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PROFITABILITY DETERMINANTS OF COMPANIES IN IT INDUSTRY: CASE OF UKRAINE

Purpose. To identify patterns of profitability of IT enterprises by quantitative evaluation of the relationship of profitability of enterprises with the structure of capital and assets, taking into account the level of business activity and the main economic activity, as well as the formation of appropriate recommendations.

Methodology. The empirical basis of the study was the aggregate performance of enterprises whose main economic activity belongs to Chapter 62 of the NACE "Computer programming, consultancy and related activities" during 2013–2020. Correlation and regression analysis was used to build a multifactor model of linear regression, which describes the dependence of return on assets from the ratio of long-term and short-term liabilities and provisions to liabilities of the balance sheet, the ratio of current assets to balance sheet assets, total assets and main economic activity.

Findings. It has been established that the capital structure of IT companies is unsatisfactory due to the dependence on external sources of funding, including current liabilities, which have a negative impact on return on assets. It has been found that the structure of assets is dominated by current assets, the growth of which has a positive impact on the profitability of enterprises in the industry. This indicates the need to optimize non-current assets, given the level of their involvement in the production process. It is proved that by expanding markets, it is possible to ensure further growth in profitability of enterprises in the industry, as business activity has a positive effect on return on assets. The return on assets varies depending on the main type of economic activity.

Originality. The relationship is identified between the efficiency of IT companies and the structure of their capital and assets, business activity and type of economic activity.

Practical value. The applied value of the study is the ability to predict the profitability of assets of IT companies depending on the structure of sources of funding for their activities and areas of asset placement, business activity and the main type of economic activity. The recommendations can be used to improve the state policy of digital economy in terms of justifying the need to encourage business owners to reinvest profits, to involve enterprises more actively in national digital projects and support the product business model.

Keywords: *IT industry, business activity, capital and assets structure, return on assets, military conflict*

Introduction. The beginning of the military conflict in Ukraine led to a change in the scale and structure of the national economy due to human losses, annexation of territories, loss of control over assets, and a reduction in foreign economic activity with the Russian Federation. During 2014–2021, the IT industry remained one of the few that showed active growth, providing by the end of 2021 USD 6.8 billion of revenues from exports in Ukraine and the transfer of UAH 23.5 billion to state funds [1].

At the same time, it should be noted that the sales volumes and export orientation of the Ukrainian IT industry demonstrated during these years qualitatively distinguish it from similar industries in countries that are in the active phase of hostilities (Afghanistan, Yemen, Ethiopia, Myanmar, Syria).

One of the steps taken by the state to stimulate the development of the industry was the creation of Diia. City, which is a special legal model for IT companies. To encourage investment, enterprises can choose to pay one of the types of corporate tax – corporate income tax traditional for Ukraine with a rate of 18 % or a new type for the domestic economy – tax on withdrawn capital with a rate of 9 % (mainly dividends are the tax base), as well as exemption of dividends from taxation by individuals, provided that they are paid no more than once in 2 years and the opportunity to take advantage of the tax discount when purchasing a share in a startup [2].

According to this model, as an alternative to the existing form of cooperation on the market between IT companies and IT specialists (registration of the latter as individual entrepreneurs on a simplified tax system that allows optimizing up to 30 % of the income of IT specialists), it is proposed to reduce the tax burden on the labor income of IT specialists (personal income tax is reduced from the base rate of 18 to 5 % and the base for calculating a single social contribution to the minimum wage), and the possibility of cooperation with IT specialists on the basis of a gig contract (special civil-law contracts with elements of an employment contract), with the simultaneous introduction of restrictions on cooperation with individual entrepreneurs, depending on the annual income and the chosen type of corporate tax.

In addition, due to the use of elements of English law, guarantees for the protection of intellectual property and fixing the tax regime, it is expected to simplify the conditions for attracting foreign investment, including venture capital.

At the same time, there are restrictions on obtaining the status of a resident of Diia. City, related to the types of economic activity, the number of employees and the amount of average remuneration at the level of 1200 euros, and others.

