0.0	2.9
2020	1.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.9

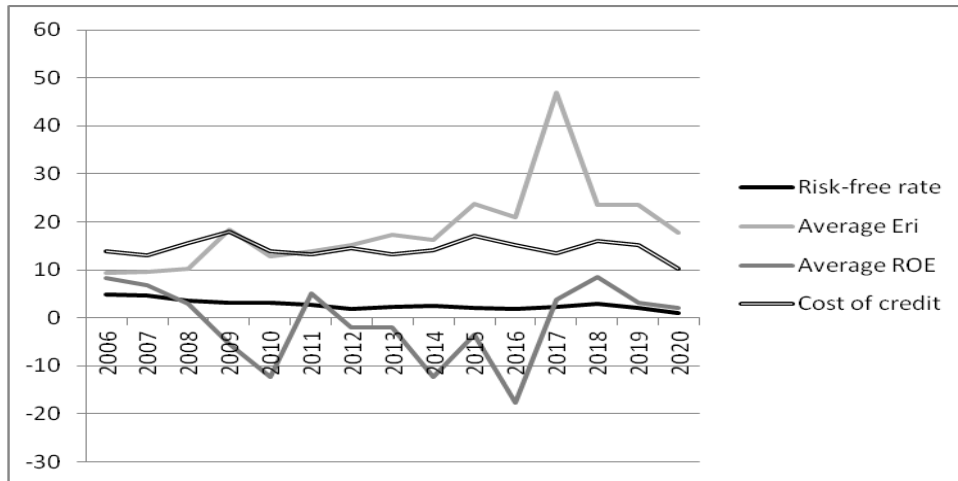
Source: author's calculations using data [12].

High number of outliers is a result of extreme volatility of profitability, or, to be more exact, unprofitability. Even though the data was aggregated using the median, and not the average values, there are values of the return on equity as low as (-196,4%) in table 3. Despite this, 54,5% of the industries show positive average return on equity during the period of observation. The highest return on equity is observed in mining (18,3%), while the lowest – in glass industry (-17,8%). If we take the median values instead, positive aggregated return on equity is observed in 63,6% of the industries, in particular, the highest value remains in mining (17,6%), while the lowest one is now observed in metallurgy (-10,9%).

Descending trend in the average return on equity was observed in 2006–2010, 2011–2014, 2015–2016 and 2018–2020, moreover, this index reached lower than (-12%) in some years. If median return on equity is used instead, the descending trend can only be observed in 2007–2009 and 2011–2014.

Minor amount of additional information can be received from the analysis of return on assets of the sample firms during 2006–2020: namely, the number of negative observations is reduced from 53 to 46 compared to the return on equity. The reason for this is that the volume of total assets, unlike equity, normally never reaches zero. In particular, for instance, the average return on equity in paper industry was (-16,4%), while its average

return on assets – 0,5%. The dynamics of these two indices is mostly similar: the average return on assets also has peaks in 2007 and 2012, and an ascending trend starting from 2018. The difference lies in lack of positive trend for return on assets in 2009–2011. How does this correlate with expected cost of equity and cost of credit? See fig.4:



**Figure 4. The average return on equity, and costs of financial resources for big industrial firms in Ukraine in 2006–2020, %**

Source: author's calculations using data [12, 13, 15].

As we can see, the average return on equity among big industrial firms in Ukraine during the observed period fluctuates from (-17,8)% to 18,3% (for comparison, their return on assets fluctuated between (-1,9)% and 12,3%). In other words, on average, the firms had to pay from 7,7 to 16,4 kopecks for 1 hryvna invested into firm's equity, while they earned on average from (-17,8) to 18,3 kopecks per hryvna of equity invested. This means that not all the firms were able to attract investments from the stock market, even if it was functional. It is also worth mentioning that the average cost of credit during the period of observation was consistently higher than the average profitability, i.e. an average firm was not able to afford a loan; even though, the cost of credit on fig. 4 is the lowest one considered in this research – cost of new credits taken from the NBU publications.

### **Conclusions and perspectives of the further research**

Thus, the materials reviewed in this study allow to draw a number of conclusions on the peculiarities of loan process, which includes big industrial firms in Ukraine in 2006–2020.

1. On average, big industrial firms prefer commercial credit over the bank loans, and while using the latter one, they prefer short-term loans over

long-term ones, which can be seen from their mutual dynamics. Phasing of the bank loans for commercial credit indicates either unwillingness of big industrial firms to take bank loans or their inability to do it.