According to the data of the Association "IT Ukraine" in the first quarter of 2022, revenues from the export of IT services reached USD 2 billion, showing an increase of 28 % compared to the same period last year [3]. At the same time, like companies from other industries, the IT business faced physical destruction of property, loss of customers in the domestic market and outflow of personnel due to mobilization (according to a survey conducted at the end of 2021 by the portal dou.ua, 60 % of IT professionals are men [4]).

Considering the fact that the negative impact of the COVID-19 pandemic on the industry was one of the minimal compared to other areas, and the industry continues to devel-

op under the influence of active hostilities (according to a survey conducted by the IT Ukraine Association in April 2022, 56 % of companies expect business growth by the end of the year), we can assume that the role of IT companies in the domestic economy will grow.

That is why it is important to use the potential of the IT industry as effectively as possible to overcome the economic consequences of the military conflict by generating foreign exchange earnings, replenishing state funds, and creating new high-paying jobs. To do this, it is necessary to increase the profitability of this type of business and its investment attractiveness by improving the financial management system, taking into account the influence of external factors and internal specifics of enterprises.

According to statistics [5–7], during 2018–2020, about 44 % of the volume of products sold in the industry accounted for small enterprises (the average figure for this group of enterprises in Ukraine is 20 %), and the 10 largest companies provide only about 11–12 % of the volume of products sold in the industry (according to the YouControl system). Thus, the development vectors of the industry depend on small and medium-sized businesses, where, in comparison with large businesses, given the scale of activity, the financial management system is insufficiently formed.

Literature review. The issue of defining the determinants of enterprise profitability is very relevant and has been considered in a number of publications, including research devoted to the impact of financial leverage of the country of registration of the main owner and other characteristics on the return on assets of companies in the Visegrad Four (Czech Republic, Slovakia, Poland and Hungary) [8], the dependence of profitability of listed companies in Romania on the structure of sources of financing for their activities [9], as well as the impact of the asset structure on the profitability of listed companies in Iran [10, 11] and Vietnam [12]. Concerning the increase in the profitability of IT industry enterprises, we should mention the works devoted to the factor analysis of the profitability of Romanian IT companies [13], the impact of corporate governance and external factors on the efficiency of IT companies in India [14, 15], as well as social capital on the return on equity and assets of world leaders in the field of Information Technology [16].

At the same time, research by foreign scientists was conducted, as a rule, on the example of companies whose shares were traded on the stock exchange, while the absolute majority of domestic enterprises in the IT industry operate in the form of limited liability companies. Among the works devoted to modeling the impact of the capital structure on the profitability of Ukrainian companies, we can distinguish studies conducted on the example of mining enterprises [17] and transport [18].

Unsolved aspects of the problem. Assessment of the scientific achievements of domestic and foreign scientists indicates that the issue of the capital structure and assets of IT industry enterprises, taking into account the main type of their activity, has not been sufficiently covered and requires further development.

The financial strategy of IT companies, developed taking into account the identified patterns of existing business models in the industry, would make it possible to maximize the financial potential of enterprises in the industry, which remains one of the most promising in the context of a military conflict.

Purpose. The purpose of the article is to identify patterns in the formation of profitability of IT industry enterprises through a quantitative assessment of the relationship of profitability with the structure of capital and assets, taking into account the level of business activity and the main type of economic activity, as well as the formation of appropriate recommendations.

Methods. The empirical basis of the study was aggregated performance indicators of enterprises, the main type of economic activity of which is related to Section 62 of the NACE "Computer programming, consulting and related activities" during 2013–2020. Along with this, depending on the main type of economic activity, enterprises were divided into four groups: "Computer programming" (62.01), "Consulting on informatization issues" (62.02), "Computer equipment management activities" (62.03), and "Other activities in the field of Information Technology and computer systems" (62.09). This approach allows taking into account the specifics of individual types of business.

To assess profitability, the following indicators were calculated based on the generated data: return on equity (the ratio of net profit to equity at the end of the corresponding period), return on assets (the ratio of net profit to assets at the end of the corresponding period), as well as gross margin (the ratio of net profit to the volume of services sold for the corresponding period). Similarly, to assess the structure of assets and liabilities, the shares of equity, long-term and current liabilities in liabilities, the share of current assets in assets, as well as liquidity indicators (the ratio of current assets to current liabilities) and asset turnover were calculated.

Results. According to official statistics, during 2018–2020 78 % of the industry's revenue is generated by computer programming enterprises and is mainly focused on export. The leaders of this sector according to the results of 2020 (according to the Youcontrol system) include subsidiaries of international holdings, in particular EPAM Systems LLC (12.47 % of the market), GlobalLogic Ukraine LLC (6.57 % of the market), INFOPULS Ukraine LLC (2.84 % of the market), which have a clearly defined business model of outsourcing and outstaffing.

Enterprises engaged in consulting on informatization issues form 15 % of revenue in the industry. Among the leaders in this area are companies that offer IT solutions to solve the problems of specific sectors of the economy (in particular, Metinvest Digital LLC, Astound Commerce LLC, SimCorp Ukraine LLC). The share of enterprises engaged in computer equipment management remained at the level of 1 %. The leaders of the direction (DE NOVO LLC, VADREMBUD LLC, Smart Digital Solutions LLC), which are more characterized by a product business model, were focused on the domestic market.

Results of statistical analysis of profitability indicators (Table 1) made it possible to draw the following conclusions:

1) the most noticeable increase in marginality (NPM) in 2020 compared to 2013 was observed for enterprises that provided consulting services on informatization issues (NPM increased by 7.11 percentage points) and software development services (NPM increased by 2.68 percentage points). In the industry as a whole, this indicator more than doubled during the analyzed period – from 2.39 % in 2013 to 6.02 % in 2020;

2) the situation with resource efficiency was similar. Thus, computer programming provided a return on equity (ROE) of 25.75 % (10.99 percentage points, higher than in 2013), a return on assets (ROA) of 14.88 % (7.58 percentage points, higher than in 2013), while the provision of consulting services on informatization issues resumed its profitability after 2015, and computer equipment management became unprofitable at the end of 2020. In the industry as a whole, ROA increased 1.5 times during the analyzed period (from 15.45 % in 2013 to 24.54 % in 2020), and ROE almost 4 times (from 3.20 % in 2013 to 12.67 % in 2020).

Based on the results of the analysis of business activity indicators of industry enterprises (Table 2) the following trends were identified:

1) active expansion of enterprises' activities in all the studied types of activities, as evidenced by a stable growth in the volume of products sold during 2013–2020;

2) the highest turnover of assets and working capital was for enterprises in the field of software development (on average, asset turnover was about 194.14 %, and working capital – 620.95 %) and providing informatization services (on average, asset turnover was about 125.14 %, and working capital – 1712.38 %).

Table 1

Profitability indicators of enterprises in the IT industry (by types of economic activity) in 2013–2020, % [5–7]

Indicator	Type of business	2013	2014	2015	2016	2017	2018	2019	2020
ROE	Programing	14.79	34.02	–0.21	19.95	23.31	23.43	20.52	25.78
ROE	Consulting	109.83	54.09	60.46	20.13	38.42	30.01	23.59	15.23
ROE	IS management	7.75	26.69	8.04	93.10	29.45	–27.72	30.10	–24.13
ROE	Other	70.33	39.41	47.06	52.49	34.09	50.82	42.04	36.25
ROE	**Industry**	**3.20**	**–0.67**	**–0.48**	**9.94**	**10.29**	**11.23**	**9.76**	**12.67**
ROA	Programing	7.30	16.46	–0.19	10.76	13.21	13.65	11.65	14.88
ROA	Consulting	–2.97	–32.42	–14.58	1.44	4.30	5.75	5.22	6.87
ROA	IS management	3.41	8.94	3.91	28.71	3.92	–2.04	3.08	–3.09
ROA	Other	29.19	13.91	22.05	22.47	8.15	11.53	10.39	11.48
ROA	**Industry**	**15.45**	**–6.91**	**–0.58**	**22.44**	**25.09**	**24.98**	**22.16**	**24.54**
NPM	Programing	3.79	7.81	–0.73	6.26	5.70	5.65	4.69	6.47
NPM	Consulting	–3.52	–38.83	–14.27	1.09	3.39	3.87	3.96	3.59
NPM	IS management	2.00	5.32	5.89	14.97	9.20	–4.15	6.10	–6.74
NPM	Other	15.07	9.40	10.01	13.45	6.60	11.60	7.72	7.26
NPM	**Industry**	**2.39**	**–0.42**	**–1.45**	**6.06**	**5.42**	**5.55**	**4.80**	**6.02**