2. Dynamics of the cost of credit during the period of observation indicates that the sample firms are paying higher than normal rate for their loans, – this conclusion even holds after the outliers are dropped from the sample. In general, such a situation is indicative of excessive risks of the debtors.

3. Calculation of expected cost of equity supports the conclusion that the sample firms have heightened risk. Fluctuations between the profit and loss, or heightened profit volatility result in the excessive risk, which in turn is reflected in the higher than normal cost of both equity and credit.

4. Returns on equity and assets of the sample firms are on average insufficient to cover the interest on even the cheapest loans or to attract investments from the stock market. A significant fraction of observations has negative values (27.88% for the return on assets and 32.12% for the return on equity), which is the result of negative book equity and/or net losses, and indicates chronic profitability problems. The average profitability of the sample firms is low enough to cause negative average or even median values of the returns on equity and assets. Coupled with the previous conclusion, this also attests to low average creditworthiness of big industrial firms in Ukraine.

5. The average cost of credit is mostly lower than the expected cost of capital, calculated using the unmodified beta, and is lower than expected cost of capital, calculated sans beta  $>5$ , and is barely higher than the risk-free rate, which means that, despite credit being the cheaper source comparing to equity, an average industrial firm still cannot afford a loan.

6. Thus, on average, big industrial firms did not have the ability to attract financial resources as either bank loans or investments during 2006-2020. Due to the lack of newer data, it is impossible to say exactly whether the situation has changed, but the possibility of such change is low. Only few industries, namely, mining, agricultural, mechanical engineering, trading and food industries, demonstrate better than the average indicators, as well as individual firms from other industries. This allows to conclude that meso- or microeconomic approach is needed to formulate practical conclusions (for instance, propositions for state policy).

Perspectives of the further research include the study of credit cost formation from the banks' point of view as of the creditors, the long-term effect from war time monetary policy on credit process in Ukraine, etc.

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### **ЦІНА КРЕДИТУ ТА ДОХІДНІСТЬ ВЕЛИКИХ ПРОМИСЛОВИХ ПІДПРИЄМСТВ УКРАЇНИ**

*Кредитування в Україні здебільшого розглядається з точки зору кредиторів і насамперед з огляду на макрорівень за доступності статистики. Це потенційно залишає поза увагою проблеми, які існують на мікрорівні, та призводить до односторонніх висновків щодо, наприклад, виправданості чи невиправданості певного рівня плати за кредит, зважаючи виключно на мінімально необхідну дохідність кредитора. Для заповнення такої прогалини доцільним є аналіз первісної звітності підприємств на базі репрезентативної вибірки, відштовхуючись від відкритих даних, а тому метою дослідження є оцінка можливості залучення кредитування великими промисловими підприємствами України у 2006–2020 рр.*

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У рамках мети було здійснено аналіз структури пасивів підприємств вибірки, очікуваної вартості фінансових ресурсів – як кредитних, так і власного капіталу, – а також зіставлення цієї вартості із показниками рентабельності цих підприємств. Основним результатом є висновок про те, що у середньому великі промислові підприємства в Україні не були достатньо дохідними для отримання кредитів чи інвестицій на ринкових умовах у 2006–2020 рр. і зміна цього стану наразі видається малоімовірною. Винятки становлять окремі підприємства, здебільшого сільськогосподарської, видобувної, машинобудівної, харчової та торговельної галузей. Причиною такого стану є надвисока волатильність дохідності, а у багатьох випадках – збитковість таких підприємств, яка у свою чергу підвищувала їх ризиковість (а отже – і вартість фінансових ресурсів), тобто підприємства вибірки у середньому через свою низьку кредитоспроможність сплачували вартість кредиту, вищу за ринкову.

Дослідження продемонструвало, як правило, слабке пристосування великих промислових підприємств до ринкових умов функціонування, а отже, і їх другорядність при формуванні політики економічного розвитку. Враховуючи тенденцію до викривлення агрегованої статистики у бік великих підприємств, натомість доцільною видається орієнтація на репрезентативні вибірки із малих і середніх підприємств при розрахунку агрегованих показників, зокрема таких, які характеризують типову галузеву структуру капіталу та ціну його елементів, а також ризиків, які в неї включаються, задаючи таким чином більш обґрунтовану шкалу оцінки "дорожнечі" чи "дешевизни" фінансових ресурсів у країні<sup>4</sup>.

**Ключові слова:** банківський кредит, комерційний кредит, очікувана плата за капітал, плата за кредит, рентабельність власного капіталу

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