Notes: ROE is the ratio of net profit to equity, ROA is the ratio of net profit to assets, and NPM is the ratio of net profit to revenue.

Programming – computer programming, Consulting – consulting on informatization issues, IS management – computer equipment management activities, Other – other activities in the field of information technologies and computer systems, Industry – IT-industry as a whole

Table 2

Indicators of business activity of enterprises in the IT industry (by types of economic activity) in 2013–2020, % [5–7]

Indicator	Type of business	2013	2014	2015	2016	2017	2018	2019	2020
Turnover	Programming	192.62	210.89	25.77	171.76	231.93	241.54	248.55	230.06
Turnover	Consulting	84.25	83.49	102.23	132.40	126.63	148.71	132.02	191.36
Turnover	IS management	170.07	168.15	66.30	191.75	42.56	49.25	50.60	45.86
Turnover	Other	193.64	147.99	220.15	167.09	123.53	99.46	134.49	158.18
Turnover	**Industry**	**134.12**	**160.66**	**33.13**	**164.12**	**189.99**	**202.27**	**203.50**	**210.67**
WCT	Programming	787.36	695.48	484.94	413.15	559.99	593.29	782.59	650.77
WCT	Consulting	305.82	–156.19	–548.11	1186.53	1001.19	1239.04	9702.76	968.00
WCT	IS management	861.37	3390.51	755.26	906.17	–110.37	–85.30	–84.39	–76.28
WCT	Other	570.40	1258.78	770.84	626.70	1408.02	1840.32	2039.82	983.72
WCT	**Industry**	**501.39**	**-33,841.09**	**725.17**	**472.71**	**653.98**	**722.96**	**1077.03**	**758.01**
SalesGrowth	Programming	62.89	65.67	59.35	39.78	22.48	28.67	21.72	17.42
SalesGrowth	Consulting	–9.31	–32.36	35.04	31.06	31.62	20.24	14.32	18.13
SalesGrowth	IS management	–28.01	72.86	44.22	38.41	36.44	145.81	40.71	-12.01
SalesGrowth	Other	18.00	19.73	115.51	–18.57	30.83	–30.31	83.13	33.12
SalesGrowth	**Industry**	**24.31**	**28.03**	**59.97**	**31.40**	**24.54**	**23.19**	**23.46**	**18.28**

Notes: Turnover – the ratio of revenue to assets for the corresponding period, WCT – the ratio of revenue to working capital (current assets less current liabilities) for the corresponding period, SalesGrowth –increase in sales volume.

Programming – computer programming, Consulting – consulting on informatization issues, IS management – computer equipment management activities, Other – other activities in the field of information technologies and computer systems, Industry – IT-industry as a whole

Based on the assessment of the asset and capital structure (Table 3) the following was detected:

1) a noticeable increase in the financial autonomy of enterprises in the field of software development and provision of informatization services (shares of equity in liabilities increased to 57.75 and 45.11 % by the end of 2020, respectively), while strengthening the financial dependence of enterprises that manage computer equipment and other activities (shares of equity in liabilities decreased to 12.8 and 31.67 % by the end of 2020, respectively). At the same time, the vast majority of industry enterprises (with the exception of software development) were financed from external sources, mainly short-term liabilities;

2) maintaining a large share of current assets in the total amount of assets (up to 80 %), represented mainly by accounts receivable and Cash (up to 60 and 30 % of all current assets, respectively) and a high level of liquidity (during 2018–2020, the ratio of current assets to current liabilities of enterprises

(with the exception of those that manage computer equipment), which exceeded the recommended values. Thus, during 2013–2020, the industry's enterprises demonstrated a high level of marginality along with a significant increase in the scale of activity, as evidenced by business activity indicators. This, in turn, made it possible to increase the profitability of enterprises' resources as a whole, taking into account the specifics of the main type of activity.

The primary step for developing an economic and mathematical model of the relationship between the profitability of enterprises with the structure of capital, assets and business activity is to study the close relationship between the corresponding financial coefficients (Table 4).

The results of the correlation analysis give grounds to assert that there is a linear interdependence between:

- return on assets and share of equity in liabilities (R = = 0.6835) and asset turnover (R = 0.6087) and liquidity (R = = 0.5484);
- return on equity and share of long-term liabilities in liabilities (R = 0.5035) and the share of current assets in the total amount of assets (R = 0.6192);
- net margin and share of equity in liabilities (R = 0.6766) and the share of current assets in the total amount of assets (R = 0.6192).

To confirm the assumption that there is a relationship between the profitability of IT enterprises with the structure of their capital and assets, and business activity, taking into account the type of economic activity, a linear regression model was used. At the same time, the return on assets was determined as a dependent value for constructing an economic and mathematical model (*ROA*), which, unlike other indicators of profitability, makes it possible to more fully assess the effectiveness of resources invested in the enterprise and is more often used to characterize profitability.

The ratio of long-term liabilities and collateral to the balance sheet liability was used as factors (*LTD*), the ratio of short-term liabilities and collateral to the balance sheet liability (*STD)*, the ratio of current assets to the balance sheet asset (*CATA),* turnover of total assets *(Turnover*), as well as the main type of economic activity in accordance with the NACE (*Business*).

Based on this, the economic and mathematical model has the following form

$$ROA = \beta_0 + \beta_1 \cdot LTD + \beta_2 \cdot STD + \beta_3 \cdot CATA + \\ + \beta_4 \cdot Turnover + \beta_5 \cdot Business + \varepsilon.$$

To estimate the level of multicollinearity, we constructed 4 auxiliary multivariate regressions reflecting the dependence

Table 3

Indicators of financial stability and liquidity of IT industry enterprises (by type of economic activity) in 2013–2020, % [5–7]

Indicator	Type of business	2013	2014	2015	2016	2017	2018	2019	2020
EQ	Programming	49.37	48.39	89.81	53.93	56.70	58.24	56.78	57.72
EQ	Consulting	–2.70	–59.93	–24.12	7.16	11.19	19.17	22.14	45.11
EQ	IS management	44.01	33.51	48.57	30.84	13.30	7.37	10.25	12.81
EQ	Other	41.50	35.30	46.85	42.81	23.90	22.69	24.70	31.67
EQ	**Industry**	**20.72**	**9.70**	**83.37**	**44.29**	**41.01**	**44.96**	**44.05**	**51.64**
LTD	Programming	8.49	6.33	0.76	8.56	8.42	7.54	6.32	5.27
LTD	Consulting	50.50	32.92	31.54	25.99	19.63	14.53	3.93	7.33
LTD	IS management	1.76	9.63	0.15	0.76	10.16	9.61	2.01	2.34
LTD	Other	13.11	6.10	5.88	6.40	4.32	5.70	3.85	2.87
LTD	**Industry**	**31.47**	**15.49**	**2.36**	**11.63**	**10.64**	**8.92**	**5.38**	**5.26**
STD	Programming	42.10	45.28	9.42	37.51	34.88	34.22	36.90	37.02
STD	Consulting	52.19	127.01	92.58	66.85	69.18	66.30	73.93	47.56
STD	IS management	52.81	56.86	51.28	68.40	76.54	83.02	87.74	84.85
STD	Other	45.39	58.58	47.27	50.79	71.78	71.61	71.44	65.46
STD	**Industry**	**47.79**	**74.81**	**14.27**	**44.08**	**48.35**	**46.11**	**50.57**	**43.10**
CATA	Programming	66.56	75.60	14.74	79.09	76.30	74.93	68.66	72.37
CATA	Consulting	79.74	73.56	73.93	78.01	81.83	78.30	75.29	67.33
CATA	IS management	72.55	61.82	60.06	89.56	37.98	25.29	27.79	24.73
CATA	Other	79.34	70.34	75.83	77.45	80.55	77.01	78.03	81.54
CATA	**Industry**	**74.54**	**74.33**	**18.83**	**78.80**	**77.40**	**74.09**	**69.47**	**70.89**
Liquidity	Programming	158.11	166.96	156.39	210.82	218.74	218.97	186.07	195.50
Liquidity	Consulting	152.79	57.91	79.85	116.69	118.28	118.10	101.84	141.57
Liquidity	IS management	137.39	108.72	117.12	130.94	49.62	30.46	31.67	29.15
Liquidity	Other	174.79	120.07	160.42	152.49	112.22	107.55	109.23	124.56
Liquidity	**Industry**	**155.97**	**99.37**	**132.02**	**178.76**	**160.09**	**160.67**	**137.36**	**164.49**

Notes: EQ – ratio of equity to balance sheet liability; LTD – the ratio of long-term liabilities and collateral to the balance sheet liability; STD – the ratio of short-term liabilities and collateral to the balance sheet liability; CATA – the ratio of current assets to the balance sheet asset; Liquidity – the ratio of current assets to current liabilities.

Programming – computer programming, Consulting – consulting on informatization issues, IS management – computer equipment management activities, Other – other activities in the field of information technologies and computer systems, Industry – IT-industry as a whole

Table 4

Correlation matrix of indicators of profitability, capital and asset structure, and business activity

	ROA	ROE	NPM	EQ	LTD	STD	Turnover	WCT	CATA	Liquidity
ROA	1	–	–	–	–	–	–	–	–	–
ROE	0.1959	1	–	–	–	–	–	–	–	–
NPM	0.9234	0.0897	1	–	–	–	–	–	–	–
EQ	0.6835	–0.2963	0.6766	1	–	–	–	–	–	–
LTD	–0.5313	0.5035	–0.5662	–0.6520	1	–	–	–	–	–
STD	–0.5902	0.1229	–0.5647	–0.9275	0.3215	1	–	–	–	–
Turnover	0.6087	0.1779	0.3892	0.4729	–0.1781	–0.5033	1	–	–	–
WCT	0.1277	–0.0255	0.1842	0.0665	–0.1969	0.0145	0.0987	1	–	–
CATA	0.3270	0.6192	0.1872	–0.0595	0.2484	–0.0491	0.6473	0.2157	1	–
Liquidity	0.5484	0.1843	0.3964	0.6944	–0.0830	–0.8265	0.7838	–0.0042	0.5112	1

of each factor on the others in the main model, and determined the coefficient of determination for each model (R^2) and calculated the value of the variance-inflationary factor (*VIF*).

The calculation results shown in Table 5 indicate that there is no multicollinearity between the factors in the main model, since the values of the variance-inflationary factor do not exceed the critically established value (*VIF* = 10).

To achieve this goal the following hypotheses were put forward:

Hypothesis 1 (H_1). Changes in the share of long-term and current liabilities and collateral in the total amount of financial resources affect changes in the return on assets of IT industry enterprises (H_1: $\beta_1 \neq 0$ or $\beta_2 \neq 0$). It is expected that, due to the high cost of borrowed capital, including due to military and political risks, there will be a statistically significant linear feedback loop between profitability and the corresponding financial ratios (all other things being equal).

Hypothesis 2 (H_2). Asset structure affects changes in the return on assets of IT industry enterprises (H_2: $\beta_3 \neq 0$). It is expected that due to the specifics of the IT business, which does not involve significant capital investments in real estate and fixed assets, there will be a direct linear relationship between the share of current assets in the total amount of assets and profitability (all other things being equal).

Hypothesis 3 (H_3). Changes in asset turnover affect changes in the return on assets of IT industry enterprises (H_3: $\beta_4 \neq 0$). Based on the capital turnover rate, there will be a statistically significant direct linear relationship between asset turnover and return on assets (all other things being equal).

Hypothesis 4 (H_4). The main type of economic activity affects changes in the return on assets of IT industry enterprises (H_4: $\beta_5 \neq 0$).

The weighted least square method was used to construct the model, which allows us to take into account the heteroskedasticity detected in the data.

Table 5

Value R^2 and *VIF* for auxiliary multivariate regressions

Dependent variable	Factor variables	R^2	*VIF*
LTD	STD, CATA, Turnover, Business	0.3521	1.5434
STD	LTD, CATA, Turnover, Business	0.5078	2.0317
CATA	LTD, STD, Turnover, Business	0.6787	3.1124
Turnover	LTD, STD, CATA, Business	0.6564	2.9104

Results of the regression analysis performed (Table 6) provide an opportunity to draw a conclusion about the significance of the model parameters and its adequacy. In particular, the values of the coefficient of determination (Adjusted R^2 = = 0.820669), indicate that the change in return on assets by 82 % is determined by changes in the factors taken into account in the model.

At the same time, Hypothesis 1 was partially confirmed, according to which an increase in current liabilities and collateral by 1 percentage point causes a decrease in the return on assets by an average of 0.34 percentage points, all other things being equal, as well as Hypothesis 2, according to which an increase in the share of current assets in the total amount of assets causes an increase in the return on assets by an average of 0.22 percentage points, all other things being equal.

In addition, Hypothesis 3 was confirmed, according to which an increase in the asset turnover ratio of enterprises by 1 percentage point leads to an increase in the return on assets by an average of 0.05 percentage points, all other things being equal. At the same time, the profitability of enterprises engaged in computer equipment management (compared to enterprises in the field of computer programming) is on average 0.13 percentage points higher (Hypothesis 4).

Conclusions. Based on official statistics, the IT industry proved to be resistant to military conflict and continued its growth during 2014–2020, and given the trends of its development after February 24, 2022, it can strengthen its role in the economy and become one of the drivers of economic growth in the post-conflict recovery.

The use of economic and mathematical modeling tools to quantify the impact of the capital structure and assets, as well as business activity and the main type of economic activity on the profitability of assets of IT industry enterprises made it possible to form the following conclusions.

First, the capital structure of enterprises in industry is unsatisfactory due to the dependence of external sources of financing, in particular current liabilities (depending on the type of economic activity, their share ranges from 43 to 88 %). At the same time, it is established that the use of short-term credit resources to finance the activities of enterprises in industry has a negative effect in comparison with their own sources of financing (in contrast to existing developments, a quantitative assessment of this impact was carried out).

In view of this, it is necessary to transform the time structure of obligations (towards long-term ones), as well as focus on internal sources of financing. Considering that the vast majority of enterprises are created in the form of limited liability companies and the lack of a developed stock market and the issue of shares is difficult, especially under martial law, it is

Table 6

Results of regression analysis

	Coefficient	Std. Error	t-ratio	p-value	
const	–0.00411007	0.0355744	–0.1155	0.9090	
LTD	–0.212547	0.127642	–1.665	0.1089	
STD	–0.342559	0.0629361	–5.443	<0.0001	***
Turnover	0.0519831	0.0243582	2.134	0.0433	**
Current Total assets	0.220101	0.0963376	2.285	0.0315	**
Business: consultancy	0.0433588	0.0370709	1.170	0.2536	
Business: management	0.151804	0.0420637	3.609	0.0014	***
Business: Other	0.133430	0.0271485	4.915	<0.0001	***
Sum squared resid	28.98151	S.E. of regression			1.098892
R-squared	0.861163	Adjusted R-squared			0.820669
F(7, 24)	21.26642	P-value(F)			7.66e-09
Log-likelihood	−43.82079	Akaike criterion			103.6416
Schwarz criterion	115.3675	Hannan-Quinn			107.5284

Notes:
1. The weighted least squares method is used
2. Basic version of the model: enterprises with the main type of economic activity "Computer programming"

important to create conditions for reinvesting profits in business development.

Some of these ideas are already provided for residents of Diia. Therefore, it is advisable to expand the main activities allowed by the model to include the entire section 62 of the NACE "Computer programming, consulting and related activities" and simplify the requirements to the number of employees and the average salary not only under martial law, but also after it.

Second, the asset structure is dominated by current assets, the growth of the share of which has a positive impact on the profitability of enterprises in the industry. The actions of the company's management should be aimed at optimizing non-current assets by analyzing the involvement of all types of property to provide services to consumers, as well as using cloud solutions for doing business (office software, database hosting, file storage, etc.), which allow you to abandon the maintenance of high-cost equipment and scale business faster.

Third, it is possible to ensure further growth in the profitability of assets of enterprises in the industry by expanding sales markets, mainly abroad (it was found that business activity has a positive impact on the return on assets). In addition to increasing the share of export revenue, it is important for industry enterprises to participate in programs of digitalization of public services, which has shown its importance under martial law and can be implemented to attract funds from international partners, as well as to ensure national security in the digital sphere.

Fourth, there is a significant difference between the return on assets of enterprises in the industry, depending on the main type of economic activity. In view of this, the state should create additional conditions for domestic companies to launch their own products (support for product business models), as opposed to the dominant form of attracting enterprises providing computer programming services as contractors within the framework of outsourcing and outstaffing business models.

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Детермінанти прибутковості підприємств ІТ-галузі: приклад України

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Мета. Виявлення закономірностей формування прибутковості підприємств ІТ-галузі через кількісну оцінку взаємозв'язку прибутковості підприємств зі структурою капіталу та активів, ураховуючи рівень ділової активності та основний вид економічної діяльності, а також формування відповідних рекомендацій.

Методика. Емпіричною базою дослідження стали агреговані показники діяльності підприємств, основний вид економічної діяльності яких належить до розділу 62 КВЕД «Комп'ютерне програмування, консультування та пов'язана з ними діяльність», протягом 2013–2020 рр. З метою досягнення поставленої задачі за допомогою інструментарію кореляційно-регресійного аналізу побудована багатофакторна модель лінійної регресії, що описує залежність рентабельності активів від відношення довгострокових і короткострокових зобов'язань і забезпечень до пасиву балансу, відношення оборотних активів до активу балансу, оборотності загальних активів, а також основного виду економічної діяльності.

Результати. Встановлено, що структура капіталу підприємств ІТ-галузі України є незадовільною через залежність від зовнішніх джерел фінансування, зокрема поточних зобов'язань, що мають негативний вплив на рентабельність активів. Виявлено, що у структурі активів переважають оборотні активи, зростання частки яких має позитивний вплив на прибутковість підприємств галузі. Це свідчить про необхідність оптимізації необоротних активів, з огляду на рівень їх залученості до виробничого процесу. Доведено, що за рахунок розширення ринків збуту можна забезпечити подальше зростання прибутковості підприємств галузі, оскільки ділова активність позитивно впливає на рентабельність активів. Встановлено, що прибутковість активів підприємств ІТ-галузі різниться залежно від основного виду економічної діяльності.

Наукова новизна. Полягає у виявленні взаємозв'язку між ефективністю діяльності підприємств ІТ-галузі та структурою їх капіталу та активів, діловою активністю й видом економічної діяльності.

Практична значимість. Прикладне значення дослідження полягає в можливості спрогнозувати прибутковість активів підприємств ІТ-галузі залежно від структури джерел фінансування їх діяльності й напрямів розміщення активів, ділової активності та основного виду економічної діяльності. Сформовані рекомендації можуть бути використані при удосконаленні державної політики розвитку цифрової економіки в частині обґрунтування необхідності стимулювання власників підприємств до реінвестування прибутку, активнішого залучення підприємств до національних цифрових проектів і підтримки продуктової бізнес-моделі.

Ключові слова: *ІТ-галузь, ділова активність, структура капіталу та активів, рентабельність активів, воєнний конфлікт*

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